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AUTUMN 2022
VOLUME 74 NO.1

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MANAGING EDITOR'S MESSAGE

WELCOME TO THE AUTUMN 22 EDITION OF *WINGS*. In this edition we complete our series on the histories of both the Royal Australian Air Force and the Australian airline, Qantas following their centenary anniversaries. I believe both series are a concise but quite comprehensive record of the evolution of those two great enterprises, and I would encourage all our readers to retain the magazines for future reference.

I would also like to express my deep appreciation and gratitude to the two authors who committed the time and effort to research and bring each series to life, Michael Nelmes, our resident historian, and recently promoted B-787 Captain Don Hill. Mike also extracts the material for our Skunk Works series that will conclude shortly. We have some exciting content planned for future editions that will then take up Mike's time.

A big thankyou also to our loyal advertisers and sponsors, the past couple of years have tested all our patience and we hope we can return your support through the growing appeal and reach of the magazine.

Ron Haack,
Wings *managing editor*

WINGS EDITORIAL DEADLINES 2022

Wings welcomes editorial submissions and letters to the editor. Please note the following deadlines for submissions.

EDITION	DEADLINE
Winter (June)	8 April 2022
Spring (September)	8 July 2022
Summer (December)	7 October 2022

Please send submissions and letters to: editor@raafapublications.org.au, including your name and details. Submissions may be edited for length and clarity. We cannot guarantee all material will be published.

AIR FORCE ASSOCIATION

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MESSAGE FROM AIR COMMAND

AS WE REACH THE END OF OUR CENTENARY YEAR, the theme of Then. Now. Always captures our enduring connection across the generations, a connection that has always been at the heart of the Air Force Association. We commend the Air Force Association, its editors and sponsors for once again producing an excellent product.

When appointed Air Commander Australia in July 2019, we could not have predicted the events that were to follow. We started out with the devastating bushfires across the summer of 19/20 with Air Force contributing to the national response both in the air and on the ground. We recall the vivid imagery of a blood-orange sky taken from the cockpit of one of our C-27Js as the crew attempted an approach into Mallacoota.

The bushfires had been barely extinguished when we then hit the leading edge of the COVID-19 pandemic, with further contributions to the national response to assist state and territory health and control measures. We had a brief – and fortunate – interlude in March 2021, which enabled Air Force to celebrate its centenary in style encompassing a full Colours Parade and Centenary Flypast in Canberra before changing gears again in August 2021 to take a leading role in the evacuation of civilians from Afghanistan.

In parallel, we have farewelled the F/A-18 Classic Hornet and introduced the F-35A. We continued operations across the globe, from Alaska to Antarctica. We have established Space Command as Air Force ventures into that distant domain. We have assisted regional neighbours through natural disasters. And consistently throughout the turmoil, it has been our people – Air Force aviators – who have risen to the challenge with professionalism, humility and good humour. It is the essence of our motto, *Per Ardua Ad Astra*.

We commend *Wings* magazine for continuing to foster the stories of our Air Force. We hope you enjoy this edition.

Joe 'Vinny' Iervasi, AM, CSC, Air Vice-Marshal, Air Commander Australia

Raylee 'Pixie' Scott, AM, Warrant Officer, Air Command Warrant Officer

ON THE COVER
A No.36 Squadron C-17A Globemaster at the Wilkins Aerodrome in Antarctica. Photo: CPL David Said.

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AIR FORCE ASSOCIATION

PRESIDENT'S DESK

THE LATE AIR MARSHAL (RET'D) SELWYN DAVID EVANS AC, DSO, AFC had many beliefs. One that resonates with me is: "We are here on Earth to do good unto others. What the others are here for, I have no idea". During its century-long existence, the Air Force Association has demonstrated the ethos of assisting veterans and their families. Indeed, it is committed by its Values to work for the benefit of others through its members giving something of themselves to support fellow veterans.

The Association works with Air Force as its number-one partner. During the past few years, there has been considerable mutual support with commemorations, Air Force Association Trophy unit awards, public relations, Australian Air Force Cadets and air shows. In fact, the Association has been described as "a creature of Air Force". Shortly, a Memorandum of Understanding that defines the relationship between Air Force and the Air Force Association will be ratified.

One of the biggest challenges facing the Association is ensuring serving and former serving veterans and families in need are aware of the Association's benevolent role. It's not without limitation, but if the support required is beyond the Association's capacity, it will identify organisations that can assist. The Association's existence within the veteran community is relatively unknown despite the use of social media, print newsletters, *Wings* magazine, and the Association's National and State/Division websites. Consequently, a new Association national directorship was created to improve our communication with the veteran and wider communities. Wing Commander Deanna 'Dee' Knott, a serving Public Relations Officer, has been appointed Director of Communications on the Air Force Association Ltd Board of Directors. Dee has extensive public relations, communication, marketing, advocacy and community engagement experience in both the private and public sectors. She will be assisted by Jacqui Rudd, a former RAAF 'brat', who is our national website webmaster and a communication specialist.

Many veterans are keen to remain connected with former work colleagues and their families, especially those with whom they have developed close relationships. Although social media is a great conduit for that purpose, the Association believes the development of an Air Force Association Alumni network with membership extending to all former and serving RAAF personnel will further help maintain connections, improve wellbeing, increase awareness of the Association, and provide a range of alumni benefits. A draft Statement of Requirements has been developed for consideration by the National Board.

Also under consideration with the alumni network project is the development of a comprehensive Association-wide communications system that will include a personnel database to facilitate direct communication to members and other interested parties.

The alumni network and communications system will be major projects for 2022. Hopefully, the Association can progress those and other projects/programs this year without hinderance from COVID-19.

Keep safe and well.

Carl Schiller
National President

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To join the Association, visit raafa.org and follow the JOIN US link.

For assistance, contact the Association by phone or email. See page 15 for contact details.

EDITED BY Bob Treloar

Hercules records Tonga damage

RAAF No.37 Squadron pilot flies along the Tongan coast to assess damage after the eruption. Photo: SGT David Gibbs

A SPECIALLY MODIFIED RAAF C-130J Hercules transport aircraft fitted with a variety of systems as part of a prototype trial proved its value over Tonga following the underwater volcanic eruption on 15 January. The aircraft, operated by No.37 Squadron, is one of six to be fitted with a Ka-Band satellite communications antenna, which provides crew and passengers with high-speed global data connectivity and an AN/AAQ-28(V) Litening pod that records video during day and night light conditions.

The C-130J and its crew flew a 12-hour, 3,500km mission on January 18 to record the damage caused by the Hunga Tonga-Hunga Ha'apai underwater volcano. The Hercules remained on station for two hours recording video of the damage to Tongan communities and infrastructure and livestreamed that imagery to Headquarters Joint Operations Command in Australia.

The crew then flew 2,000km to land in Auckland, before conducting another survey flight on 20 January.

Source: Department of Defence

BLACK HAWKS TO REPLACE TAIPANS

THE AUSTRALIAN GOVERNMENT has negotiated to buy up to 40 Sikorsky UH-60M Black Hawk battlefield mobility helicopters to replace the troubled fleets of Army and Navy NH Industries MRH 90 Taipan helicopters.

The performance of the MRH 90 Taipan has been an ongoing concern and expense for Defence and the fleet has not met contracted availability or cost of ownership requirements.

The Taipan was introduced from 2007 to replace Army's S-70A-9 Black Hawks, which were finally retired late last year. The Taipan is operated in the battlefield mobility role by Army's 5th Aviation Regiment at Townsville and in a Special Operations support role by 6 AVN at Holsworthy.

Source: Australian Defence Magazine

RIGHT NRH-90 Taipan.

REPLACEMENT FOR LOST GROWLER

A RAAF BOEING EA-18G Growler electronic attack aircraft that caught fire and suffered serious damage during an aborted take-off in 2018 is to be replaced. The No.6 Squadron Growler was one of four deployed from RAAF Base Amberley to Nellis Air Force Base, Nevada in January 2018. Both crew members escaped the fire without injury. The new Growler will cost US$125 million and bring the RAAF's fleet back to 12 aircraft.

Source: Janes

ABOVE A 6SQN RAAF EA-18G.

USAF considers purchase of WEDGETAIL

THE US AIR FORCE (USAF) is considering purchase of five E-7 Wedgetail Airborne early-warning aircraft to replace its ageing E-3 Sentry aircraft. Boeing first developed the Wedgetail from the B-737 NG airliner airframe, specifically for Australia in the 1990s and it is now also in service in the UK, South Korea and Turkey.

USAF Chief of Staff, General Charles Q Brown said any purchase of the E-7 would give the US a path to a new space-based radar capability, which he suggested could be less vulnerable than an aviation system based on a commercial airliner.

ABOVE US Air Force E-3 Sentry Airborne Warning and Control System aircraft.

Army launches aviation command

Army soldiers with ARH Tiger helicopters from the 1st Aviation Regiment during an exercise at Townsville Field Training Area. Photo: LT Jonathon Smyth.

THE AUSTRALIAN ARMY has launched a new command organisation to optimise its aviation assets. The Army Aviation Command will include: the assets of the Australian Army Aviation Corps; the 16th Aviation Brigade; the Army Aviation Training Centre; and the assets of the Australian Army Aviation Corps. The unit will be commanded by Major General Stephen Jobson.

Chief of Army, Lieutenant General Rick Burr, said the new command will enhance the service's resilience and adaptability, and ensure its training systems are agile and contemporary.

Source: Janes

PACIFIC ISLAND FLIGHT TRAINING

LORD HOWE ISLAND is being used for flight training to deliver humanitarian assistance and disaster response into remote locations. The island's short, low-strength runway provides challenges typical of island destinations throughout the Pacific.

Last year, a No.35 Squadron's C-27J Spartan aircraft completed its first landing and take-off at Lord Howe. The squadron will return more frequently to ensure its crews are prepared and ready for operations to remote and austere environments, particularly during high-risk weather conditions.

Lord Howe Island was initially serviced by flying boats until Army engineers from the First Field Regiment built an emergency airstrip in 1974. Nos 36 and 37 Squadrons have conducted numerous operations in support of the Lord Howe Island community over the years, including aero-medical evacuations and logistic support following the grounding of HMS *Nottingham* in 2002.

Source: Air Force Newspaper

ABOVE The fringes of Lord Howe Island from the back of an Air Force C-27J Spartan aircraft. Photo: FLGOFF Lily Lancaster.

US aircraft ROTATION

LAST YEAR THE US and Australia agreed on a rotational deployment of US aircraft to Australia, together with the sustainment and maintenance programs to support that commitment. By 2035, there will be more than 300 F-35 aircraft active in the Indo-Pacific, operating from land bases, aircraft carriers and from amphibious ships.

Source: SkyNews.com.au

BELOW F-35 Lightning II public debut.

Final F-35A Lightning II arrivals for 2021

The RAAF's newest F-35A Lightning II aircraft taxi to the lines at RAAF Base Williamtown. Photo: CPL Craig Barrett.

THREE NEW LOCKHEED MARTIN F-35A Lightning II Joint Strike Fighters were delivered to the RAAF in November, bringing the in-country total to 44.

After completing a journey from Eglin Air Force Base in the United States as part of Exercise Lightning Ferry 21-4, the aircraft arrived at RAAF Base Williamtown and were accepted by No.77 Squadron

No.77 Squadron Wing Commander Tim Ireland said that, before the ferry flight, the aircraft took part in an operational test activity, known as Exercise Lightning Spear 21, at Eglin AFB in early November to verify mission specific weapons integration. "The consecutive activities of Lightning Spear and Lightning Ferry demonstrate No.77 Squadron's agility and maturity operating our latest F-35A capability".

Source: Air & Sea Lift

Double flight test FOR LOYAL WINGMAN

BOEING AUSTRALIA EXPANDED the flight-test program of the Boeing Airpower Teaming System (ATS), with two of its Loyal Wingman prototype combat drones successfully completing separate flight missions at the Woomera Range Complex last November.

For the first time, the landing gear on the Loyal Wingman aircraft was raised and a second aircraft successfully completed its first flight mission. The flight tests made it possible to evaluate the main parameters of aircraft controllability, its navigation system, communication with the ground, and several other functions.

Test flight performance data will be used to refine the digital twin of the ATS, with the view to accelerate the aircraft's development. The digital twin models the system's lifecycle, from design and development to production and sustainment, and contributes to manufacture speed and first-time quality.

Air Vice-Marshal Cath Roberts, RAAF Head of Air Force Capability, said Loyal Wingman offered significant capability agility for Air Force, particularly with features such as the reconfigurable nose. "We're heavily engaged in the payload development and the element of surprise that it gives us in the battlespace. You never really know what's in the nose."

The jet-powered combat drone is designed to work jointly with other RAAF combat aircraft in both defence and surveillance modes. The drone has flight characteristics comparable to a conventional fighter and is equipped with artificial intelligence, for a standard set of surveillance, and reconnaissance missions.

Source: Inceptive Mind

ABOVE Loyal Wingman prototype aircraft at Woomera, SA. Photo: FLTLT Ricky Treloar.

RAAF Base Tindal welcomes F-35As

THE FIRST F-35A Lightning II Joint Strike Fighter aircraft arrived at RAAF Base Tindal, 330km south of Darwin in December to replace No.75 Squadron F/A-18A/B Classic Hornets.

Lockheed Martin and the Australian Defence Force are working in close cooperation with F135 engine manufacturer Pratt & Whitney to ensure that ongoing long-term engine maintenance will be provided at Tindal.

RAAF Base Tindal is a strategic military establishment for national defence and a hub for regional engagement. Tindal-based F-35As will assure the ADF's ability to deter or defeat threats to Australia's interests and strengthen national ability to project potent air power into Australia's immediate region.

Source: Air Force Technology

BELOW No.75 Squadron F-35A Lightning II aircraft A35-029 arrives at RAAF Base Tindal. Photo: SGT Pete Gammie.

First female SADFO for Townsville

WING COMMANDER NAOMI GILL (picture left) has been appointed as the first female Senior Australian Defence Officer (SADFO) at RAAF Base Townsville. She is the Commanding Officer of No.27 Squadron, the unit in which her mother once served.

Source: Townsville Bulletin

US BOMBERS IN TOP END EXERCISE

TWO UNITED STATES AIR FORCE (USAF) B-1B Lancer aircraft travelled more than 6,000km from Diego Garcia in the Indian Ocean for emergency diversion familiarisation training at RAAF Base Darwin last November. The B-1Bs rendezvoused over the Timor Sea with two RAAF KC-30A Multi-Role Tanker Transports from No.33 Squadron to refuel.

The visit coincided with the 10-year anniversary of the first US Force Posture Initiatives in Australia, including the Marine Rotational Force Darwin and Enhanced Air Cooperation, and 70 years of the ANZUS Treaty.

Commonly called the 'Bone', the B-1B is the backbone of America's long-range bomber force and can carry a conventional payload of up to 34 tonnes of guided and unguided ordnance.

Source: Department of Defence

USAF B-1B Lancers take on fuel from a RAAF KC-30 Tanker.

BELOW RAAF aircraft join USAF and Japan Air Self-Defense Force aircraft on the taxiway at Andersen Air Force Base in Guam during Exercise Cope North 2022. Photo: USAF.

RAAF in GUAM FOR COPE NORTH

THE RAAF DEPLOYED AIRCRAFT AND PERSONNEL to Guam and the Commonwealth of Northern Mariana Islands to conduct Exercise Cope North 2022 with the United States Air Force (USAF) and the Japan Air Self-Defense Force (Koku-Jieitai) in February.

The trilateral exercise focused on increased interoperability between the RAAF, USAF and Koku-Jieitai through combined tactics, techniques and procedures for large-force employment, humanitarian assistance and disaster relief operations.

The RAAF deployed E-7A Wedgetail, C-27J Spartan, KC-30A multi-role tanker transport aircraft and F-35A Lightning II fighters, alongside a contingency response squadron focused on humanitarian assistance training.

Army drone FLEET CLEARS DASA AUDIT

A Shadow UAS ready for launch at the Townsville Field Training Area. Photo: Corporal Nicole Dorrett.

THE AUSTRALIAN ARMY'S Unmanned Aerial Systems (UAS) operations have passed a Defence Aviation Safety Authority (DASA) audit.

"Army operate over a thousand UAS, varying from ones the size of a mobile phone to ones the size of a small car," said DASA's SQNLDR Malcolm Walker. "Such a large and diverse fleet presents a number of challenges, such as training, and, to use a pilot term, airmanship.

"It is very difficult to teach a soldier who flies a mobile phone-sized UAS to think like the pilot of a helicopter. Clearly, we don't need the soldier to have all the training that the pilot has, but there are aspects of that we do want them to have. The soldier's airmanship needs to be scalable based upon the size and complexity of the UAS being operated."

Another challenge for Army's UAS capability is working closely with other militaries, such as the United States Marine Corps that have even larger fleets.

While the DASA audit found areas for improvement, Army's UAS were assessed as exemplar operators.

Source: Air & Sea Lift

US Silver Star TO AUSTRALIAN VIETNAM VETERAN

ABOVE FLGOFF Cottrell with his Cessna O-1 in 1968. Photo: courtesy Mac Cottrell.

IN DECEMBER, United States Defense Attaché COL Scott Weston presented prestigious US Silver Star medals to GPCAPT Macaulay (Mac) Cottrell (RAAF Ret'd) and the family of the late WOFF2 Kevin Wheatley. Both medals were awarded for exceptional valour in combat while serving with US military units in Vietnam.

The Silver Star is the third-highest US military combat decoration. Of some 23,000 awarded in Vietnam, just six had previously been awarded to members of the Australian military. Another 12 went to Australians in World War II and the Korean War.

In April 1968, then-FLGOFF Cottrell was checked out on the Cessna O-1 Bird Dog at Phan Rang air base, South Vietnam. His first assignment as a Forward Air Controller in the O-1 was to Lai Khe in support of the 3rd Brigade of the US 1st Infantry Division. The mission for which he earned the Silver Star came on 10 June, when he was directing US fighter aircraft to attack ground targets. His citation states that he: *disregarded an environment of intense hostile ground fire and adverse weather conditions to successfully pinpoint the unfriendly positions for combat support missions. By his gallantry and devotion to duty, Flying Officer Cottrell has reflected great credit upon himself and the Royal Australian Air Force.*

WOFF Wheatley was nominated for the US Silver Star in 1965 after he led a charge against heavy automatic gun fire and concentrated grenade defence to capture a hostile village. WOFF Wheatley was posthumously awarded the Victoria Cross for protecting a mate against overwhelming odds during an action later that year in the Tra Bong valley.

BELOW At the ceremony, from left, Governor General David Hurley, Mac Cottrell and Chargé d'Affaires Michael Goldman.

SA DIVISION

MOONTA CELEBRATES THE FATHER OF THE AIR FORCE

ON 7 NOVEMBER 2021, the Air Force Association joined the Moonta community and RAAF Edinburgh to celebrate the father of the Air Force, Sir Richard Williams, with a day of festivities, commemoration, flypasts and the unveiling of a sculpture of the military aviator.

Sir Richard Williams, born and raised in Moonta, was Australia's first military-trained pilot and saw distinguished service in the Middle East before returning to Australia to lead the formation and development of the RAAF.

The celebrations included a street parade led by a RAAF Base Edinburgh contingent, the Navy Band, Australian Air Force and Army Cadets, Air Force Association and Vietnam Veterans, and various community groups. A spectacular PC-21 flypast was conducted over the parade as it passed

Her Excellency, The Honourable Frances Adamson AC, Governor of South Australia.

The community then came together at Queen Square for the unveiling of the sculpture. The unveiling ceremony featured a RAAF Honour Guard, a smoking ceremony by FLTLT Steve Warrior (Indigenous Liaison Officer, RAAF Edinburgh), the recitation of a poem entitled *Sir Richard Williams – Our Cornish Australian Hero* by Dr Robert Black, the singing of *Eagle of Australia* (the Air Force song) by a local choir and an address by the governor. Following the ceremony, the Honourable Company of Air Pilots Association presented a flypast of vintage aircraft over the park.

ABOVE The RAAF Edinburgh contingent with Her Excellency, The Honourable Frances Adamson AC, and the Sir Richard Williams sculpture.

CENTENARY EVENTS CONCLUDE IN SALISBURY

A YEAR-LONG PROGRAM of Air Force centenary activities in South Australia concluded late last year with commemorations and a Freedom of Entry Parade in Salisbury, the home of RAAF Edinburgh since the 1950s.

On 19 November, a Graveside Acknowledgement Ceremony was held at the grave of FLGOFF Maxwell Pearce, a No.1 Elementary Flying Training School instructor killed on 10 December 1943 while on a routine training sortie. It followed similar ceremonies at Mallala and Port Pirie where those who perished in World War II training accidents in SA were honoured.

The graveside ceremony was followed by a commemorative service at the Salisbury War Memorial to acknowledge those from the area who served in the RAAF in WWII and paid the ultimate sacrifice. Later that day, a service was held to dedicate a grand P-3 Orion Propeller Monument in honour of the men and women who supported P-3 Orion operations from RAAF Edinburgh for more than 50 years.

Meanwhile, from 10 November to 3 December, AFA-SA partnered with RAAF Edinburgh to present an Air Force Centenary display at the Salisbury Community Hub. The display comprised mannequins, large current fleet model aircraft, Air Force Centenary banners, the RAAF Edinburgh Freedom of Entry Charter from the City of Salisbury and audio-visual displays.

On 20 November, the Royal Aeronautical Society had its monthly presentation in the Community Hub Hall amidst the centenary display with a special presentation by GPCAPT Greg Weller on South Australia's Contribution to the Air Force over the past 100 years.

ABOVE LEFT RAAF Honour Guard and Ensign at the grave of FLGOFF Maxwell Pearce. Photo AFA-SA.

LEFT Graham Reynolds and WGCDR Marija Jovanovich unveil the plaque at the P-3 Orion Propeller Monument at the Salisbury War Memorial. Photo: LAC Stewart Gould.

NSW DIVISION

LIFE MEMBERSHIP AWARDED

THE STATE COUNCIL of Air Force Association (AFA) NSW awarded Life Membership to Mrs Lesley Gent OAM in recognition of her outstanding contributions and commitment to the preservation and collation of history of RAAF and RAF veterans, the affiliates of the Fighter Squadrons Branch (FSB) and the AFA generally.

On behalf of State President Ron Glew OAM, FSB President Mike Lavercombe presented the award – a framed certificate, a life member badge and a congratulatory letter from Ron – at an FSB Committee Meeting on 6 December 2021 in the Heritage Room at Fighter World, Williamtown.

Lesley says she loves researching RAAF and RAF history, gathering stories from veterans and especially enjoys being able to help families learn a little more about their relatives and the activities of the various squadrons during service history. She says veterans have some wonderful stories to tell.

LEFT Mike Lavercombe presents Lesley with her life membership certificate.

WANDERERS WEEKEND

THE WANDERERS BRANCH of the AFA NSW invites all Ex ATTU/1CCS and current serving members to participate in a weekend of camaraderie and commemoration in Canberra, 22-25 April 2022.

Activities will revolve around the dedication of a plaque at RAAF Memorial Grove honouring the service of all ATTU/1CCS members past and present. There will also be informal drinks, a fun golf day, a dedication dinner and Anzac Day events – Dawn Service at the Australian War Memorial, Gunfire Breakfast at Olims Hotel, Anzac Day parade and lunch.

Visit wanderersbranch.net for details and follow Wanderers Facebook for updates. Please take the opportunity to go along and enjoy a great weekend.

WA DIVISION

SUPPORT FOR THE HOMELESS

ON 15 FEBRUARY, RAAFA WA launched the Andrew Russell Veterans' Living (ARVL) program to continue its support for veterans.

RAAFA WA CEO John Murray acknowledged that homelessness amongst the WA veteran community had become an increasingly desperate issue that required immediate action. "We know veterans experiencing homelessness are often facing a suite of complex needs as a result of their service experience and that no one in WA is currently providing a specialist housing response to this group," he said. "It is our hope that through ARVL we can give veterans somewhere to live, while they get support and find their way back into permanent accommodation."

Modelled on the South Australian program established in 2016, ARVL is a two-part Housing First program providing transitional housing and connection to professional support services, followed by appropriate and affordable permanent housing for veterans.

The program is named in honour of SGT Andrew Russell, the first Australian military servicemen to die in combat since the Vietnam war – 15 February marked the 20-year commemoration of his death.

SGT Russell's wife Dr Kylie Russell said: "I am honoured to continue Andrew's life and legacy through this partnership with RAAFA," Dr Russell said. "Following the ARVL Program's success in South Australia, it was important to me that we address veterans' homelessness in WA and the lack of support for emergency housing and critical services that offer connection back to the community.

"I honour and acknowledge RAAFA's courage to take a risk and fund this extremely important program that will help veterans restart their life."

Veterans are at higher-than-average risk of homelessness with 5.3 percent of recently transitioned ADF population (5,767 individuals) experiencing homelessness over a 12-month period, compared to 1.9 percent of the general population.

Since its inception, the SA ARVL program has provided 16,500 nights of emergency accommodation and supported 155 veterans through permanent accommodation.

RAAFA WA has secured land for development and is seeking support from the community to establish the program.

A voice to government for members and ex-members

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Air Force Association

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EDITED BY John Kindler

Sovereign space CAPABILITY

ADELAIDE-BASED DEWC SYSTEMS, which specialises in electronic warfare, and Queensland-based launch provider Gilmour Space Technologies recently signed a memorandum of understanding that could herald a truly Australian tactically responsive space capability.

DEWC Systems is working to improve the ADF's use of the electromagnetic spectrum while consecutively degrading an opponent's use. It is creating an Australian space-based Minaturised Orbital Electronic Warfare Sensor System that it hopes will provide a step-change in the ADF's warfighting capacity.

DEWC was the first Australian company to launch a payload on a space-capable rocket from Australia. It is engaging with a number of launch providers to deliver satellites into space, including Southern Launch and Gilmour Space Technologies.

In January, Gilmour Space Technologies announced the successful 110-kilonewton test fire of the world's largest single-port hybrid rocket engine.

Artists Impression of a Gilmore Rocket on the launch pad. Image: Image: Gilmour Space Technologies.

The 75-second test was a major milestone for Gilmour Space, which is developing rockets that it says will be capable of launching 300 to 4,000kg satellites and payloads into low-earth and other orbits in the next five years.

"What you see here is the main engine that will power the first and second stages of our three-stage Eris rocket to space," explained company CEO Adam Gilmour.

He said the test was also a demonstration of Australia's first sovereign launch capability. The company is seeking government approvals for a small orbital spaceport at the Abbot Point State Development Area in Bowen, Queensland and hopes to launch Australia's first sovereign-made rocket later this year.

Source: Australian Defence Magazine; gspacetech.com

Scan the QR code to see a video of the Gilmour Space rocket engine test.

Loyal Wingman in the hangar at Woomera, SA.

Loyal Wingman build site

BOEING AUSTRALIA HAS selected Toowoomba, Qld as the site for its first uncrewed-aircraft production facility outside North America.

The facility at the Wellcamp Aerospace and Defence Precinct at Wellcamp Airport will manufacture part of the Loyal Wingman unmanned aircraft and complete its final assembly.

Boeing Defence Australia vice president and managing director Scott Carpendale said the location was attractive due to its access to a flight line, clear flying days, commercial flight access from major cities and ability to support the rapid pace at which the Airpower Teaming System (Loyal Wingman) program was growing.

Breakthrough:

JET FUEL FROM CO_2

A USAF KC-135 Stratotanker, assigned to the 350th Expeditionary Aircraft Refuelling Squadron, flies over Qatar. Photo: USAF / Master Sgt Joey Swafford.

THE US AIR FORCE (USAF) has partnered with a Tulsa-based emerging fuels technology company Twelve to convert atmospheric carbon dioxide (CO_2) into jet fuel.

Last year, Air Force Operational Energy authorised Twelve to launch a pilot program to showcase the company's proprietary technology to convert CO_2 into lower-cost aviation fuel, known as E-Jet. In August 2021, the project reached a major milestone after Twelve successfully produced jet fuel from CO_2.

The first phase of the project to detail the process and report is scheduled for completion in December. The next phase will be to use the technology for synthetic fuel production in commercial quantities.

Initial tests proved that the technology is "highly deployable and scalable". It would allow troops to access synthetic fuel from anywhere across the globe without any need for highly skilled on-site fuel experts.

The process used by Twelve has not been disclosed, however, scientists at Oxford University have successfully produced specific hydrocarbons by converting atmospheric CO_2 with hydrogen and a catalyst made from a compound of iron, manganese and potassium.

Source: Airforce Technology

AIRPORT WELCOMES GLOBAL PLAYER

NEWCASTLE AIRPORT aviation precinct is welcoming new and expanding tenancies.

Defence contractor Hensoldt Australia has established a new office adjacent to RAAF Base Williamtown and the Astra Aerolab aerospace precinct. Hensoldt offers technology solutions across the defence, space, clean-energy and maritime sectors, with systems integration and engineering services.

Hensoldt's Programme Director – Fixed Defence Air Traffic Control Surveillance System, Doug Cross said: "Being co-located with our Defence customers at Williamtown allows for regular close communication and interaction and maximises our chance of success."

Newcastle Airport CEO Dr Peter Cock welcomed the new tenant. "Globally Hensoldt has an extensive history spanning over 150 years … with offices located across the globe," he said.

Meanwhile, regional airline and charter company FlyPelican, based at Newcastle Airport since 2015, is expanding its footprint to bring its maintenance facility and base of operations together under one roof.

FlyPelican's new 1,230 square metre headquarters includes hangar and offices to house three aircraft and 50 team members. Base maintenance of its British Aerospace Jetstream 32 aircraft will be located at the airport and the airline is assembling a team of local maintenance engineers.

ABOVE Hensoldt Australia's Paul Blyton and Doug Cross with Peter Wych from Newcastle Airport.

New space collaboration

MELBOURNE'S RMIT UNIVERSITY and Boeing have signed an agreement to collaborate on advancing Australia's local space capabilities. The partnership will harness global networks and expertise to develop local solutions for the manufacturing of space equipment. Projects will include product design strategy, materials research and process innovation.

The research and development will be based at RMIT's Space Industry Hub, a launch pad incubator backed by the Victorian Government and SmartSat Cooperative Research Centre.

F-35 DATA SHARING SUCCESS

LOCKHEED MARTIN has revealed its F-35 Lightning II Joint Strike Fighter and Virtual Aegis Weapon System shared real-time sensor data with non-F-35 platforms outside the US during Exercise Talisman Sabre 21 (TS21).

Sensor data was transmitted via the F-35's multi-function advanced data link, from Fort Worth, Texas to the US Indo-Pacific Command in Hawaii, before being relayed to ADF exercise participants. The demonstration aimed to support strategic objectives outlined in the Pacific Deterrence Initiative, which includes the use of large-scale exercises to pursue innovative experimentation with all-domain information sharing capabilities.

The F-35 is billed as the only fighter asset with the ability to reach into austere environments to provide critical real-time information to allied partners. The experiment conducted during TS21 proved that the F-35 sensor fusion capabilities make it the most advanced sensor node in the 21st century warfare network-centric architecture.

Source: Defence Connect

ABOVE Virtual Aegis Weapon System cabin in the field at Exercise Talisman Sabre 21.

The Internet of MILITARY THINGS

THE GOVERNMENT HAS SIGNED a $5.48 million contract with Adelaide-based Myriota to expand its cutting-edge satellite communications network for use by Defence.

If successful, the secure, flexible and scalable direct-to-orbit satellite connectivity network, known as the 'Internet of Military Things', could deliver increased operational efficiency, safety, and reliability, through greater situational awareness, visibility and preventative maintenance.

Myriota will use its network of nano-satellites to retrieve data from sensors across hundreds of Defence platforms, forming a global, space-enabled communications network.

"Sovereign, space-enabled capabilities are critical to the future of Defence," Minister for Defence Industry Melissa Price said. "This innovation could enable the secure transfer of Defence data from almost anywhere on Earth."

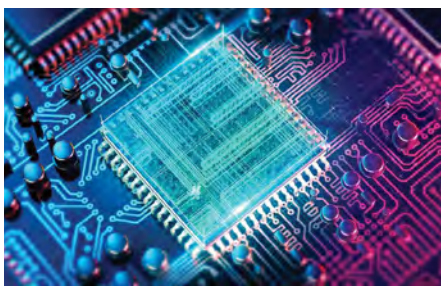
The technology has the potential to impact across almost all sectors of the Australian economy from mining to remote education.

$3m in grants to local businesses

TEN AUSTRALIAN BUSINESSES have been awarded up to $300,000 grants aimed at accelerating sovereign response to defence capability challenges, including cyber security, enhanced human performance, medical countermeasures, trusted autonomous systems, and integrated intelligence, surveillance and reconnaissance.

The funding comes under Defence's $36 million Industry Competitive Evaluation Research Agreement, an element of the Next Generation Technologies Fund.

The grant recipients are: Neoculi, Vic; Sirius-Beta, Qld; Regeneus, NSW; Curve Tomorrow, Vic; Vestia, Vic; AIM Defence, Vic; Operational Systems, SA; Daronmont Technologies, SA; Adelaide Research & Innovation, SA; and DEWC Systems, SA.



ABOVE An integrated circuit board.

New defence industry link

THE CENTRE FOR DEFENCE INDUSTRY CAPABILITY (CDIC) has been replaced by the Office of Defence Industry Support (ODIS). The change follows a government review that recommended strengthening the alignment between Defence, defence industry and the CDIC by moving it from the Department of Industry, Science, Energy and Resources to the Department of Defence.

With offices around Australia, ODIS's core function will be to provide advisory, guidance and mentoring services to Australian small and medium enterprises looking to enter, or expand their footprint, in the defence industry.

$100 MILLION WEAPON RANGE

CONSTRUCTION FIRM TIWI PARTNERS has been awarded a $107.8 million contract to demolish old facilities and construct three new Mobile Emitter Site Mounds at Delamere Air Weapon Range in the Northern Territory. The project is scheduled to commence in late September and conclude by June next year.

It is the latest Defence contract awarded to Tiwi Partners, which in September 2021 was selected to build a $7 million explosive ordnance storage facility at RAAF Base Darwin.

ABOVE No.76 Squadron Hawk delivers a LGB at Delamere, NT.

Thermoelastic stress-mapping technology

MELBOURNE-BASED 1MILLIKELVIN, in collaboration with Defence Science and Technology Group, has developed the world's first fully integrated, microbolometer-based thermoelastic stress imaging system to analyse thermoelastic stress.

The LTS-640V camera is a digital imaging machine that provides real-time fusion of stress and visible spectrum imaging – in effect merging the visible with the invisible. Thermoelastic Stress Analysis systems built around photonic infrared camera systems have limited use due to their bulkiness, expense and complexity. The LTS-640V is not only extremely sensitive, but also user friendly, compact, easily deployable and capable of generating precise stress maps.

A prototype of the technology helped support sustainment of the F/A-18 Classic Hornet, and more recently provided Lockheed Martin Aeronautics with valuable new information during structural certification of the F-35 Joint Strike Fighter.

LTS-640V camera.

JORN radar UPGRADE

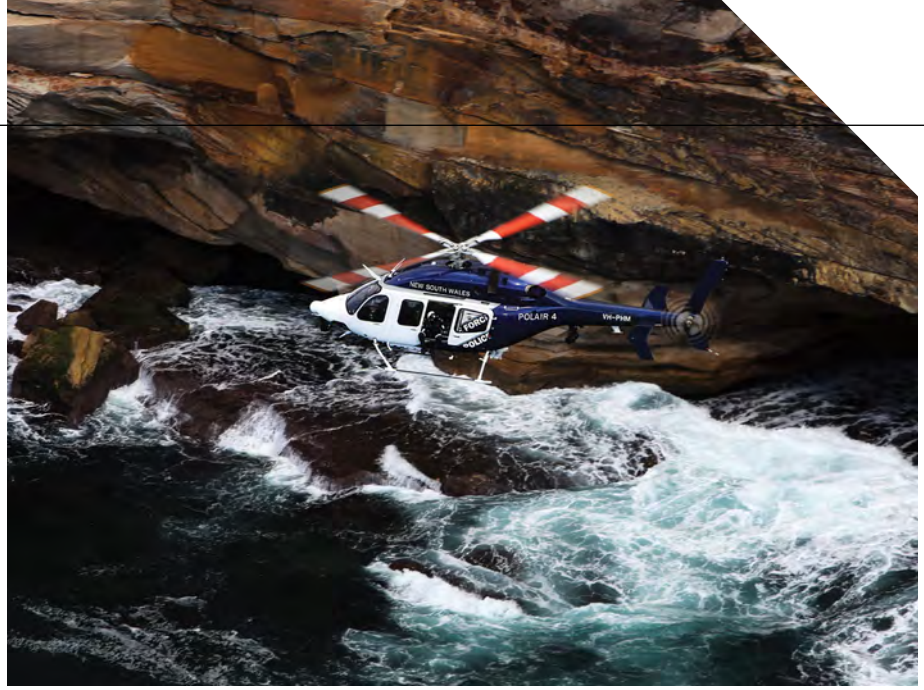
BAE SYSTEMS AUSTRALIA has begun site works for the redesign and upgrade of the first of three Jindalee Operational Radar Network (JORN) radars used to surveil Australia's northern maritime environment and airspace. The JORN Phase 6 upgrade will introduce technologies and architecture that will improve performance and extend JORN's operational life to beyond 2042.

JORN operates radars in Alice Springs in the Northern Territory, Longreach in Queensland and Laverton in Western Australia.

The radar system is designed to provide surveillance to a range of 1,000 to 3,000km, supporting the Australian Defence Force's maritime capabilities, border surveillance, disaster relief and search and rescue operations.

Source: Australian Aviation

ABOVE JORN antenna, Laverton, WA. Photo: Department of Defence.



BELL 429s FOR NSW POLICE

THE NEW SOUTH WALES POLICE FORCE has commenced operations with three new Bell 429 aircraft delivered late last year. On arrival, the helicopters were fitted with the latest mission equipment including FLIR 380HDc cameras. The equipment was integrated and commissioned by Jet Aviation Australia's design engineering team, in partnership with Bell. The helicopters will be used to conduct search and rescue, surveillance and support patrols and specialist operations across the state.

ABOVE Bell 429 in POLAIR livery.

Ryan Aerospace supplies USAF simulators

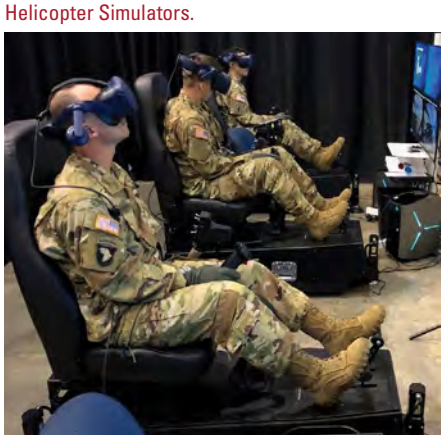
RYAN AEROSPACE has been awarded a series of contracts to supply nearly 300 fighter and helicopter training simulators to the US Air Force (USAF) as part of a new program known as Pilot Training Transformation.

The Gold Coast firm has developed a modular and reconfigurable flight training simulator that can be modified to represent a number of different fixed-wing and rotary-wing aircraft. According to the company, the simulators offer greater value for money and have only a very small footprint compared to traditional training devices.

With the help of a virtual instructor, students can effectively teach themselves many of the desired skills and knowledge. The system is supported by an after-action review software package that automatically assesses, grades and logs the student's performance.

About 180 of the systems have already been delivered and installed ahead of schedule and USAF aviators have commenced training. It is expected the final simulators will be delivered and installed in early 2022.

BELOW US Army pilots on Ryan Aerospace (Australia) HELIMOD Mark III Helicopter Simulators.



USAF replacing REFUELLING TANKERS

IN JUNE 2021, the US Air Force (USAF) Life Cycle Management Center released a sources-sought notice for the Bridge Tanker (or KC-Y) program to replace the KC-135 Stratotanker fleet. It aimed to identify companies capable of providing solutions for the proposed 'non-developmental tanker recapitalisation program'.

In response, Lockheed Martin offered an aerial refuelling tanker called LMXT, which it stated would complement USAF tanker capabilities as an in-flight refuelling tanker for immediate and long-term mission requirements.

The LMXT is a variant of the Airbus A330 Multi Role Tanker Transport operated by the RAAF, modified specifically for USAF operators. Changes include an upgraded suite of communications for joint all-domain command and control as well as improvements to range and fuel-offload capability.

LEFT Lockheed Martin LMXT aircraft. Photo: Brandon Stoker/ Lockheed Martin.

A GLOBAL GUARDIAN

ABOVE A KC-30A MRTT refuels F/A-18F Super Hornets and an EA-18G Growler during Exercise Talisman Sabre 2021.

RIGHT Squadron Leader Ron Rankin (second from right) with Republic of Korea Army and UN personnel in Korea, June 1950.

FAR RIGHT A DHC-4 Caribou in East Timor.

PHOTOS Courtesy of the Department of Defence except where noted.

DURING PEACETIME, THE RAAF FULFILS NUMEROUS ROLES, FROM PEACEKEEPING AND DISASTER RELIEF TO SURVEILLANCE AND ANTARCTIC SUPPORT.

AFTER WORLD WAR II, the RAAF continued its extensive involvement beyond Australian shores, principally through two separate channels: humanitarian assistance missions and supporting United Nations (UN) peacekeeping operations which ranged in size from a handful of observers or advisors to larger, composite force deployments.

PEACEKEEPING

In 1947, following the Dutch invasion of Indonesian Republic territory, the RAAF undertook the world's first in-the-field peacekeeping mission. A RAAF officer acted as chair of the UN Consular Commission while another was one of four UN observers, culminating in Indonesian independence in 1949.

Since then, the RAAF has been involved in the peacekeeping activities around the globe, from Korea and Kashmir to the Middle East and Africa, as well as closer to home in the Asia Pacific region (see panel far right).

In 1999, the RAAF contributed to Operation Concord, monitoring East Timor's transition to independence. Air Force transported personnel from RAAF Base Darwin to East Timor, evacuated UN and foreign nationals, and delivered

humanitarian aid by parachute. At the time, East Timor was the most significant ADF deployment since Vietnam.

The ADF led the UN International Force East Timor. The RAAF committed Airfield Defence and Expeditionary Combat Support Squadrons (ECSS) in support of Operation Warden, and C-130s and Caribou aircraft to move supplies and military personnel.

From August 1999, F-111s were deployed to Tindal, Northern Territory to conduct reconnaissance missions over East Timor, and prepare for potential strike missions should the need arise. The RF-111 detachment flew reconnaissance missions over East Timor for five months during 1999-2000.

Following the creation of the UN Transitional Administration in East Timor in 2001, RAAF medical staff supported the UN hospital and directed aeromedical evacuations under Operation Tanager.

OTHER PEACEKEEPING OPERATIONS

KOREA 1950: A RAAF and an Army officer inspected and reported on South Korean military dispositions on the border of North and South Korea. When the Korean War broke out, their report provided irrefutable evidence of the source of aggression.

KASHMIR 1975-79: The RAAF maintained a Caribou transport in Kashmir as part of the UN Military Observer Group in India and Pakistan. Flying in treacherous mountainous conditions, crews were often required to operate in limit weather conditions from ill-prepared airstrips at high altitude.

TIMOR 1975: Before annexation of Portuguese Timor by Indonesia, RAAF transports flew relief missions and refugees to Darwin. One Caribou was hijacked by Timorese Democratic Union forces and forced to fly an overload of refugees to Darwin.

SINAI 1976-86: A RAAF detachment of UH-1 helicopters formed part of the UN Emergency Force to observe the ceasefire between Egypt and Israel. From 1982-86 a second detachment operated as part of the Multinational Force and Observers non-UN monitoring group in the Sinai.

CAMBODIA 1992: RAAF and Navy personnel served in a Communications Unit that supported the Australian-commanded UN Transitional Authority in Cambodia.

SOMALIA 1992-93: The RAAF participated in Operation Solace, the stabilisation of Somalia. Throughout the 17-week long operation, C-130s made shuttle flights carrying personnel and cargo to and from the area of operations, and B707s repatriated Australian troops to Townsville.

RWANDA 1995: The RAAF contributed to an Australian Medical Support Force deployed to Kigali in response to the Rwandan genocide.

BOUGAINVILLE 1997-98: Medical personnel, comprising half of a 23-strong Combined Health Element were deployed to Bougainville, where Air Force personnel had been involved in peace talks in 1994. RAAF personnel also contributed to the Peace Monitoring Group, charged with monitoring a ceasefire.

SOLOMON ISLANDS 2003-06: The RAAF contributed an air component and an ECSS detachment to Operation Anode established to assist the Australia-led Regional Assistance Mission to the Solomon Islands to re-establish law and order.

SUDAN 2005: Operation Azure raised a deployment of ADF personnel to the UN Mission in Sudan (UNMIS), supporting the peace agreement between the government and the army. The RAAF officer commanding the Australian Contingent of staff officers and observers was, for the first time, a woman.

TIMOR-LESTE 2006-2012: When a crisis re-emerged in the now independent Timor-Leste (East Timor), a multinational force of peacekeepers was deployed to assist the new government. RAAF C-130s flew in personnel and equipment and evacuated civilians. AP-3C Orion carried out surveillance operations and B707 aircraft provided logistic support under Operation Astute. In 2012, RAAF working dogs and their handlers provided security for ADF facilities.

LEBANON 2006: When Israel launched a large-scale retaliatory incursion into Lebanon, Operation Ramp diverted a RAAF C-130, which had been supporting Australian ground forces in Iraq and Afghanistan, to assist the evacuation of Australian citizens from Beirut and Tyre to regional hubs in Turkey and elsewhere.

SOUTH SUDAN 2011 ONWARDS: When South Sudan gained independence, UNMIS was restructured into the UN Mission in South Sudan (UNMISS). As part of Operation Aslan, the ADF continues to provide up to 25 RAAF and other ADF headquarters personnel, aviation and logistics specialists, as well as military advisers to UNMISS.

A C-130J being loaded with cargo for South Sudan. Photo: WO2 Rob Nyffenegger.

DISASTER RELIEF

From the very beginning, the potential for air power assistance to civil communities in times of need was recognised. Air Force bushfire surveillance patrols have been flown during Australia's long dry summers since 1930; helicopters joining the effort after World War II.

The RAAF has transported medical teams and supplies to where they are needed, made surveillance flights, and performed a host of other roles in aid of the community. Flood relief operations have been mounted since the 1950s.

Capabilities have been greatly extended by acquisitions such as the C-17 strategic transport aircraft from 2007, and by advanced sensor systems such as those aboard the AP-3C to aid in fire surveillance. From 2006, relief operations have been ADF-wide co-ordinated responses and fall within the Defence Assistance to the Civil Community initiative. Air Force has also aided the community in situations other than natural disasters, such as Operation Immune in 1989 that saw the RAAF fly over 170,000 commuters during an airline pilots strike.

Early this year, following the eruption of Tonga's Hunga Tonga-Hunga Ha'apai underwater volcano on 15 January, RAAF P-8A Poseidon maritime patrol aircraft flew air reconnaissance to assess the damage to the Pacific nation as part of Operation Tonga Assist 2022. The RAAF also delivered more than 119 tonnes of humanitarian and disaster relief stores using C-17A Globemaster III and C-130J Hercules transport aircraft.

DISASTER RELIEF OPERATIONS

1950: Floods, NSW
1973/74: Floods, eastern and southern Australia
1974: Cyclone Tracy, Darwin
1983: Ash Wednesday bushfires, Victoria and South Australia
1998: Drought, Papua New Guinea
1998: Tsunami, Aitape region
2002, 2005: Bali bombings, Indonesia
2004: Boxing Day tsunami, Indonesia
2005: Bushfires, Victoria
2009: Earthquake and tsunamis, Samoa
2010: Floods, Pakistan
2011: Cyclone Yasi and floods, Queensland
2011: Earthquakes, Christchurch, New Zealand
2011: Earthquake and tsunami, Japan
2012: Cyclone Evan, Fiji and Samoa
2013: Typhoon Haiyan, Philippines
2013: Bushfires, NSW and Tasmania
2014: Flight MH370 search (Indian Ocean)
2014: Flight MH17 (Ukraine) investigation / recovery
2015: Earthquake, Nepal
2015: Cyclone Pam, Vanuatu
2016: Cyclone Winston, Fiji
2020 onwards: COVID-19 Assist
2020: Cyclone Yasa, Fiji
2021: Evacuations from Kabul, Afghanistan
2022: Volcanic eruption, Tonga

ABOVE LEFT When the Bulloo River, Qld, flooded in 1963, a RAAF Neptune located 11 men on a rooftop (at rear) and dropped relief canisters; they were later rescued by a RAAF helicopter.

MIDDLE A patient evacuated by C-17 from Cairns Base Hospital to Brisbane, ahead of Cyclone Yasi, with RAAF medical personnel assisting.

LEFT After Pakistan was devastated by floods in 2010, 92 RAAF personnel responded as part of Operation Pakistan Assist II.

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COASTAL SURVEILLANCE

Although coastal surveillance has historically been a Navy function, the government formally assigned that responsibility to the RAAF in 1954. After Lincoln bombers were modified for maritime patrol, more specialised aircraft were acquired: the Neptune, the P-3B and P-3C Orion and recently the P-8A Poseidon.

P-3s played decisive roles in the Southern Ocean rescues of French yachtswoman Isabelle Autissier in 1995 and yachtsman Tony Bullimore in 1997.

Defence also contributes to border security operations. Between 2006 and 2011 AP-3Cs logged 9000 flying hours in coastal surveillance as part of Operation Resolute, aimed at combating unlawful incursions by foreign vessels into Australian territorial waters.

SURVEY MAPPING SUPPORT

In the 1920s, the RAAF made aerial photography flights in support of the Army's topographical mapping survey of the Australian continent. Aerial support for ground survey parties continued until the Royal Australian Survey Corps completed a mapping program in the mid-1960s, and a more detailed program in 1982 using Canberra bombers. In the 1970s, Caribou, Iroquois and Canberras flew mapping surveys in Indonesia, Papua New Guinea and island groups in between. From 1978 until 1994, a series of survey operations was carried out across the south-west Pacific, including aerial photography by contracted Learjet aircraft.

ANTARCTIC FLIGHT

Following on from the support provided to Australia's program of exploration in the Antarctic before World War II, the RAAF again became involved in the frozen continent from the late 1940s. RAAF aircraft and crews embedded with the annual scientific expeditions assisted with survey, reconnaissance, photographic and communications tasks.

For about five years, the RAAF's Antarctic Flight of DHC-2 Beaver and Auster aircraft, later joined by a DC-3, Dakota, remained based on the ice until they were destroyed during storms in 1960. Resupply missions by C-130 and P-3 aircraft to Australia's scientific bases at McMurdo Sound and Macquarie Island continued until the mid-1980s.

In 2015/16, the C-17A Globemaster began proof-of-concept supply flights to Casey Station. With a 'light' 20-tonne load it could make the flight from Hobart and back unrefuelled.

ABOVE A RAAF C-130 Hercules takes off from Komoro Airfield, near Dili, on a sortie between the INTERFET Command and Darwin.
Photo: SGT W. Guthrie.

LEFT TOP A RAAF DHC-2 Beaver, part of Australian National Antarctic Research Expeditions.

LEFT MIDDLE RAAF UH-1 flies over a burnt out tank in the Sinai.

LEFT BOTTOM F-35A with weapon bays open.
Photo: CPL Kylie Gibson.

FAR LEFT A Mk.20 Canberra, modified to carry the Wild RC-10 camera, on the tarmac at RAAF Base Amberley.

ABOVE Aircraft Technician ACW Georgia Sawyer on the flightline with an E-7A Wedgetail AEW&C aircraft.
Photo: SGT David Gibbs.

HONING THE FORCE

The RAAF recognised that its role defending Australia would require operations from bases in the north to effectively cover the air-sea gap to the north and north-west. In 1972, Air Force opened its first bare base, at Learmonth in Western Australia. Additional bare bases were constructed – RAAF Curtin, WA in 1988 and RAAF Scherger, Qld in 1998. RAAF Tindal, NT became a permanent base for Hornets in 1989 and recently welcomed its first F-35A Lightning II.

In 2002, Force Element Groups were reorganised to better align the Air Force's platforms with the roles performed. Tactical Fighter Group and Strike Reconnaissance Group were amalgamated to form Air Combat Group. In 2004, Maritime Patrol Group was combined with Surveillance and Control Group to form Surveillance and Response Group. Combat Support Group remained to provide airbase operational support.

Air Force then underwent significant upgrades in response to the uncertain and complex security environment expected to prevail. From 2004, Surveillance and Response Group received a major boost to its air and battlespace management capabilities with the TPS-77 radar system. From 2006, the Amberley-based C-17A Globemaster III aircraft has addressed the pressing need for a strategic airlift capability, while the C-130H fleet was replaced with the C-130J-30 variant.

The C-27J Spartan Battlefield Airlift aircraft replaced the piston-engine Caribou, which was retired in 2009. The KC-30A MRTT and E-7A Wedgetail AEW&C fleets, serving since 2015, have been significant force multipliers. The P-8A Poseidon and MQ4-C Triton Unmanned Aircraft System have replaced the AP-3C Orion in maritime patrol and surveillance roles.

F/A-18F Super Hornets (Rhinos) were acquired in 2010, initially to maintain strike capability between the retirement of the F-111 and the debut of the F-35 Joint Strike Fighter. The Rhino capability will be retained and the fleet expanded to 24 aircraft. The EA-18G Growler Electronic Warfare (EW) version of the F/A-18 was acquired to satisfy the specialist role of air defence system suppression.

The Lockheed Martin F-35 Lightning II fifth-generation, stealthy, multi-role strike fighter has probably been the RAAF's highest-profile acquisition since the F/A-18A. The first of 72 F-35s arrived in 2018. All are planned to be operational at RAAF Williamtown and RAAF Tindal by 2023.

A MATURE FORCE

The experience derived from Air Force's rich history provides a comprehensive foundation to sustain the highest levels of professional and ethical standards into the future. It has matured as a force able to operate jointly with the other military arms and as an efficient member of an alliance coalition.

The Air Force centenary year, 2021, provided an opportunity to look back and reflect on the Air Force's crucial service to Australia in war and peace, on the 350,000 men and women who have served, and on the 11,000 who gave their lives in service. *Wings* was privileged to present this rather concise history of the RAAF and in a small way honour all who serve.

Scan the QR-code to view eight online Air Force 100 videos, including the ABC's two-hour coverage of the March 2021 flyover in Canberra.

PORCUPINES AND CATS

WORDS Mike Nelmes

EMPLOYED BY THE RAAF SINCE THE 1920S, WATERBORNE AIRCRAFT PLAYED AN IMPORTANT ROLL IN WWII.

THE CONCEPT OF AIRCRAFT operating from a water surface seems incongruous, but waterborne craft were prominent in the early years of aviation, probably because airfields were practically non-existent and the prevailing doctrine was driven by a dominant naval perspective. Here, we briefly explore the adoption and employment of waterborne aircraft in RAAF service.

EARLY FLOATPLANES IN AUSTRALIA

The first military floatplane in Australia was a Maurice Farman hydro-aeroplane for the Central Flying School at Point Cook. On arrival in 1914, it was sent to Rabaul in New Guinea but not used in action. Three years later, it was converted to a landplane.

In 1921, 28 Avro 504 biplanes were transferred from the Australian Air Corps to the newly formed Royal Australian Air Force. Of those, two were the 504L floatplane version that had been deployed the year before on two Royal Australian Navy (RAN) capital ships; the battle cruiser HMAS *Australia* and the light cruiser HMAS *Melbourne*. In RAAF service they served with No.1 Flying Training School (1FTS) at Point Cook.

Another six seaplanes, Fairey IIIDs ordered for the Navy, also joined the new service. Operating from Point Cook, they were used for survey and reconnaissance and made pioneering flights around the Australian coastline. Co-operation exercises were also carried out with naval units.

Most famously, in 1924 a Fairey IIID crewed by WGCDR Goble and FLTLT McIntyre completed the first flight around Australia, covering nearly 14,000km over an uncharted course in the face of numerous challenges. The flight was hailed as "the finest in the history of aviation", overshadowing another round-Australia flight that year by a Civil Aviation Branch DH.50 landplane. The floatplane had an advantage: it could alight anywhere along the coast (in relatively calm water), while airfields for landplanes were few and far between.

FLOATPLANES, FLYING BOATS & AMPHIBIANS

As the name suggests, floatplanes sit on the water on floats and operate from water surfaces. They can be fitted with a wheeled undercarriage to become landplanes, as was the case in Sir Alan Cobham's pioneering flight from England to Australia and return in 1926. For its flight across Australia his DH.50 biplane had wheeled undercarriage fitted at Darwin, but the majority of the journey was made as a floatplane. The advantage was that at the time, particularly between India and Australia, few runways had been constructed; floatplanes could set down on any river or harbour, and (in theory) in the ocean in the event of engine failure, although there was little chance of rescue.

In contrast to floatplanes, a flying boat's lower fuselage functions as a hull to support the aircraft in water. In 1927, a pair of Supermarine Southampton wooden-hulled flying boats were shipped to Australia for co-operation with the Royal Air Force (RAF) Far East Flight, which was attempting the first formation flight from England to Australia. That pair of Southamptons formed the nucleus of a RAAF Coastal Reconnaissance Flight at Point Cook through the 1930s, before joining the Seaplane Squadron with 1FTS.

Amphibious aircraft, such as the RAAF's later versions of the Catalina, featured a retractable undercarriage so they could operate from land or water.

LEFT RAAF Catalina taking off on a patrol from Rathmines NSW, painted by official WWII artist Dennis Adams.

A No.10SQN Sunderland sets out on patrol from the flying boat base RAF Pembroke Dock, Wales, in 1944.

SUNDERLANDS

Nine Short Sunderland flying boats were initially ordered for the RAAF. However, when No.10 Squadron accepted the first aircraft at Pembroke Dock, England on 11 September 1939, in the early days of WWII, the British Government asked that the squadron remain in the UK for the duration. It was later joined in RAF Coastal Command by an 'Article XV' RAAF Sunderland squadron, No.461.

Those squadrons played an active role in the desperate Battle of the Atlantic, hunting the German submarines (U-boats) and ships that were decimating Allied supply convoys. After the first confirmed U-boat 'kill' on 1 July 1940, the two squadrons went on to destroy almost a dozen U-boats and damage others.

The role of RAAF Sunderland squadrons was general reconnaissance – a catch-all description that included anti-submarine and shipping patrols, convoy escort and photographic reconnaissance of enemy coastal facilities. During the war's first two years, 10SQN flew an estimated 1.6 million kilometres.

In the words of SQNLDR Graham Pockley DFC & Bar, one of 10SQN's most daring pilots: "Our patrols took us north up to Iceland, south to the coast of Africa and east as far as Cairo. One day we might be at Gibraltar, within 48 hours we'd be flying off Norway. We had to be ready to go anywhere, anytime, and do anything.

"A patrol might last 12 hours or longer. After hours of seeing nothing but sea and sky, the tiniest speck on the ocean surface would be examined with close interest. The ocean is a big place and the sight of an empty raft or an overturned lifeboat, hundreds of miles from anywhere, would remind us grimly of the fact."

Pockley describes several attacks in his first published account, beginning with an attack on a surfaced Italian submarine off Algiers: *Our first attack caused her batteries to gas, forcing the crew to come up on deck. The conning-tower was black with them in no time. When we came in to drop another salvo, the port bomb-releases refused to work. So we transferred the port depth-charges to starboard and went through the procedure again.*

ABOVE TOP Engine maintenance on a 10SQN Sunderland at RAF Mount Batten, Plymouth, England, April 1945. Beaching wheels needed to be manually fitted before the aircraft could come onto land.

ABOVE Some Sunderlands were armed with up to 16 .303-inch machine guns. Air gunner SGT A. E. Couldrey DFM of 10SQN, pictured in 1943, had already seen three years of operational service.

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The submarine limped home, but didn't quite get there, for it sank in deep water when the crew were attempting to beach it near Majorca. We fought a five-and-a-half-hour gunfire duel with that customer. We used about 8,000 rounds of ammunition and came back to base on two engines, with 200 holes in our aircraft. But none of our crew received a scratch…

Anti-submarine patrols might produce events of a kind different from those expected. One day we were cruising to seaward of the French coast, near the Spanish border. Off Bayonne, we sighted a German R-boat and dive-bombed her at 200 knots, dropping seven depth-charges. 1,600 rounds of machine-gun fire were added for good measure. The enemy vessel lifted clean out of the water, listed badly and sank by the stern.

We were then only four miles from the coast and within range of shore batteries. Buildings and vehicles could be clearly discerned – but we did not linger to take in the view. We were attacked by fighters and on the way home received further unfriendly attentions from two [Junkers] *Ju 88s and one Me 109. But after dodging in and out of clouds for hours we arrived back at base without mishap. Later we learned that the Me 109 sent to intercept us had been shot down by Spitfires off the Lizard* [Lizard Peninsula, Cornwall]*, only two miles astern of us. As on most patrols, we had maintained contact with base by radio, and Fighter Command, expecting an enemy attempt to catch us, had sent the Spitfires out to catch them. We were tickled pink.*

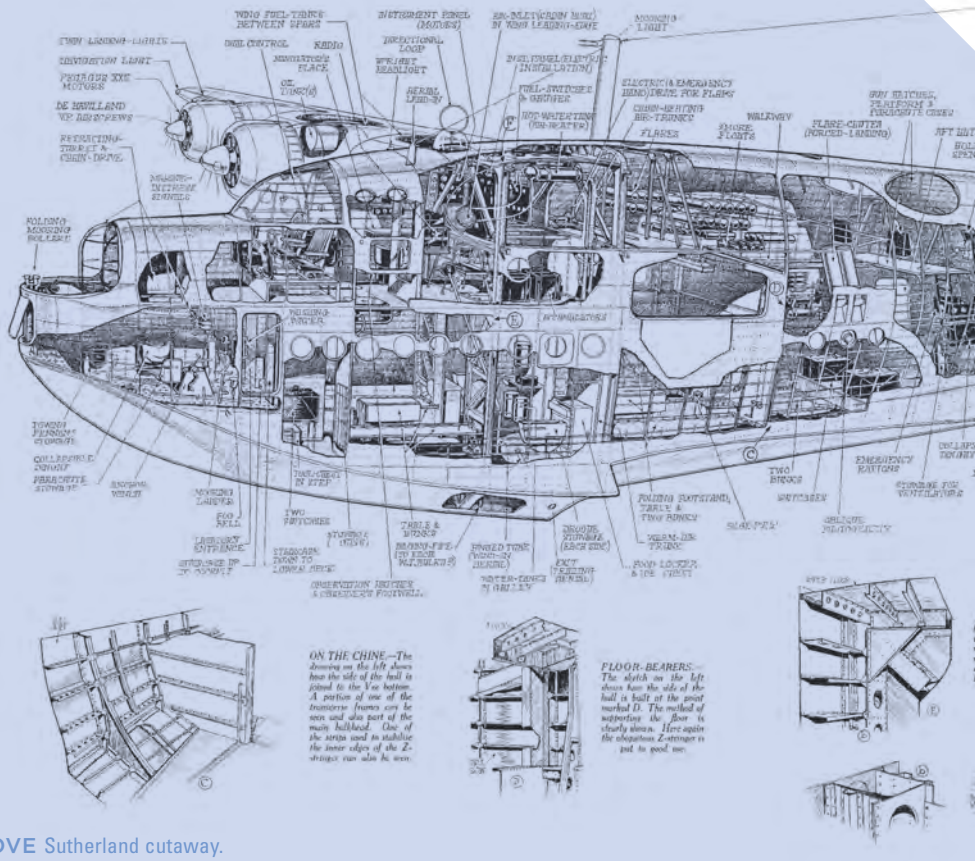
Apart from fighters, we occasionally had a brush with Focke-Wulf Kuriers [Fw 200 Condors]. *These were four-engine reconnaissance-bombers, out on missions more or less similar to ours. They had an advantage over us in speed but did not always use it for attacking – often the opposite. Sometimes when we'd meet them, they'd have a crack….*

Pockley survived the Battle of the Atlantic, only to disappear with his crew in a RAAF special operations Liberator in the Pacific War in 1945.

No.10 Squadron highly modified its Sunderlands by increasing defensive armament in answer to regular German fighter attacks. So many machine-guns protruded from them that they were given the nickname Flying Porcupines.

No.461 Squadron accomplished the unusual feat of landing a Sunderland on an airfield (through necessity – its hull was made for alighting on water, not land) and, remarkably, looped another. In July 1943, one crew was attacked by eight Junkers Ju 88 fighters and its gunners claimed three of them destroyed, one probably destroyed, one possibly, and damaged the remaining three.

In 1944 six Sunderlands from 10SQN were flown to Australia and operated with No.40 Squadron on transport duties. Several of its civilian twin, the Short Empire, flew with the RAAF and with Qantas, including two that were destroyed in the 1942 Japanese attack on Broome.

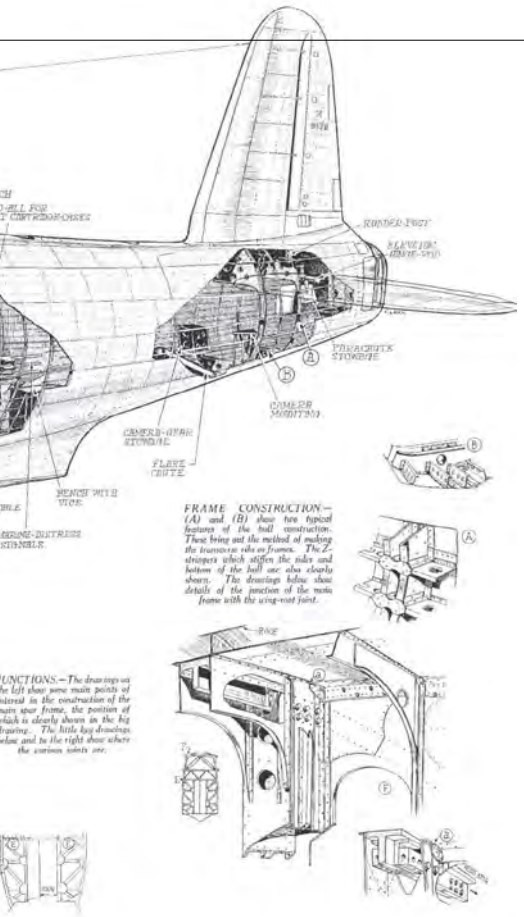


ABOVE Sutherland cutaway.

RIGHT TOP A 461SQN Sunderland, captained by FLTLT I.A. Clarke, attacks German U-boat submarine U106 off Cape Ortegal, Spain on 2 August 1943. Adding to the damage achieved by depth charges dropped from another Sunderland, the U-Boat exploded and went down vertically, killing 22 of the 48 German crewmen.

MIDDLE 461SQN captain FLGOFF J. Kennedy at the controls of 'C for Charlie' in February 1944.

BOTTOM After completing an air-sea rescue mission in May 1943, a 461SQN Sunderland suffered a holed hull. Rather than risk it sinking, its captain landed on an airfield near Pembroke Dock with little damage.



BELOW A dozen of No.461 ANZAC Squadron's Sunderlands at Pembroke Dock and in the bay.

A 43SQN Black Cat. (A Catalina now flown by the HARS Museum, NSW wears this aircraft's paint scheme.)

CAT BOATS

As No.10 Squadron would not be available for the defence of Australia, a flying boat squadron was needed at home. No.11 Squadron formed at Richmond, NSW on 25 September 1939 with just two Supermarine Seagulls and two Short Empire flying boats. Britain was not in a position to supply more aircraft, so in 1940 Australia looked to the United States.

When the first six Consolidated PBY Catalinas arrived at 11SQN in February 1941, they were sent to Port Moresby. Most were transferred to No.20 Squadron when it formed six months later. With the delivery of new Catalinas in November, 11SQN was reequipped, and the two squadrons worked together on joint operations, beginning with the search for survivors of HMAS *Sydney*.

RAAF Catalinas eventually came in two varieties: PBY-5 flying boats, which needed to have undercarriage attached in the water in order to be brought onto land (RAAF serials A24-1 to 68), and the PBY-5A/Canadian PB2B-1 amphibious version fitted with a retractable tricycle undercarriage (A24-69 to 114).

Crewed by eight men, the 'Cat' like the Sunderland had remarkable endurance which made it especially suitable for reconnaissance, supply-drop and air/sea rescue operations (ASR). Unlike their RAAF Sunderland counterparts in the Battle of the Atlantic, the Catalinas of Nos 11 and 20 Squadrons regularly bombed land targets as well as bombing and mining Japanese vessels.

Nos 42 and 43 Squadrons, two Communication Units, three ASR Flights and an Operational Training Unit were also equipped with Catalinas.

From Port Moresby in early 1942, Nos 11 and 20 Squadrons bombed Rabaul and other Japanese strongholds. With the Catalina's low speed making for long flights, crew fatigue was prevalent. Low-flying Cats were also easy targets for enemy ground fire and fighters.

One particular Catalina had an unfortunate role in the decision to alter the national insignia (roundel) painted on RAAF aircraft. After a bombing raid on Tulagi in the Solomons on 26 June 1942, the Cat was attacked by a US Navy F4F Wildcat fighter. The American pilot had mistaken the centres of its red, white and blue roundels for the Japanese *hinomaru* insignia. The roundel's red centre was subsequently deleted. At the same time the Moresby-base Catalinas relocated to Bowen, south of Townsville, where they were less vulnerable at base.

Catalina flights of 20 hours or more were common, leading to the motto "the first and the furthest". In 1943, in response to severance of the Australia-UK air route after the fall of Singapore, an even longer Qantas mail and passenger run, crewed by RAAF personnel seconded to Qantas and dressed in Qantas uniforms, was begun between Perth and Sri Lanka – a flight of some 30 hours.

Its low speed and great range made the Catalina particularly ideal for mine-laying – seeding harbours and shipping lanes with anti-shipping mines. Black Cats, painted black for night operations, carried out precision mine-laying from heights of just a few metres above the water for accuracy. Their missions helped to cripple the Japanese Navy.

In 1943/44 two more RAAF Catalina squadrons, Nos 43 and 42, formed at Bowen and joined 20SQN laying mines in the Netherlands East Indies.

RESCUE CATS

ASR was another role at which the Catalina excelled, exploiting its ability to alight on relatively rough seas. Numerous remarkable rescues of downed airmen are recorded. One involved two, almost three, rescues of the same airman. Keith Shilling was a wireless operator/air gunner in one of two Liberators shot down by fighters while bombing a Japanese light cruiser in the Flores Sea, Netherlands East Indies in April 1945.

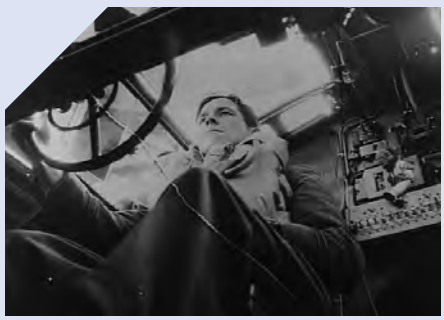
Shilling left the burning bomber through its bomb bay and parachuted down to the water. A Catalina from Darwin-based No.112 ASR Flight picked him up, but during take-off it was strafed by Japanese fighters and caught fire. Shilling wrote in his report: *Twenty minutes later a Catalina arrived and taxied close enough to pick me up. SGT Sayer from FLTLT Ford's crew was aboard, having been picked up earlier.*

I was exhausted and cold. I had swallowed a lot of salt water. We taxied around and picked up WOFF Vickers, also from FLTLT Ford's crew. The Catalina took off, landing again about 30 minutes later to pick up another survivor, whom I believe to be FSGT Faichnie. He was completely exhausted and was being pulled in over the gun blisters when the Catalina was attacked by a Zero from 12 o'clock. The Catalina caught fire immediately and sank three minutes later.

I had undressed as ordered and was going to bed in a bunk in the waist. I had been called forward for the landing and was in the navigator's position when the attack was made. The order was given to bale out, and I made my way aft. On the way a fuel line burst above me, pouring blazing fuel on to my back. This was extinguished by SGT Sayer who smothered the flames with a sleeping bag.

I escaped out of the port blister, naked and with no Mae West [flotation vest]. *I do not remember much for a few minutes, and when I regained my faculties, I was being kept afloat by two members of the Catalina crew, FLTLT Bulman and FSGT Scholes. Those two men had to let me go after 15 minutes owing to their Mae Wests coming undone. FLGOFF Becke helped me for the next 45 minutes. Through the fortitude of those men I was saved from drowning.*

A few minutes after the Catalina was hit, an air-sea rescue Liberator dropped



TOP RAAF launches being prepared to take a Catalina crew ashore, August 1941.

ABOVE Preparing to throw surrender leaflets from a Catalina gunner's blister down to Japanese troops, September 1945

LEFT Pilot of a RAF Catalina. RAAF crewmen manned many types of seaplanes in British service.

BELOW LEFT Armourers load a mine under the wing of a 43SQN Black Cat at Darwin in May 1945.

two large dinghies and one supply canister. After an hour's struggle, we reached one of the dinghies. Another Catalina [captained by FLTLT Corrie] *was directed to us by the Liberator. It landed after half an hour's battle with heavy seas and wind. We were eventually picked up. One dinghy was cut in half by the port wing float. As the last survivor clambered aboard, an Irving* [Japanese fighter] *was sighted making for us. The enemy made his first attack as we were taking off and scored hits. Our return fire did no visible damage. A running fight ensued for about twenty minutes. The attacks ceased and we headed for Darwin, reaching there about 2230 hours.*

Nine men had been picked up: six from Bulman's Catalina and three from the Liberators. But despite three days of searches for the other crewmen of the two Liberators lost that day, Shilling was the sole survivor.

After the war, Catalinas rescued many more men – the emaciated survivors of prisoner-of-war camps, flying them home.

A FEW OTHER TYPES

SUPERMARINE SEAGULL V (WALRUS)

The RAAF received some 60 Walrus single-engine amphibians, an improvement over the earlier wooden-hulled Seagull III. They served with Nos 5 and 9 Squadrons, notably aboard the cruisers HMAS Australia, Sydney, Hobart, Perth and Canberra. One went down with HMAS Sydney when it was sunk by a German raider off Western Australia in 1941. Another joined the 1947 Antarctic expedition but was wrecked in a gale at Heard Island. It has now been restored for display in the RAAF Museum, Point Cook.

VOUGHT-SIKORSKY KINGFISHER

The Vought-Sikorsky Kingfisher, an American naval observation scout could operate as a seaplane or be fitted with undercarriage for land use, although it was used mainly in the former configuration. The RAAF's examples flew reconnaissance patrols from coastal bases and catapult-equipped ships, as well as ASR operations.

No 107 Squadron was formed at Rathmines, NSW, in May 1943 to operate the Kingfishers originally ordered for the Netherlands East Indies Air Force. After a German U-boat sank a US liberty ship off the NSW south coast the squadron spent a week searching for it, to no avail.

DORNIER DO 24

Built in Holland for the Royal Netherlands East Indies Naval Air Force, six worn-out survivors of some 30 Dorniers escaped to Australia early in 1942 and were impressed into RAAF service. Five served as transports with No. 41 Squadron, supplying Goodenough Island, Milne Bay and Port Moresby. Two later flew with No. 8 Communications Unit in the ASR role.

The sixth flying boat escaped to Perth after surviving the Japanese attack on Broome in March 1942 and made clandestine flights to New Guinea for Dutch intelligence, before joining the RAAF in October 1943.

MARTIN MARINER

In the 1930s the Martin company in the USA designed and built its 'clipper' flying boat, which served alongside Boeing's clippers with the airline Pan Am. From that experience it designed the twin-engine PBM (Patrol Bomber, Martin) for the US Navy which also served with the Royal Air Force as the Mariner.

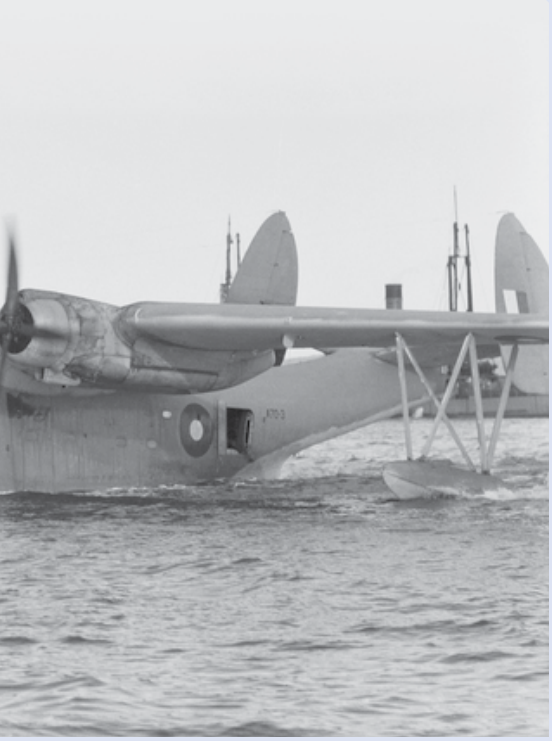
In late 1943, 12 Mariners were lend-leased to the RAAF as unarmed freight and personnel transports and together with Sunderlands of No. 40 Squadron made long-range deliveries to the island campaigns against the Japanese.

ABOVE Kingfishers at No.1 Flying Boat Repair Depot, Lake Boga, Victoria.

A Mariner transport of 41SQN taxies for take off at No.1 Flying Boat Maintenance Unit) at Bowen, Qld, May 1944. Though only twin-engined, the Mariner had a greater wingspan than the Sunderland.

RAAF FLOATPLANES & FLYING BOATS

TYPE	NO. IN SERVICE
1921-39	
Avro 504L	2
DH.60G Gipsy Moth	5 (est.)
DH.50A	1
Supermarine Seagull III	9
Fairey IIID	6
1939-45	
Supermarine Southampton	2
Supermarine Seagull V	25
Supermarine Walrus	37
Consolidated Catalina	169
Short Sunderland	6 (plus 140 in UK)
Short Empire	5
Douglas Dolphin	4
Sikorsky Kingfisher	18
Dornier Do24K	6
Martin Mariner	12
1950S-60s	
DHC-2 Beaver	2

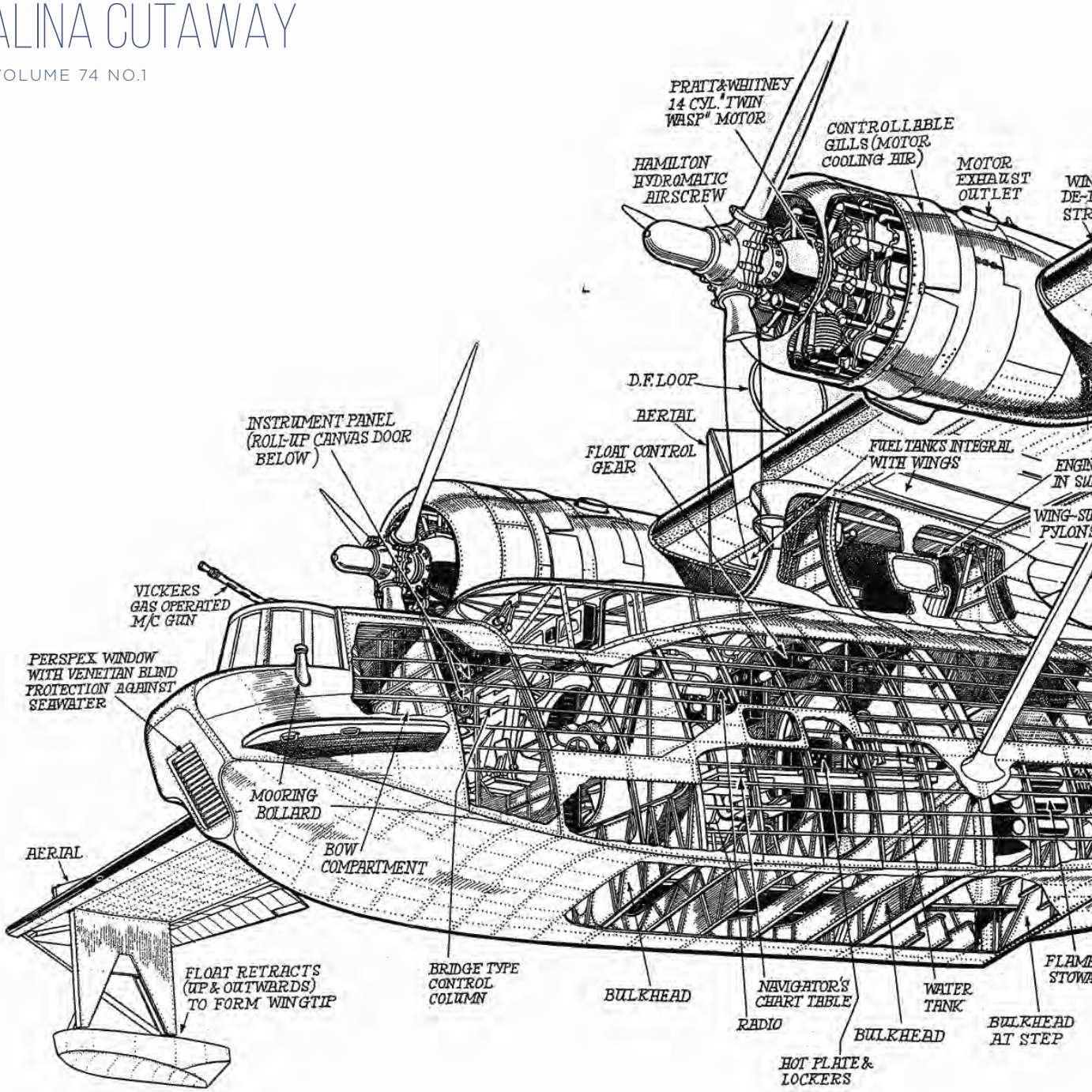


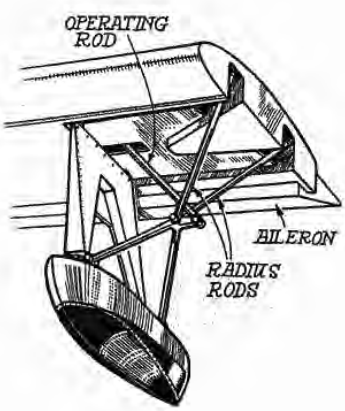
ABOVE A Dornier Do 24K of the Royal Netherlands East Indies Naval Air Force, from which the RAAF's examples were transferred, patrols the north-west of Australia.

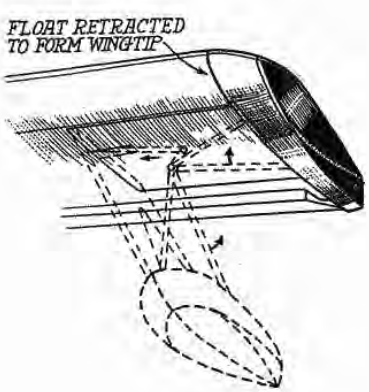
LEFT A Walrus amphibian of No.5 Fleet Co-operation Squadron RAAF being catapult-launched from a cruiser.

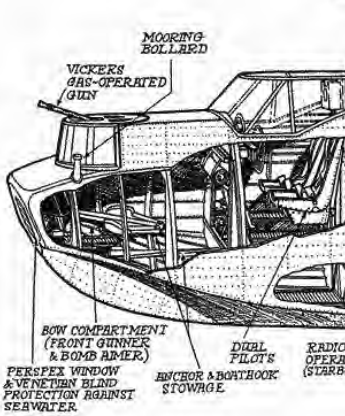
CATALINA CUTAWAY

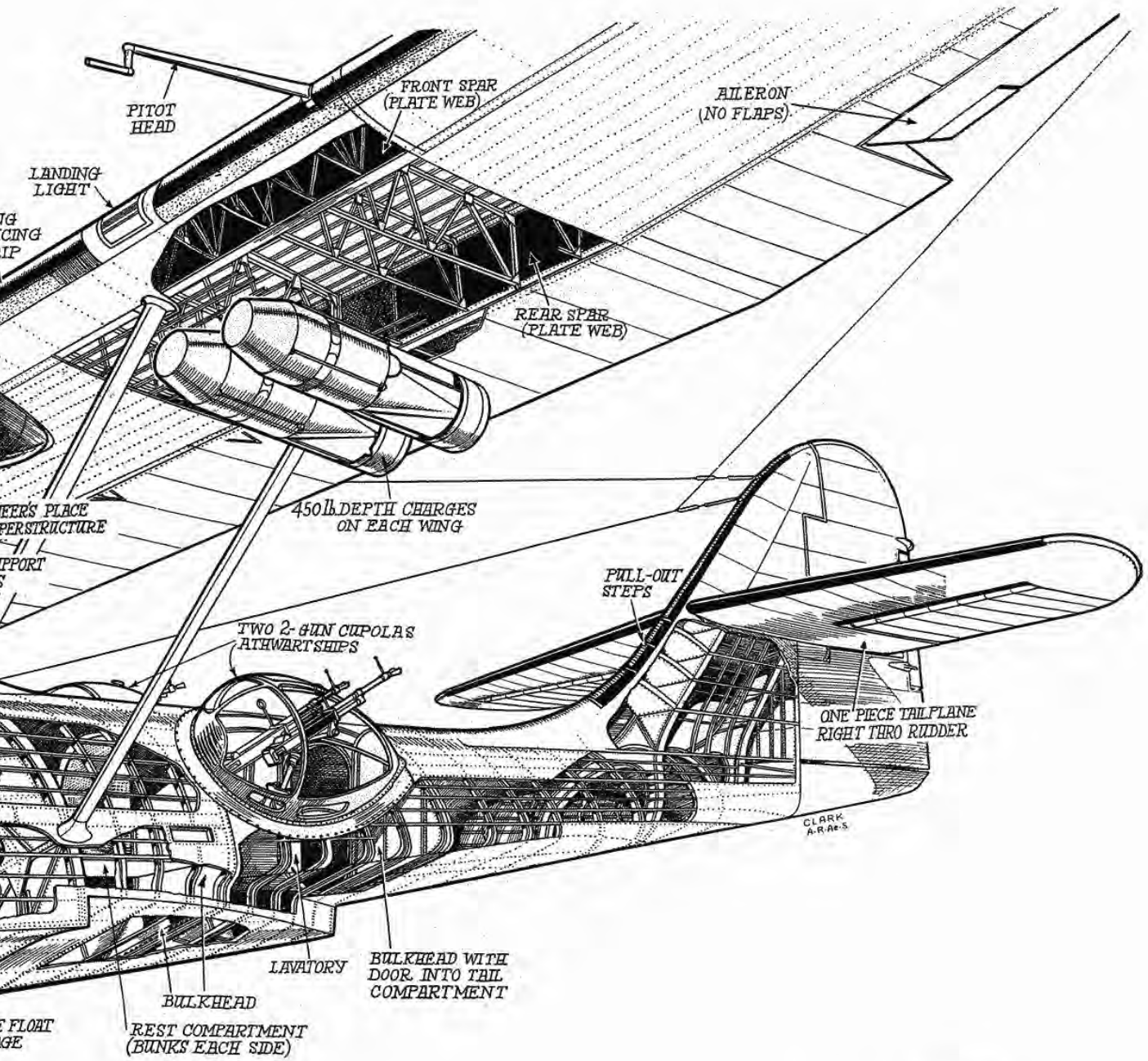
WINGS VOLUME 74 NO.1

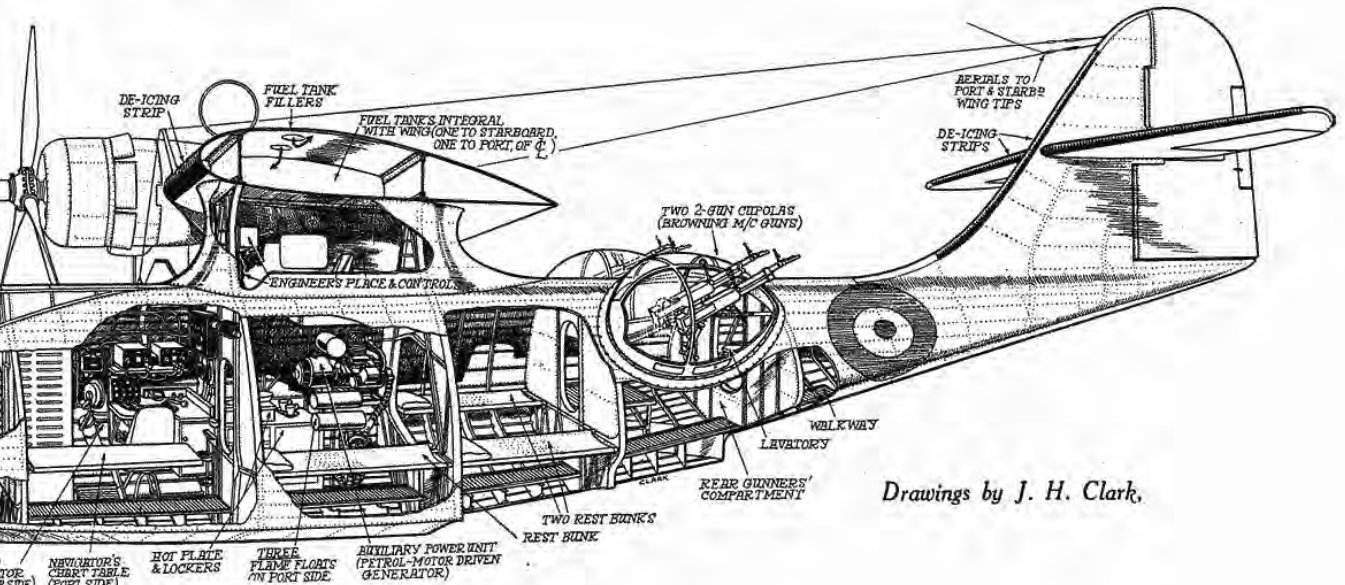






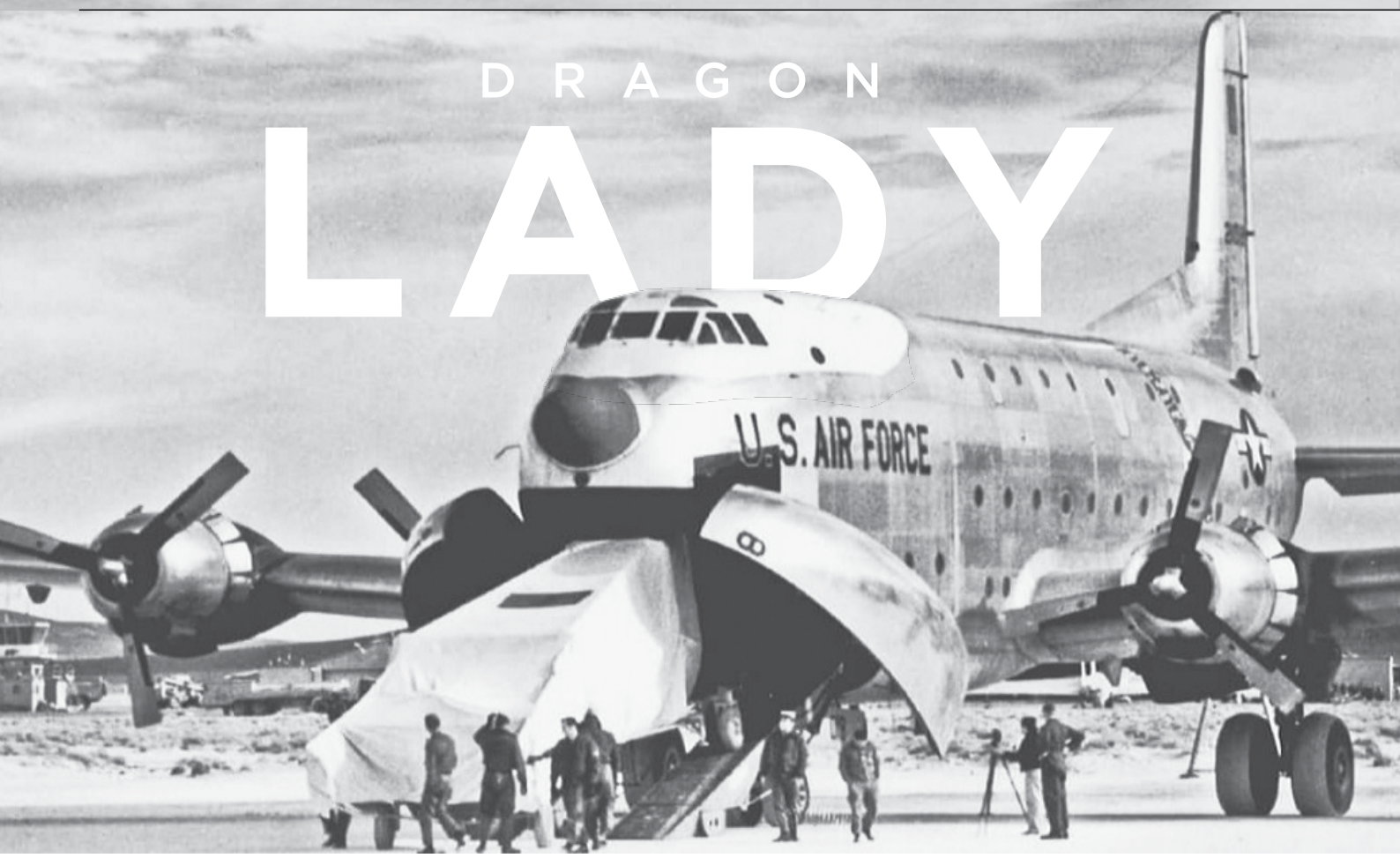






Drawings by J. H. Clark.

DRAGON LADY



CREATED TO MEET STRINGENT CIA REQUIREMENTS UNDER A TOP-SECRET PROGRAM, SKUNK WORKS' U-2 REMAINS AN INVALUABLE AERIAL INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE PLATFORM – 67 YEARS AFTER ITS FIRST FLIGHT.

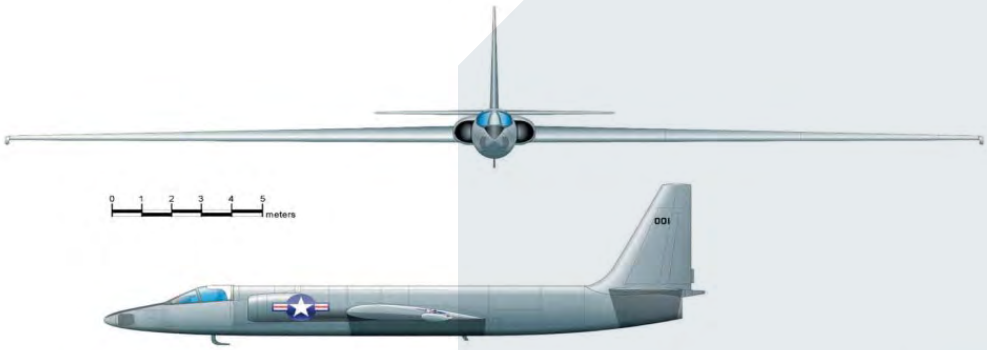
IN JULY 1953, the Bell Aircraft Corporation and the Fairchild Engine and Aircraft Corporation received study contracts from the US Air Force (USAF) Aircraft Research and Development Command (ARDC) at Wright Field to develop an entirely new high-altitude reconnaissance aircraft. In addition, the Glenn L. Martin Aircraft Company was asked to examine the possibility of improving the already exceptional high-altitude performance of the twin-engine B-57 Canberra.

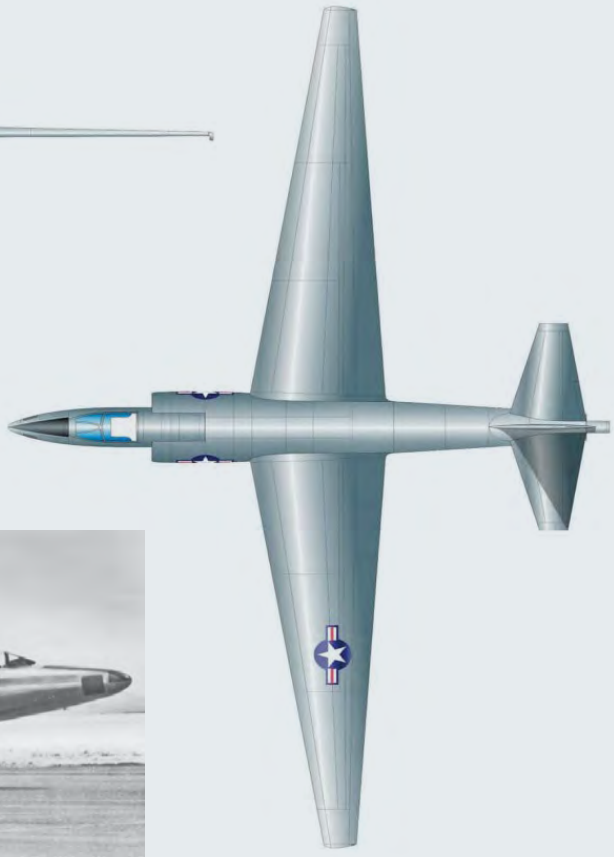
Within six months, all three firms had submitted proposals under what was called Project Bald Eagle - ARDC Project MX-2147. Martin's design was a big-wing version of the B-57, designated Model 294, designed to cruise at 64,000 feet. Fairchild's entry, the single-engine Model M-195, could reach 67,200 feet. Bell's offering was its twin-engine Model 67, which had a projected maximum altitude of 69,500 feet.

In March 1954, USAF Major John Seaberg, a former Chance Vought Aircraft aeronautical engineer, and other USAF engineers at Wright Field, evaluated the three contending designs and recommended adoption of both the Martin and Bell proposals. They considered Martin's proposal an interim project that could be completed and deployed rapidly while the more advanced concept from Bell was being developed. Fairchild's M-195 fell by the wayside.

Since the big-wing B-57 already had a B (for bomber) designation, the special version was simply identified as the D version of the RB-57 reconnaissance bomber, hence RB-57D. Bell's Model 67 needed an inconspicuous designator and X-16 (X for dedicated research) was applied to hide its true mission. Thus, the Martin RB-57D and Bell X-16 would be the USAF's dedicated high-altitude reconnaissance aircraft. Or would they?

ABOVE The first U-2, Article 341, was transported partially disassembled and shrouded from Burbank to Groom Lake (Area 51) onboard a Douglas C-124 Globemaster II. Photo: LM Code One.





BELOW Article 341 at Groom Lake before flight tests. Photo: LM Code One.

NEW KID ON THE BLOCK

As Bell and Martin were moving forward on their respective proposals, Lockheed in California got wind of the program. In early March 1954, management directed Kelly Johnson to come up with a proposal. Within a month his design, Lockheed Temporary Design Number-282 (TDN CL-282), was submitted to Wright Field as an unsolicited proposal. In May, MAJ Seaberg and his engineering fraternity evaluated the proposal and officially rejected it in June.

There were several reasons for rejection. Johnson's proposal was single-engine, using the unproven General Electric J73-X52 (formerly J47-21) turbojet. It also had unconventional landing gear. Seaberg favoured a twin-engine design using the Pratt & Whitney J57. Nevertheless, Johnson had great faith in his CL-282 design and continued to refine it while he looked for potential customers. The project was authorised in November 1954 as a joint USAF/CIA program, and given the USAF codename Oarfish and CIA codename Aquatone. The airplane itself was designated U-2 (the U prefix for utility to hide its true purpose).

Bell, meanwhile, had received a contract to produce 28 X-16 airplanes with the first to fly in the spring of 1956.

On 22 December 1954, Lockheed received a contract to produce 20 single-seat U-2s and a single two-seat trainer, plus spares. The USAF would supply the engines. Johnson's choice, the J73, was replaced with a special high-altitude version of the Pratt & Whitney J57 Turbowasp – the J57-P-13. A formal CIA contract was signed on 2 March 1955, and called for U-2 deliveries between July 1955 and November 1956. With Johnson's assurance, the first flight was to occur no later than 2 August 1955.

The Bell X-16, designed by Bill Kux, was patented in April 1958. A full-scale engineering mockup was built and inspected. The first example was about 80 percent complete when the X-16 program was terminated in the late summer of 1956, leaving the big-wing RB-57D to carry the torch until the new kid – the 'super glider' from Johnson and his Skunk Works – arrived.

Referred to as the Angel in Skunk Works, the Article by the CIA and Dragon Lady by the Air Force, the U-2 was created to meet stringent CIA requirements under a top-secret program. The development and operation of the U-2 were critical to US national security and enjoyed top-priority status.

ABOVE The premier U-2 (CIA article 341) in three-view as it appeared on its official first flight date of 8 August 1955. Artwork: Giuseppe De Chiara.

BELOW Kelly Johnson with an early version of the U-2.

FIRST FLIGHT

Once onsite at the newly acquired Groom Lake facility (Area 51) in Nevada, the first U-2 – Article 341 – was reassembled and ground tested in preparation for initial taxi tests and subsequent flight test. On 27 July 1955, preliminary taxi runs were performed, Lockheed test pilot Tony LeVier taking the craft to 50 knots. On 4 August, he took off on an unofficial first flight to see if the Angel was a lady or a tramp before anyone was around. Four days later, with CIA and USAF dignitaries in attendance, the official first flight was made. LeVier took Article 341 up to 32,000 feet and made a near-perfect demonstration flight before landing.

Lockheed Skunk Works test pilot Bob Matye soon expanded the U-2's altitude envelope to its maximum operational ceiling. Matye later become chief engineering test pilot on the F-104 program.

1960 SHOOTDOWN

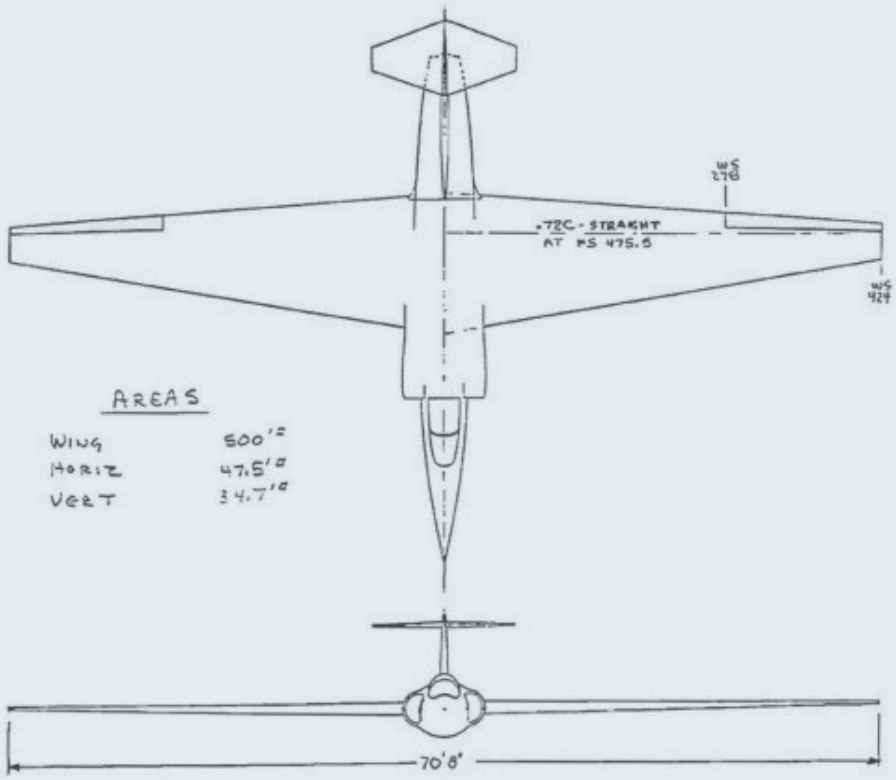
In May 1960, the U-2 was thrust into the public eye. U-2C Article 360 (serial 56-6693), piloted by Francis Gary Powers, took off from Pakistan on a CIA mission to photograph Soviet intercontinental ballistic missile sites at the Baikonur and Plesetsk Cosmodromes, as well as the Chelyabinsk plutonium plant. However, the Russians knew about the mission and Powers was shot down by a surface-to-air missile in the Ural Region. A MiG-19 sent to intercept the U-2, which could not reach its altitude of 65,000 feet, was also brought down by a SAM and its pilot killed.

Powers parachuted out and was captured, put on trial and convicted of espionage. He was sentenced to three years' imprisonment plus seven years of hard labour. However (as depicted in the 2015 movie *Bridge of Spies*), after 21 months' captivity, he was exchanged in Germany for Soviet intelligence officer Rudolf Able and returned to America.

The incident had a profound impact on international relations at the height of the Cold War. US President Eisenhower had denied the existence of CIA spy missions. The initial US claim that the U-2 was on a NASA weather research flight was used by Soviet Premier Krushchev to embarrass Eisenhower into admitting that he had lied to the American public. Not only did the Russians have Powers' admission that he was on a spy mission, but they also had the U-2 wreckage with its surveillance equipment.

Another consequence of the shootdown, which had revealed the vulnerability of the subsonic U-2, was the acceleration of development of Lockheed's triple-sonic A-12 (Project Oxcart) which first flew at Area 51 in 1962, and subsequently its derivative the SR-71 Blackbird.

U-2s made reconnaissance flights over Cuba prior to the 1961 Bay of Pigs invasion. A missile claimed a U-2 and its pilot over Cuba in 1962, a week after revealing deployment of Soviet offensive missiles which sparked the Cuban Missile Crisis. At the same time, Republic of China (Taiwanese Air Force) pilots were flying U-2s over China, and since then the Dragon Lady has overflown almost every political and military hotspot on the globe.



ABOVE Johnsons original submission (TDN CL-282) was largely based on the fuselage of his F-104 fighter design and was to be powered by a single General Electric J73 turbojet engine. Image: LM Code One.

U-2A SPECIFICATIONS

CREW: One (pilot)

PROPULSIVE SYSTEM: One non-afterburning, axial-flow, 11,000-lbf Pratt & Whitney J57-P-37A turbo-jet engine

LENGTH: 15.24m

WINGSPAN: 24.38m

EMPTY WEIGHT: 5,929kg to 7,464kg, depending on equipment

GROSS TAKEOFF WEIGHT 10,225kg to 10,954kg depending on equipment

MAXIMUM CRUISE SPEED: 740kph at 65,000ft

SERVICE CEILING: Over 70,000ft

CRUISE DURATION: 8 hours

ARMAMENT: None

U-2 JOINS THE NAVY

Early U-2s didn't have limitless range and often couldn't be based close enough to regions of interest. Thus, the CIA and the US Navy initiated Project Whale Tail in the early 1960s to investigate the feasibility of operating U-2s from the angled decks of the largest aircraft carriers then in service.

Several U-2s were fitted with arresting hooks so that they could engage one of several cables (preferably the third) strung across the carrier deck. Those U-2s also featured reinforced landing gear for their violent on-deck recovery and were equipped with special wing spoilers to dump lift and eliminate the tendency to glide in ground effect. Later carrier-borne U-2s had folding wingtips to minimise their hangar footprint.

The first U-2 take off from an aircraft carrier was made from the relatively new USS *Kitty Hawk* (CVA-63) off the coast of San Diego, California on 5 August 1963. The following March, the first U-2 arrested landing was made onboard the Forrestal-class USS *Ranger* (CVA-61).

As aircraft carriers take some time to position at long range, U-2 carrier operations were rather sparse. By the time the U-2 arrived on scene, perhaps several weeks after the need for their reconnaissance service, the urgency could well have passed.

U-2R SPECIFICATIONS

CREW: One (pilot)

PROPULSIVE SYSTEM: One axial-flow, 17,000-lbf Pratt & Whitney J75-P-13B turbojet engine or 18,000-lbf General Electric F118-GE-101 turbofan

LENGTH: 19.17m

WINGSPAN: 31.40m

EMPTY WEIGHT: Classified

GROSS TAKEOFF WEIGHT: Classified

MAXIMUM SPEED: 724kph

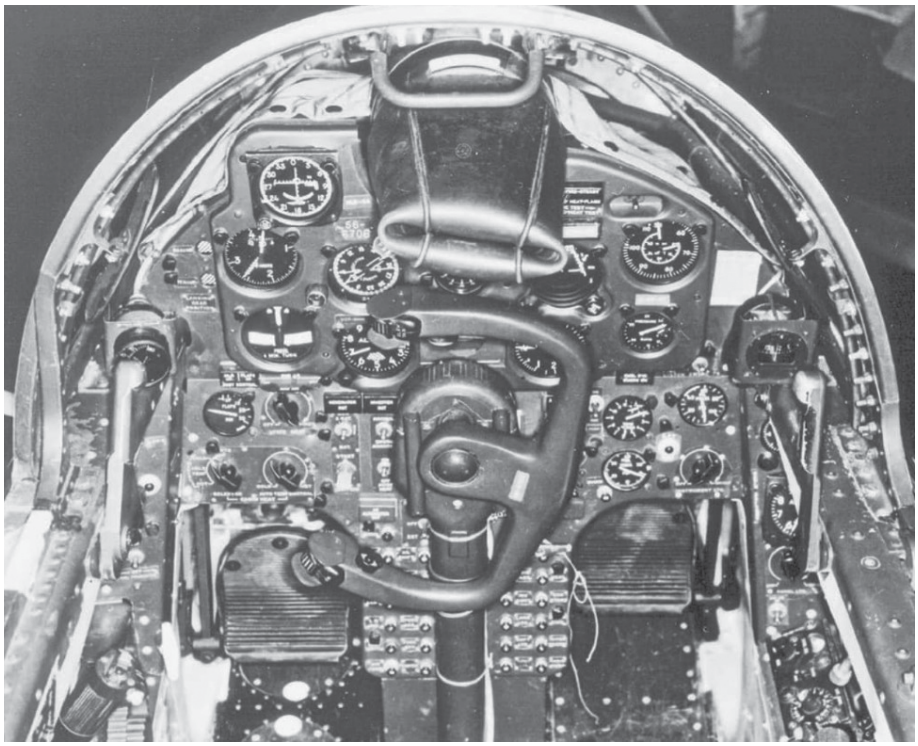
MAXIMUM RANGE: over 4,830km

SERVICE CEILING: over 70,000ft

PAYLOAD: Many combinations of intelligence gathering equipment, most of which are classified

LEFT Francis Gary Powers with a U-2.

BELOW LEFT Cockpit dashboard of a U-2A, USAF serial no. 56-6706. Photo: National Museum of the US Air Force.



U-2 SNIPPETS

- When the USAF initially turned down Johnson's CL-282 design, its development under Project Aquatone was funded by the CIA, the only government agency that could spend government funds without accounting for them. Project head was Richard Bissell Jr, aide to CIA Director Allen Dulles.
- When Johnson ordered altimeters for the U-2 which read up to the unprecedented altitude of 80,000 feet, he came up with a cover story that they were for an experimental high-altitude rocket.
- Jet Propellant Thermally Stable fuel was developed specifically for the U-2. It costs three times more than the USAF's standard jet fuel.

REBIRTH: THE U-2R

Even though the U-2's intended replacements, the Lockheed A-12 and SR-71 Blackbird, were blasting to higher altitudes at more than three times the speed of sound, development of the lower-altitude, subsonic U-2 continued. The U-2R version was about 40 percent larger than its predecessors and could carry more equipment within its fuselage and in underwing pods.

Skunk Works test pilot Bill Park was the first to fly the new U-2R version of the Dragon Lady out of the restricted North Base facility on Edwards Air Force Base in August 1967. He began aircraft carrier trials in November 1969, operating U-2R N812X off the USS *America* (OVA-66).

PROJECT RAINBOW

The U-2 proved to be highly susceptible to Soviet radar detection. Beginning in August 1956, just two months after the U-2 became operational, Secret Project Rainbow was initiated. Skunk Works, assisted by the Massachusetts Institute of Technology's Lincoln Laboratory, tried to cure the aircraft's radar reflectivity. Various anti-radar treatments were applied, including thin film-like veneers called 'wallpaper' and external structures called 'wires'.

During its first Project Rainbow test flight on 4 April 1957, the premier U-2, nicknamed Dirty Bird (Article 341), crashed to destruction, killing pilot Robert Seiker. Only one other Dirty Bird (Article 344) was used in the Project Rainbow program.

The project proved unsuccessful and was abandoned after a year, replaced by Project Gusto and Oxcart, the Lockheed A-12.

THE ULTIMATE U-2: TR-1A

The U-2 program was a very successful venture for Lockheed and as U-2R production was nearing its end, Skunk Works designed an advanced version in the hope of generating additional funds for the firm.

To get the program rolling, the USAF ordered three aircraft – one designated ER-2 (prefix ER for Earth Resources) and two designated TR-1B. The single ER-2, the TR-1A program testbed airplane (USAF serial number 80-1063), was first flown at Palmdale on 11 May 1981, with Skunk Works engineering test pilot Art Peterson at the controls. Following USAF flight test and equipment evaluations, it was delivered to the National Aeronautics and Space Administration (NASA) as serial N706NA.

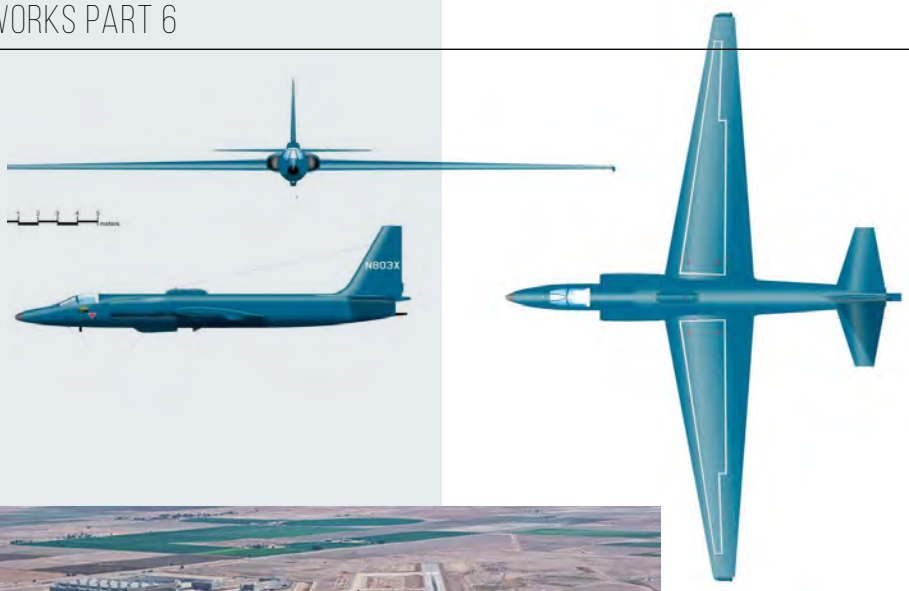
Skunk Works engineering test pilot Ken Weir test flew the first military-equipped TR-1A on 1 August 1981. Peterson made the first flight of the two-seat TR-1B from Palmdale on 23 February 1982, before that pair of aircraft (80-1064 and 80-1065) were delivered to the USAF. The 37th and last production TR-1 was delivered in 1989.

STILL FLYING

While the TR-1 was the end of the line for U-2 design, many earlier U-2s were modified and retrofitted to perform a variety of roles and clandestine missions.

Sixty-seven years after its first flight, the U-2 is still an invaluable aerial intelligence, surveillance and reconnaissance platform. In 2014, moves were made to retire the fleet; the USAF wanted them gone in favour of less expensive, remotely piloted RQ-4 Global Hawks. But for the time being the Dragon Lady continues to soar, long outlasting its original Mach 3 replacement, the SR-71 Blackbird, which was retired in 1998.

Edited excerpts and photographs are used (with permission) from The Projects of Skunk Works *by Steve Pace (Voyageur Press).*



ABOVE U-2R number one (USAF serial no. 68-10329) in three-view. Artwork: Giuseppe De Chiara.

LEFT U-2S (formerly TR-1A) over USAF Plant 42, 16 April 2002. Photo: LMSW/Denny Lombard.

TR-1A/B SPECIFICATIONS

CREW (TR-1A): one (pilot/tactical reconnaissance systems operator)

CREW (TR-1B trainer): two (instructor, student pilot)

PROPULSIVE SYSTEM: As for U-2R

LENGTH: As for U-2R

WINGSPAN: As for U-2R

EMPTY WEIGHT: 7257kg

GROSS TAKEOFF WEIGHT: 18,144kg

MAXIMUM SPEED: 724kph

MAXIMUM RANGE: over 4,830km

CEILING: over 70,000ft

ARMAMENT: None

PAYLOAD: 2,268kg

THE COLD WAR COMES TO AUSTRALIA

On 17 October 1960, a US Air Force C-121 carrying an advance party arrived at RAAF East Sale, Victoria. Over the next week, 115 personnel and 110 tonnes of equipment were delivered, followed on 26 October by three single-seat U-2s, four reconnaissance versions of the B-57 Canberra with three crewmen each, and two C-54 search-and-rescue aircraft with five crewmen each.

Operation Crowflight VI had arrived. It was of the High-Altitude Sampling Program (HASP), a global program between 1957 and 1963 aimed at collecting air samples of the gas krypton-85, a tell-tale sign of plutonium production and nuclear testing. By accounting for the presumed contribution of 'friendly' sources, Soviet nuclear production could be estimated.

Under the guise of weather research, those specially modified aircraft made atmospheric sampling flights over the Southern Ocean. Equipped with side-mounted air scoops for the collection of radioactive gas, they were operated by the USAF 4028th Strategic Reconnaissance Squadron, which also sent detachments to Europe, Alaska and Puerto Rico.

Although HASP was highly classified, an ABC film crew was engaged to make a short documentary about Operation Crowflight VI. After that first Australian-based operation ceased in December 1960, short-duration Crowflight deployments were subsequently made to East Sale and Laverton the following year (prompting at least one UFO sighting in Tasmania) and periodically between 1962 and 1965.

The RB-57s returned to RAAF East Sale in 1965 and replaced the U-2s. The series of of Crowflight operations was terminated the following February. However, in August 1966 a WU-2 (weather research U-2) flew out of Laverton on Operation HICAT, research into high-altitude clear air turbulence. Interestingly, RAAF roundels were painted on its tail. In 1987 and 1993, single ER-2s were flown by NASA out of Darwin and Townsville on stratospheric research.

A U-2 modified for HASP flights – note the additional air scoops on the lower fuselage, and air valve in the nose.

RIGHT A U-2A takes off from RAAF East Sale on a Crowflight VII operation in May 1961. Photo: Australian War Memorial.

ABOVE The U-2A / WU-2, which made Operation HICAT flights from RAAF Laverton in 1966, now displayed in the National Museum of the US Air Force. Photo: NMUSAF.

A BRIGHT FUTURE

A DEFENCE RESEARCH PROGRAM IS DEVELOPING POWERFUL LASERS CAPABLE OF VAPORISING OR LIQUIDISING OBJECTS.

PHYSICISTS DR MIFTAR GANIJA AND DR KEIRON BOYD are leading an exciting laser research program for Defence. The Defence Science and Technology Group (DSTG) and University of Adelaide program is developing lasers that can transmit ultra-short pulses of high-energy light known as ultrashort and short pulsed lasers (USPL). The lasers are orders of magnitude more powerful than standard lasers and capable of vaporising or liquidising objects.

The ultrashort laser pulses are as brief as a quadrillionth of a second and 100 trillion times brighter than sunlight.

When shone on a material, the laser bursts create extremely high temperatures and pressures that turn the material into plasma, the fourth state of matter. Those conditions are normally only found at the heart of an explosion of thousands of tons of TNT or small nuclear bombs. Importantly, the brief laser pulses do not cause an increase in the temperature of the material surrounding the target.

"The scope of USPL applications is expanding rapidly and requires new laser sources technology to enable them," says Dr Ganija. "The range of applications is very broad, encompassing industrial, scientific, medical, environmental, sensing and defence. Some commentators predict that the 21st century will be the 'USPL century', mirroring the rapid growth in technology in the 20th century with the development of solid-state electronics."

SOVEREIGN CAPABILITY

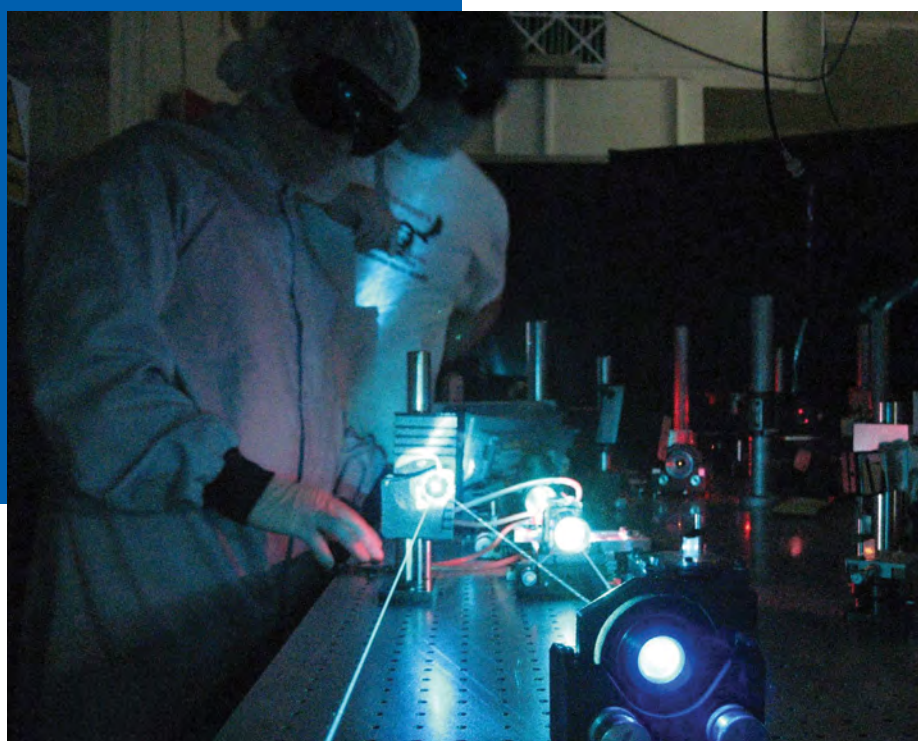
According to Dr Ganija and Dr Boyd, both based at DSTG Edinburgh, SA, it is critical that Australia develops a sovereign USPL capability for defence applications in order to understand and counter current and emerging military threats associated with USPL technology.

"There is a shortage of USPL technology development and workforce in Australia," says Dr Ganija. "Our joint DSTG/University of Adelaide USPL team has identified a pathway to address those deficiencies through the 'dual-use' approach. That involves creating a sovereign eco-system in USPL industrial and science capability, thereby ensuring that we are in a position to address Defence's critical mid and long-term needs."

By systematically building and characterising USPL laser systems, the team is adding to the understanding of the physics of USPL and the engineering required to develop USPL systems. The current system employs cryogenic

LEFT Dr Miftar Ganija investigates USPL systems in the lab.

BELOW USPL research experiment in progress.



cooling and is leading the charge on the international stage, achieving impressive pulse and peak power energy levels.

Dr Ganija joined DSTG from the University of Adelaide and supports research programs at both organisations through his position as DSTG-University of Adelaide Professor of USPL. "I am leading over a dozen researchers in the USPL program and support from DSTG has been critical to ensuring the continuity of my role, my research with the university and enabling me to inspire new students to the program," he says.

The current USPL program can be traced back to 2014, when Dr Ganija received funding through the University of Adelaide's Institute for Photonics and Advanced Sensing, at that stage headed by Professor Tanya Monro who is now Australia's Chief Defence Scientist. The pilot project allowed Dr Ganija's work to flourish.

The University of Adelaide appointed him as a Senior Research Fellow under the Beacon Research scheme, established to retain, attract and support mid-career researchers of outstanding research calibre and potential. Under that fellowship and with further support from DSTG, Dr Ganija developed the platform for USPL and its dual-use applications.

SHORTAGE OF EXPERTS

"There is a world-wide shortage of scientists with expertise in the USPL technology and its applications, and this is perhaps the greatest threat to the realisation of the USPL potential and its commercialisation within Australia," says Dr Ganija.

"Education of highly qualified scientists and technologists in this field at postgraduate and post-doctoral levels will be driven by Defence imperatives.

"We also plan to increase industry partner engagement in the research, providing opportunities to up-skill industry. Partner organisations will also have the opportunity to assess our researchers prior to offering them employment. A proposed USPL Centre at the University of Adelaide will offer education and training for Defence personnel, allowing the centre to be Defence-oriented and support Defence needs."

WHAT WOULD HAPPEN IN ZERO G?

MORE THAN 10 YEARS AGO, THE ASIAN TRY ZERO-G PROGRAM BEGAN OFFERING STUDENTS THE OPPORTUNITY TO DESIGN AND SUBMIT EXPERIMENTS THAT COULD BE DONE IN THE JAPANESE EXPERIMENT MODULE OF THE INTERNATIONAL SPACE STATION.

HAVE YOU EVER ASKED YOURSELF what would happen to this in Zero-G (without gravity)? There have been many toys sent to the International Space Station (ISS) and astronauts get the opportunity to experiment and have fun with them.

Yo-yos, swimming frogs, basketballs, paper boomerangs, slime and even Buzz Lightyear have been to space – scan the QR code on the opposite page to see some videos. The original boomerang experiment, using a four-wing model, was inconclusive – the boomerang flew but did not come back. Then in 2008 Japanese astronaut Takao Doi tried a three-wing boomerang which successfully returned. He became the first astronaut to fly a boomerang in space.

Takao Doi delivered the Japanese Experiment Module, called Kibo (which means hope in Japanese), to the ISS in 2008. Kibo consists of several components: two research facilities; a pressurised module (PM); an exposed facility; a logistics module; a remote manipulator system; and an inter-orbit communication system unit.

Kibo has a scientific airlock through

which experiments are transferred and exposed to the external environment of space. The PM provides a shirt-sleeve environment in which astronauts conduct microgravity experiments.

In 2011, Japan Aerospace Exploration Agency (JAXA) began the Asian Try Zero-G program with the goal of promoting crewed space experiment activities aboard Kibo. Students from the Asia-Pacific region (Kibo ABC countries) were invited to design and submit experiments that could be done in the Kibo module. Over the history of the project, some amazing experiments have been selected. All of the experiments used minimal resources.

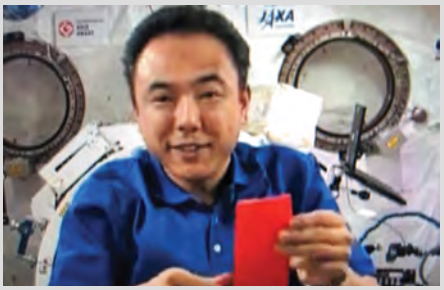
One experiment proposed by students in Indonesia and Singapore, involved observing the flight trajectory of four paper boomerangs, very different to the one thrown by Takao Doi. None of them returned and the students concluded that was due to the limited space available on the ISS.

Asian Try Zero-G 2022 has been brought to Australia to enable Australian students to pursue research and challenges in the Zero-G environment onboard the ISS.

Students are asked to design and submit proposals for simple microgravity experiments that can be easily performed onboard the ISS. Proposals will be reviewed by a panel of space professionals and, if their experiment is selected, the students will be guided in preparing it for launch. There will be two categories: under 18 years old; and young scientists and engineers, up to 27 years old.

The conduct of experiments will be transmitted to JAXA's ground station at Tsukuba Space Centre, Japan and broadcast live.

For program details and to apply visit onegiantleapfoundation.com.au/asian-try-zero-g.



TOP Conservation of weight using paper and a weight.

ABOVE Aircraft stability using a balsa plane model.

LEFT The paper boomerang experiment.

OPPOSITE Liquid Density action.

Images: JAXA/NASA.

Scan the QR-code to view videos of experiments with different toys in Zero-G.

UNCONQUERED TOGETHER

THE NEWLY FORMED INVICTUS AUSTRALIA HAS A BIG YEAR AHEAD, INCLUDING SUPPORTING A TEAM OF VETERANS COMPETING IN THE INVICTUS GAMES IN THE HAGUE, IN PARTNERSHIP WITH THE AUSTRALIAN DEFENCE FORCE.

IN OCTOBER LAST YEAR, Australia achieved a world first with the launch of Invictus Australia. Previously known as Veteran Sport Australia (VSA), the not-for-profit organisation is the legacy of the Invictus Games Sydney 2018.

Through collaboration with sport, community and veteran organisations, Invictus Australia expands the opportunities for veterans and their families to engage in sport from grassroots participation through to international competition, such as the upcoming Invictus Games The Hague 2020.

Originally scheduled for 2020, The Hague has been postponed twice due to COVID-19 and is now scheduled for April 16-28 this year. The games demonstrate the power of sport to positively influence the recovery, rehabilitation and reintegration of current and former-serving Australian Defence Force (ADF) personnel; the core philosophy of Invictus Australia.

With the motto Unconquered Together, Invictus Australia supports veterans and their families by connecting them to sport and recreation opportunities, whether it's by participating in a local sporting club on the international stage, or through volunteering, coaching or mentoring.

The organisation's immediate priorities are to extend its reach to provide sport recovery services in all states and territories, reaching as many of Australia's estimated 613,000 veterans as possible, as well as to support Team Australia at the Invictus Games in The Hague in partnership with the ADF.

Chief Executive of the Invictus Games Foundation (UK), Dominic Reid OBE

LEFT Gabriel Ramon with coach and mentor Rachel Kerrigan from Invictus Australia.

hopes Invictus Australia will be the first of many international partnerships. "In recent years, the Invictus Games Foundation has reflected on how best to continue to support its international community of wounded, injured and sick service men and women, in particular beyond the success of our global Invictus Games," he says.

"We were delighted to be approached by Veteran Sport Australia, set up following Invictus Games Sydney 2018, with a proposition to expand the Invictus model to boost the international impact 'down under'."

Working with the ADF, Invictus Australia is sending 26 former and serving Defence veterans as part of the 32-strong Team Australia to this year's Invictus Games. The veterans represent all three services, including five from the RAAF, competing across nine sports.

RAAF veteran Gabriel Ramon will be competing in athletics, indoor rowing and powerlifting.

As an Airfield Defence Guard, Gabriel deployed to the Middle East Region in 2016. The following year he ruptured a ligament in his right knee during a field training exercise. Despite multiple surgeries, he was left with a deteriorating knee injury and was medically discharged in September 2019. He also suffers from post-traumatic stress.

Before his four-year stint in the RAAF, Gabriel pursued a career as a rugby league player. He also practised mixed martial arts and ran a strength and conditioning gym. His knee injury severely restricted participation in the sports he once enjoyed.

"Sport has always been a focus for me," Gabriel says. "In my downtime, sport and outdoors were embedded in my lifestyle."

Meeting VSA (now Invictus Australia) veteran engagement specialist Rachel Kerrigan at an ADF transition day changed Gabriel's outlook. Rachel, a RAAF veteran who has found solace through sport, encouraged Gabriel to take a fresh approach.

"He didn't think he could do the sports he was interested in, as he could no longer run, squat or move the way he used to," Rachel says. "I discovered he did lifting in the gym and had quite an incredible (bench) press for the amount of training he had done."

Rachel connected Gabriel with local coaches to help him gain a sense of purpose and focus again, and is now coaching Gabriel and helping him prepare for The Hague.

Gabriel says the biggest hurdle for veterans with sustained injuries is accepting a new reality. "Understanding that these are injuries for life, but it is possible to find something that motivates you, and work towards," he says.

"It has given me the platform to apply myself again to a competitive sport, which has helped me stay motivated and goal orientated."

While the postponements to the Invictus Games have been a challenge, Gabriel says he is now "super excited", and a little bit nervous.

"It surely has been a test and I still feel like I'm being tested to my limits," he says. "But with my teammates and awesome co-captains, (Corporal Sarah Petchell and Sergeant Shane Bramley) checking on me and the support from Rachel Kerrigan from Invictus Australia guiding me with her programs, I couldn't be any more ready.

"I have faith in their programs and it shall get me peaking at the right time for the games."

Other RAAF veterans in Team Australia are Flight Lieutenant Ashley Muir (cycling, powerlifting, indoor rowing, wheelchair rugby and sitting volleyball), Sergeant Nathan King (athletics, indoor rowing, swimming and sitting volleyball) and Stephen French (athletics, indoor rowing, wheelchair basketball and wheelchair rugby).

For more information, go to invictusaustralia.org.

THE JET AGE

THE FOURTH AND FINAL INSTALMENT OF THE 100-YEAR HISTORY OF QANTAS, FOCUSES ON THE JET ERA AND THE AIRLINE'S MORE RECENT HISTORY.

DURING ITS FIRST 50 YEARS, Qantas continued to grow and survive despite sometimes overwhelming challenges that ranged from the design deficiencies of early biplanes to the loss of huge flying boats and their crews during World War II. Those lessons would never be forgotten and would stand Qantas in good stead as it grew into a truly global airline of the 21st Century.

On the 7 August 1955, Boeing test pilot Alvin 'Tex' Johnston taxied his company's latest technology aircraft out at Seattle's Boeing field for a demonstration flight organised by Boeing President Bill Allen. Allen had invited various airline executives to watch the annual hydroplane races during Seattle's Seafair week and wanted to add to the excitement of the day with a flypast of his company's first jet transport aircraft, the Boeing 367-80, forerunner of the successful B707.

As Tex made his first approach over the assembled group, no-one expected the display they were about to witness. Pulling into shallow climb, Tex applied full left aileron and rolled the large four-jet-engine airliner through 360 degrees. He repeated the aerobatic 1G manoeuvre on his return flypast. As an experienced test pilot, he knew the manoeuvre looked much more spectacular than it was dangerous. Properly executed, the barrel roll applied no more stress to the aircraft than flying straight and level even though it was upside down.

Ordered into Allen's office the following day to explain his actions, Tex simply replied: "I was selling airplanes". And sell aeroplanes, he did. Within four years, Pan Am, American Airlines, Continental and TWA were already beginning to mothball their propellor powered fleets in favour of the game-changing jet airliner.

Though likely unimpressed with the showy stunt, Qantas' chairman and managing director Hudson Fysh was nevertheless impressed with the 707, convinced Boeing had built a winner.

LEFT Qantas Boeing 707-138, 1959.

Boeing 367 inverted in mid roll.

THE JET AGE BEGINS

Qantas' entry into the jet age was a decade in the making. As the war years began to fade away, Qantas continued to grow into a solid and profitable business. Although the aging Lancastrians had been retired from service, a menagerie of propeller-powered aircraft still wore the QEA logo. Douglas DC3s, PBY Catalinas, L749 Constellations and DC4s remained the backbone of the airline's overseas operations in the early 1950s. By 1953, the fleet of 749 Constellations was in need of replacement and political pressure was being applied to purchase the British-produced jet airliner, the de Havilland Comet 1.

Powered by four of de Havilland's own 5,000-pound-thrust, Ghost jet engines, the Comet had first flown in 1949. Able to climb to over 40,000 feet and cruise at around 320 knots (590km/h), the aircraft looked stratospheric on paper. Sadly however, in 1954 two separate and shocking accidents grounded the Comet 1 forever from airline operations. BOAC flight 781 and South African Airways flight 201 both broke up in flight due to a previously unknown phenomenon – metal fatigue. Following an exhaustive investigation, the Comet 1 with its square windows was withdrawn from service and a redesigned and safer Comet 2 with oval shaped passenger windows was released to the market.

Even prior to those disasters, the Qantas board had remained sceptical of the Comet family, preferring the Constellation's newer big sister – the L1049 Super Constellation. Although slower and unable to reach the same lofty flight levels as the de Havilland Comet, the new L1049 aircraft was a sleek and more profitable option. Elegant and impressive, the Super Connie endeared itself to the public and crews alike, but the era of the propeller-driven airliner was swiftly drawing to a close. Vast improvements in design, technology, efficiency and speed made the need to step up to the new world order of jet airliners an imperative for Qantas if it was to continue to grow.

Together with a select group of experts from all departments of the airline, Hudson Fysh and technical expert Scotty Allan, spearheaded a team to take the airline into the jet age. Though the front runners of the Boeing 707 and the Douglas DC8 were clear favourites, Fysh was nothing if not thorough, even flying to Tashkent to inspect the Tupolev TU-104 to assess the Russian jet as an option for Qantas.

Tupolev TU-104

In the end however, a decisive purchase was made in 1956 with an order for nine B707 jetliners and deliveries to begin before the end of the decade. That initial order with the American manufacturer marked the beginning of a long Boeing commercial relationship with Qantas; one that would last virtually unbroken into the next century. It also marked the beginning of the end for the Qantas piston-engine and propeller-driven fleets.

The 1950s saw many other momentous steps for Qantas, including the move into its new and imposing 13-storey headquarters, Qantas House in Hunter Street, Sydney. Head office departments of the airline had outgrown their leased space in Shell House years earlier, and the expanding workforce had been occupying various office sites across Sydney. Qantas House was created to house the more than 1,000 ground staff needed to keep the airline's operations aloft. The decision to invest in the building was indicative of the changing face of the airline. It was maturing and coming of age.

EXPANSION CONTINUES

The airline's flight operations continued to expand. By 1956, Qantas was flying to ports on almost every continent. Flights departed Australia on a regular schedule for the Orient, Asia, India, Europe, Africa, North America and dozens of Pacific destinations. By the end of the decade, passengers could even completely encircle the globe on a Qantas aeroplane. Royal visitors were flown around the country during the first visit to Australia of a reigning monarch, during which company chairman Hudson Fysh was knighted for his services to aviation. In yet another demonstration that Qantas had arrived on the global stage, Super Constellation *Southern Horizon* safely delivered the Olympic Flame from Athens to Melbourne for the 1956 Olympic Games along with the Greek athletes.

Sadly however, the decade also marked the passing of two of its three original founders. While Hudson Fysh continued to steer the airline forward, Fergus McMaster, the financial backbone and original chairman of Qantas passed away in August 1950, while Paul McGinness, veteran of both world wars and visionary adventurer, suffered terminal heart failure

TOP Hudson Fysh inspecting the Comet 1.

ABOVE Qantas founders: Hudson Fysh, Fergus McMaster, Arthur Baird and Paul McGinness.

LEFT Qantas House in Hunter St, Sydney circa 1960.

FAR RIGHT Jack Grant with his invention – the aircraft slide-raft.

in January 1952, a month short of his 56th birthday. The 1950s also marked the passing of Arthur Baird, the innovative engineer whose abilities had been such a significant element of the beginnings of the aerial service. In 1920, he had accompanied Fysh on the delivery flight of its first aeroplane, the Avro 504 from Sydney to Winton.

A NEW ERA

On 2 July 1959, the crowning jewel arrived to take the airline into a new era. Boeing 707-138 *City of Canberra* touched down in Sydney, making Qantas the first airline outside of the USA to take delivery of the iconic jet airliner. *City of Canberra* had set a new record for crossing the Pacific between San Fransisco and Sydney of just 16 hours and 10 minutes, cutting almost 12 hours off the trip. The record eclipsed the first aerial crossing by Sir Charles Kingsford Smith 31 years earlier. That crossing had taken more than 80 flying hours and almost 10 days to complete in the Fokker Triplane, *Southern Cross*.

The dawn of the 1960s saw the regular delivery of the airline's new B707-100 aircraft as well as the introduction of a small fleet of Lockheed Electra aircraft to service routes with lower passenger loads. Initially operating to Japan, Hong Kong, New Guinea and New Zealand, the Electra remained in service until the late 1960s and was the last propeller-driven aircraft to wear the Qantas livery. By 1965, Qantas was now taking delivery of the even larger B707-338 aircraft. The 338 designation identified a 300 series aircraft and the 38 a Boeing customer code assigned to Qantas.

In June of 1966, Sir Hudson Fysh decided to finally call it a day. At the age of 71, he retired some 46 years after co-signing the company into existence. Employing almost 9,000 staff, and with a fleet of 19 B707s, the company had continued to make a profit almost every year since its inception. Fysh's foresight, tenacity and business acumen had delivered a world-class airline linking Australia with all corners of the globe. Perhaps the most enduring and least-known example of his continued foresight was his involvement in a decision two years earlier to reserve 10 delivery positions on the production line for the revolutionary supersonic jet, Concorde. Although the joint Anglo-French designed Concorde order never eventuated, the airline nonetheless kept looking forward, making its largest financial order ever in 1967 to purchase four Boeing B747-238 'Jumbos' worth more than $120 million dollars. Qantas had entered the jet age with vengeance.

The leap into the jet age meant a leap for the engineering department as well. Qantas began to lead the world in the development of sustainable maintenance. Engines were no longer pulled off wing and torn down like the piston versions of old; sophisticated programs monitored the engines 'on-wing' and around the globe. While major overhaul was mostly conducted at its own workshops in Sydney, line maintenance stretched to major destinations around the network to keep the jets flying in peak condition.

Regular schools of apprentice engineers learnt their craft in-house as Qantas and its maintenance department developed a worldwide reputation for safety, innovation and excellence.

SAFETY FIRST

In 1965, a Qantas safety officer named Jack Grant developed a simple invention that continues today. Aircraft came from their manufactures fitted with escape slides mounted at each doorway for evacuation, but if flying over water they also had to carry bulky life rafts which took up cabin space, added weight and would delay evacuation in the case of an aircraft ditching at sea. Grant's idea was to combine those two into one, creating the doorway fitted 'slide-raft'. First examples were manufactured in-house and sea trials undertaken at various locations under the watchful eyes of the US FAA, British Air Board and the International Air Transport Association. Quickly winning approval by the regulators, Qantas' own Jumbos became some of the first aircraft in the world fitted with the life-saving innovation.

Throughout this article the name Qantas has been generically used to refer to the airline, though its proper named remained Qantas Empire Airways (QEA). QEA had come into existence in the mid 1930s as a joint venture between the then Queensland And Northern Territory Aerial Services (QANTAS.) and Britain's Imperial Airways, to commence regular air services between the two countries. By 1967 it was time to finally step out, and the airline was renamed Qantas Airways Ltd. One of the first landmarks to wear the new name would be the luxurious Wentworth Hotel opened next door to Qantas House in Sydney just a few months earlier. The 450-room hotel was a development designed to increase business opportunities and revenue. Airlines were no longer just companies with aeroplanes that moved people and freight, the smart ones were becoming savvy tourism-based corporations.

In the immediate post-war years, the price of a one-way airline ticket to England was more than most people might earn in a year. Mass travel was still a six-week-plus voyage by sea, leaving the realm of

flight to those lucky enough to afford such extravagant trappings of life. But as the technologies advanced and jet transport became a way of life, economies of scale began to catch up. By the early 1960s more people travelled between Britain and Australia by air than by sea. Increases in air traffic sent manufactures looking for ever more efficient designs as airline executives sought out ever more economic fleets to purchase at ever more reasonable prices. Cabin interior dividers moved further forward as the 'economy' or 'tourist' class passenger load expanded, while the first-class passenger continued to enjoy supreme luxury.

QUEEN OF THE SKIES

The entry into service of Qantas' first B747-238B in 1971 continued to provide the travelling public with even more affordable opportunities for travel. Like the first B707, Qantas also named the first B747 *City of Canberra*.

Over the next almost 50 years, the B747, dubbed Queen of the Skies, would become synonymous with the name of Qantas. Brought forward due to the Covid-19 pandemic, Qantas finally disposed of the last of its B747-438 aircraft in July 2020. During the long association, Qantas operated almost all major variants of the iconic aircraft including the 200, 300, 400, Combi and the short bodied Special Performance, or SP version. A total of 65 B747s having worn the various liveries of the Flying Kangaroo. The fleet became so important to Qantas that with the sale of the last B707 in 1979, the airline became the world's only all B747 airline. That milestone was broken with the arrival of the first Boeing 767 in 1985.

Two significant moments in the history of Qantas occurred in 1974. On the 6 April, the last of the original founders, Sir Hudson Fysh passed away at the age of 79. Fysh's passing may have marked the end of an era but the continuing legacy of those original founders is found in the airline's continuing story of endurance and excellence. That legacy would come to the fore just eight months later, when Qantas and its staff would once again step up to the plate.

In the early hours of Christmas Day, severe tropical cyclone Tracy crossed the coast of the Northern Territory over Darwin city. In its wake, it left 80 percent of buildings in Darwin virtually destroyed and some 40,000 residents homeless. As a part of the national response, Qantas air-lifted some 7,000 people to other cities across Australia, including a world-record lift by one of the B747 aircraft of 693 passengers and crew in a single flight.

Though the all-Jumbo fleet was delivering the promise of moving hundreds of passengers in economic comfort, their ability to open new routes where passenger numbers would be low was limited. Qantas needed a fleet of smaller aircraft that could service thinner routes and provide more frequency to destinations across the network. Enter the Boeing 767. In 1985, the first of the twin-engine, twin-aisle, wide-body airliners came online. The diversification allowed Qantas to expand into new destinations, particularly across Asia and the Tasman Sea, and marked a return to operating the right sized aircraft for the available market. The purchase of the B767s proved to be a good decision as the effects of a worldwide recession cut deep into operating profits.

In 1989, Qantas' first B747-400 aircraft arrived in Australia setting a world record in its delivery, flying non-stop from London to Sydney in just over 20 hours. Affectionately known as the 400, the newest addition to the fleet was larger, more fuel efficient and carried even more load than the previous models. It was also the first of the B747s in Qantas to operate with a 'glass cockpit' (featuring digital flight instrument displays rather than the traditional electromechanical dials and gauges) and marked the beginning of the end for the flight engineer role.

AIRLINE MERGER

By now, domestic airline Trans Australia Airlines (TAA) had changed its name to Australian Airlines. The change occurred with the introduction of its first glass-cockpit aircraft in 1986, the B737-300. The introduction of the B737 coincided with a new livery, a new name and a reinvigorated workforce under a new CEO, James Strong.

Formed in 1946 under Prime Minister Ben Chifley's government, TAA had rarely competed on international air routes, its network was almost exclusively domestic. Being government controlled however, it made sense that in 1992, Prime Minister Paul Keating would announce that under a $400 million agreement, Qantas would effectively purchase Australian Airlines, merging the two entities into a single business. A new era and a new name: Qantas, the Australian Airline with James Strong as CEO.

ABOVE Airbus A380 Number 1 in Toulouse prior to Qantas taking delivery of its fleet.

The immediate effect was to vastly increase Qantas' fleet size and diversity. Once an all-Boeing fleet, the company now also owned four Airbus A300-B4 wide-body aircraft. Although the B4s would disappear from the balance sheet in time, they nonetheless pointed the way towards the European manufacturer that would soon be successful in finally selling aircraft to Qantas.

Still under the economic-reforming Prime Minister Keating, Qantas was privatised in 1995 with the first shares in the airline listed on the Australian Stock Exchange in almost 60 years. The airline that had started out by selling its shares to wealthy pastoralists in the bar of the Gresham Hotel in Brisbane in 1920 was once again a public company.

As the 21st Century loomed large, innovation continued to hold the key to greater efficiencies. Qantas became the first airline to incorporate Future Air Navigation Systems (FANS) in its day-to-day operations. The FANS technology

Captain Cook Lounge on the upper deck of Qantas B747-238.

ABOVE The merging of two great airlines.

MIDDLE B747 Special Performance.

BOTTOM Queen of the Skies arriving home in Sydney.

allowed satellite communication between pilots and Air Traffic Controllers in real time through datalink exchanges – effectively text messaging the aeroplanes position, as well as pilot and air traffic control communications, via satellite. A vast improvement on traditional long range high-frequency radio communications, FANS allowed for the development of more efficient flight tracking to take advantage of favourable winds. Further proof that the cornerstones of ingenuity and excellence, laid down by the airline's founders, remained strong in the company DNA.

Finally, with the dawn of the new millennia came some optimism for the Airbus sales department. By 2003, Qantas had not only ordered 12 of the yet-to -be-built Airbus A380 Super Jumbos, it had also taken delivery of the first of a new fleet of A330 aircraft.

THE NEXT CENTURY

Now, as Qantas passes into its second century, it is looking even further forward into its Project Sunrise' and beyond. Project Sunrise is intended to deliver the Airbus A350-1000 Ultra Long Haul (ULH) aircraft capable of direct services between Sydney and London, and Sydney and New York. The name of the project chosen to pay homage to the valiant crews of the Catalinas that flew the Double Sunrise flights between Perth and Ceylon in the war years – those treacherous flights keeping vital communications between Australia and Britain open. Though still some 10 hours shorter in duration, the modern version of the Double Sunrise will still involve about 20 hours flight time, and provide unique challenges for the airline, its crews and its passengers. As a proof of concept, in late 2019 the airline flew a series of research flights using its B787 Dreamliner aircraft to investigate aspects of the proposed ULH operation. The data gained is intended to help identify and overcome the effects of exposure to almost an entire day aloft.

Qantas as a company has existed longer than most Australians have been alive and has continuously operated longer than any other airline in the world. Its very existence today is testament to the values instilled in it by its founders, Paul McGinness, Hudson Fysh and Fergus McMaster throughout those formative years. That enduring legacy has passed down through the thousands of employees who have worn the Qantas uniform and perhaps explains the unique place the airline holds in today's Australian society.

In its 100 year history, Qantas has survived the loss of lives, loss of aircraft, loss of financial fortunes, wars and natural disasters. Its history isn't recorded in the minutes of board meetings nor in the financial accounts. The history of the first 100 years of Qantas is written in the memories of all Australians, the airline's staff and the travelling public.

Don Hill, Qantas Pilot & Director, Qantas Founders Museum

WARTIME FLYING BOAT BASES

RAAF Base Rathmines.

DURING WWII, THE RAAF ESTABLISHED FLYING BOAT BASES AT LAKE BOGA, VICTORIA AND RATHMINES, NSW.

LAKE BOGA

LAKE BOGA, in the Mallee district of north-west Victoria, was chosen as the site of No.1 Flying Boat Repair Depot after the Japanese bombed Broome, WA, in March 1942. The 3km-wide lake was on a rail line and offered a safe place to service flying boats, far enough inland that enemy carrier-borne aircraft could not threaten the depot from Bass Strait.

During its active service from 1942 to 1947, more than 1000 service personnel were attached to the depot. It serviced all RAAF flying boats: Catalinas, Sunderlands, Mariners, Kingfishers and Walruses, as well as some US and Dutch aircraft. After the war, the depot was used as a disposal site where aircraft were sold or melted down into aluminium ingots.

The National and Victorian Catalina Associations held several reunions at Lake Boga after the war, and in the mid-1980s convinced the Lions Club to reconstruct a Catalina flying boat on the depot site. An almost complete hull was located at Nyah West, some 45km north of Lake Boga, and the Maher family donated it. That PBY-5 Catalina, serial A24-30, had been received by the RAAF in July 1942 and flew bombing and patrol operations with No.20 Squadron based at Cairns and Bowen, Qld. Later it transferred to No.3 Operational Training Unit at Rathmines, NSW.

In 1997 the Lake Boga Lions Club opened the Flying Boat Museum in the old communications bunker on the depot grounds. The Catalina stood outside in the weather for another 15 years before a hangar was constructed over it. With the help of the Historic Aircraft Restoration Society, which flies its own Catalina

from Albion Park, NSW, the aircraft was repainted, and the museum was built around it. The communications bunker was refitted to its 1945 configuration.

In 2013, Paddy Dillon approached the Lions Club to offer his Jeep and radial aero engine for display in the museum. The club readily agreed, and Paddy placed more items from his collection on public display including a Harley-Davidson WLA motorcycle, a Ford side-valve V8 motor from a crash boat used at the depot, and several aero engines. Sadly, Paddy passed away recently.

The museum displays some 500 items to commemorate the service of the RAAF and WAAAF personnel stationed at the depot during WWII, illustrating what ordinary servicemen and women did for their country at a time of great need. The introductory video may call Lake Boga "just a repair depot", but it was much more.

The museum's Discovery Centre has an extensive library and two computers linked to the National Archives, enabling visitors to search the military history of their family. Museum staff are always delighted when someone finds a relative who flew in Catalina A24-30 or served at Lake Boga. The Lions Club erected a cenotaph in front of the museum, where those who gave their all for their country are commemorated each Armistice and Anzac Day.

David Mark

Lake Boga Flying Boat Museum, Catalina Park, 12 Willakool Drive, Lake Boga, Vic.

Open 9am to 4pm daily (except Good Friday and Christmas Day); Boo's Café open for lunch from Thursday to Sunday.

Phone 03 50372850, email museum@flyingboat.org.au

WAAAFs at work.

ABOVE Restored Catalina.

RIGHT Catalina engine and Jeep donated by Paddy Dillon.

Lake Boga Flying Boat Museum and cenotaph.

RAAF BASE RATHMINES

RAAF Base Rathmines.

IN THE MID 1930S, the RAAF was searching for a suitable site for a flying boat and seaplane base. By 1939, with the clouds of war brewing in Europe, the nucleus of the chosen 32ha base at Rathmines, on the western shore of Lake Macquarie south of Newcastle, NSW, was formed when an advance party arrived from RAAF Richmond.

Local cottages and halls were rented to house men and equipment while the RAAF station was constructed. Original plans called for brick buildings, but with impending war, expediency saw wood and tin used as well. Fondly known as 'Tin City', the station grew rapidly and was fully operational by 1940.

By 1943, RAAF Station Rathmines had more than 3,000 serving personnel housed in wooden P-type huts, each accommodating about 20 individuals. Married quarters were also available. The Rathmines Base post office opened in 1940, and the primary school in 1941. Prominent local artist and Archibald Prize winner Sir William Dobell OBE was involved with painting the buildings with a camouflage treatment.

Daily marine operations included ferrying crews in 'bomb scows' (sailing launches) to and from their flying boats, and patrols to ensure the water take-off and landing runs were clear of traffic and debris. On days with no wind and smooth water, the heavily laden aircraft often struggled to break the water's surface tension to get airborne. Motor launches would speed ahead of the aircraft to create waves to assist in the lift off. No doubt there was a sense of fun and momentary relief in that challenge.

In addition to launching patrols for enemy submarines and ships in the South-West Pacific theatre by Catalina and Kingfisher aircraft, activities at Rathmines included flying boat conversion and aircrew training, air sea rescue training, maintenance of aircraft and boats.

Operating from Rathmines were elements of Nos 9, 10, 11, 20, 40, 41, 43 and 107 Squadrons, as well as No.2 Flying Boat Repair Depot and No.3 Operational Training Unit. Squadrons were regularly relocated north to bases such as Darwin, Cairns, Bowen and Karumba. Their flying boats and seaplanes included Supermarine Seagull V and Walrus, Sikorsky Kingfisher, Consolidated Catalina, Short Sunderland, Martin Mariner and Dornier Do 24K. The commanding officer flew a Taylorcraft Auster.

Catalinas were ferried to Rathmines from the USA by RAAF crews, some of whom had relocated from the UK. The German-built Dorniers were operated by the Dutch Armed Forces and were relocated to Rathmines after the Japanese occupation of the Dutch East Indies (now Indonesia).

CATALINA OPERATIONS

The 'Cats' 20-hour endurance allowed for long-range reconnaissance patrols, search and rescue, resupply of coast watchers, bombing attacks and mine laying in distant harbours and bays.

A mission to mine Manila Harbour in the Philippines in late 1944 was one of the war's longest in both distance and time: 6,500 nautical miles (12,000km) and 80 flying hours to and from Rathmines. Six Cats from 11SQN Rathmines met at Darwin with 19 Cats from 42SQN based at Melville Bay, NT. Flying in stages, the aircraft flew to Jinamoc in Leyte Gulf, a US-occupied base within range of Manila. A few days later Manila harbour and surrounding bays were seeded with mines at night from just 200 feet above sea level. The mine laying run commenced from a preordained datum point and the mines were dropped at timed intervals on specified compass headings, often while under enemy fire. One aircraft and crew were lost.

Various types of mine were used. Acoustic mines were set to detonate after a selected number of ships passed over them, making entry into and exit from a bay or harbour a high-risk undertaking.

Navigation charts of the period were of limited accuracy. With high terrain in the Dutch East Indies, Papua New Guinea and the Philippines, there were numerous fatal accidents when crews were operating at night or in cloud below the peaks of surrounding mountains. Sadly, 320 Catalina crewmen were killed or declared missing in action or training.

RIGHT TOP Rathmines Park today, Officers Mess/Bowling Club centre-left.

RIGHT MIDDLE Catalina on the Rathmines hardstand.

RIGHT BOTTOM Full power on Kilaben Bay.

COHEN'S COUNTRY CLUB

RAAF Rathmines sat on a beautiful piece of land and while it was an active wartime base, the general lifestyle appears to have been rather exemplary. Records contain frequent references to 'Cohen's Country Club', named for an early commanding officer, Wing Commander R. Cohen. It was a popular posting for members of the Women's Auxiliary Australian Air Force, which was formed in 1941.

POST-WAR

When the last Catalina left RAAF Station Rathmines in 1952, it became a training base during the first decade of the National Service Scheme. Two years after its closure, the federal government sold the land to the Lake Macquarie City Council which allowed many of the buildings to be sold or relocated.

The main hangar was relocated to RAAF Base Richmond and its site sold to the Christadelphian Bible Society which retains it to this day. However, the administrative part of the hangar remains and numerous relocated buildings occupy the former

hangar floor, though those are fenced off from public access.

The base hospital and its land were also sold and a motel and conference centre now occupy the site.

The area occupied by accommodation huts is now quite dense bushland.

Reminders of the wartime marine service and rescue operation can be seen at Styles Point on the lake shore, near the western end of the base. Among those remnants are the recently refurbished 'F Jetties' (named due to their shape), now in regular use by boat owners and visitors.

Signs of the communication towers and buildings can be seen within the native bush. The few remaining buildings of the bomb dump can be seen to the south when travelling east along Dorrington Road. The widening of the road at that point marks the base entrance at the guardhouse, which was demolished in the 1960s.

The former Officers' Mess is now the Rathmines Bowling Club, while the Sergeants' Mess is used by local musical groups. The former theatre, gym and function hall has been refurbished and is once again operating as a theatre and function centre. A brick complex near the hall is used by the local scout group, and a wooden building that was part of the airmen's ablutions block served as a sailing clubhouse post-war and is now used by boat-building enthusiasts.

Cats in formation head north to Newcastle..

HERITAGE LISTING

In 1972, the council reserved the former site of the commanding officer's residence and control tower, east of the bowling club, for a memorial to honour our servicemen and women. Four low-set stone walls were later added with plaques commemorating those who served on the base. The site is maintained by Rathmines Catalina Memorial Park Association (RCMPA) volunteers.

In 2005, the base site was listed under the NSW State Heritage Act. Its Statement of Significance begins: *The Rathmines RAAF Seaplane Base played a pivotal role in the defence of Australia in WWII. It was the largest seaplane base in the Southern Hemisphere and was the longest serving during the war effort. It is the most intact example of a RAAF WWII seaplane base in Australia.*

The RCMPA is a not-for-profit group formed by past service personnel to honour and reflect on the wartime activities of RAAF Base Rathmines. It also organises the annual Anzac Day service. Prior to recent COVID-19 restrictions, the annual Catalina Festival each May was a large event.

In 2012-13, the association bought a PBY-5A Catalina and had it shipped from Puerto Rico to Sydney. Volunteers are restoring it to represent a RAAF Catalina for static display as the centrepiece of a heritage complex they hoped would be constructed on site. Unfortunately, negotiations with the council over 14 years were unsuccessful and RCMPA was forced to find an alternative site. It has achieved an in-principal agreement with the RAAF for the Catalina and memorabilia to go the RAAF Williamtown Aviation Heritage Centre (Fighter World) at RAAF Williamtown, which will ensure the historical collection remains in the Newcastle area.

Today, Cohen's Country Club is a serene parkland in a beautiful corner of the world.

Bill Anderson, President Rathmines Catalina Memorial Park Association
0418 770 400

Tours of the Rathmines Heritage Base are available for groups of 10 to 50 by booking with RCMPA.

For more information see rathmines-catalina.com, or email info@rathmines-catalina.com.

Further reading: **RAAF Rathmines** *by John Newton;* **Black Cats** *by A.E Minty*

WORDS Flight Lieutenant (AAFC) Paul A Rosenzweig OAM

CHALLENGE100

NO.604 SQUADRON AT HAMPSTEAD Barracks in Adelaide has a strong commitment to aviation training and the Duke of Edinburgh's International Award.

Squadron members are participating in the award's Challenge100, which marks the 100th year of the founder, Prince Philip, Duke of Edinburgh, who died last year two months before his 100th birthday.

When Leading Cadet Kitty Vo enrolled for the Silver Award last year, she became 604 Squadron's 98th registration, LCDT Vo was followed by LCDT Prashan Anjanpalage and LCDT Pushti Shah, the squadron's 100th registration. To mark that event, in what was also the Air Force's centenary year, LCDT Shah was presented with a special Air Force Centenary commemorative coin.

The AAFC is a recognised Duke of Edinburgh Award Unit, and Cadets are permitted to wear the insignia of their highest achieved level on their service dress uniform (adult staff may wear the insignia of the Gold Award). Current serving AAFC members who would like to participate in the award should contact their squadron Award Leader or Wing Manager.

For further information, go to airforcecadets.gov.au/what-we-do/activities/duke-of-edinburgh

ABOVE From left, Leading Cadets Prashan Anjanpalage, Pushti Shah and Kitty Vo. Image: FLTLT(AAFC) Paul Rosenzweig.

CADET PILOT Q+A

CUO Nicole Wilson after completing her first solo flight at Warwick Airfield. Image: Warwick Glider Training Flight.

CUO NICOLE WILSON

DURING WARWICK GLIDER Training Flight's 1/21 Gliding Course in the April holidays last year, Cadet Under Officer Nicole Wilson, from No.203 Squadron (East Brisbane), flew her first solo flight.

WHAT WERE YOUR FIRST EXPERIENCES OF FLYING?

At a Women in Aviation day at Caboolture Airport I had the opportunity to listen to inspirational female pilots, and was bitten by the flying bug after having the opportunity to fly in a number of different planes. My first experience flying the DG1000S was on my first AAFC gliding course in April of 2019. Then, during my second flight, I began to learn thermalling techniques and managed to reach 8,500 feet.

WHAT IS YOUR BEST MEMORY OF CADETS?

Completing my first gliding solo flight. The many hours spent on gliding courses

and weekend trips out to GTS Warwick and Kingaroy Gliding Club came together to help me finally achieve that goal.

WHAT WAS YOUR EXPERIENCE OF FLYING SOLO?

Hearing that you are cleared for solo and signing as pilot-in-command for the first time is exhilarating. When you begin to walk out to the glider the nerves start to kick in as you realise that it will be just you up there; you have no instructor in the backseat to rely on. But once I arrived at the glider and began doing my checks, my nerves disappeared as I focused on the task at hand.

The flight itself felt like any other, with me focused on what I needed to do. Once I landed the feelings of excitement and relief rushed over me. Seeing my instructors, good friends and family made it feel like an even greater achievement. All the hard work leading up to that point all felt worth it.

It was all thanks to the hard work of the exceptional instructors who dedicate their time and knowledge to organise these opportunities for us to fly.

LCDT ANGUS YOUNG

WHEN WARWICK GLIDER Training Flight ran its 2/21 Gliding Course in the July holidays last year, Leading Cadet Angus Young flew his first solo flight in a DG1000S glider. LCDT Young is a member of No.203 Squadron (Anglican Church Grammar School, East Brisbane), and is a Silver Award participant in the Duke of Edinburgh's International Awards, with his efforts to improve his aviation skills contributing to the Skills section of his Award.

WHAT IS YOUR BEST MEMORY OF CADETS?

When I landed after my first solo flight. It was a surreal and proud moment which captured all that is good, and achievable, within the Air Force Cadets.

WHAT WAS YOUR FIRST FLYING EXPERIENCE?

The first flight I remember was with my father in a Cessna 150 from Jandakot to RAAF Base Pearce when I was eight. Fortunately, due to my father's occupation, I have been immersed in aviation my whole life. *(Continued next page.)*

ABOVE LCDT Angus Young at Warwick Airfield before commencing his first solo flight. Image: Group Captain John Young.

WHAT WAS YOUR EXPERIENCE OF FLYING SOLO?

Everyone on the ground can wish you luck, but in the end, it is just you and the skills and judgement you have learned, which is going to get the glider safely back to the airfield.

Without the weight of an instructor, the glider feels more light, alive and responsive.

There are no second chances with gliding. You only get one chance to judge the conditions, and make decisions, so that you fly a circuit which sees you land back at the airfield.

It's a great feeling when the trust that has been placed in you culminates with a safe landing in front of the crowd of instructors and other cadets. An invisible weight lifts from your shoulders, and you allow yourself to relax and enjoy a very special milestone.

GLIDING AT BALAKLAVA

BALAKLAVA GLIDER TRAINING FLIGHT has continued to run Pilot Experience (PEX) flights, to give South Australian Cadets the feel of flying a DG1000S glider.

Through the subordinate Flights of the Gliding Training School, Cadets are given the opportunity to have an instructional flight under the supervision of a qualified flying instructor. Gliding trains pilots to be well coordinated on the aircraft controls, and develops a high degree of in-flight situational awareness and respect for other airspace users.

In a PEX flight, a Cadet can experience the joy of personally controlling a glider in flight, to inspire their motivation towards an aerospace career pathway.

ABOVE PEX participants, from left, CDT Aaron George, LCDT Achsa Binu and CDT Vandhana Packia Kumar (617SQN); LCDT Taylor Harrison (601SQN); CDT Jacob Rickards, CDT Michelle Fernandez, CDT Ram Packia Kumar, CDT Hugo Higgs and LCDT Kanav Kanav (617SQN); CFSGT Mithusha Kulatunga (613SQN).

FLYING AT JANDAKOT

LCDT Alex Kingston, CCPL Lucas Debono and LCDT Daniel Parks from 712 (City of Belmont) Squadron. Image: FLGOFF(AAFC) Alex Hartner.

FLYING OFFICER (AAFC) ALEXANDER HARTNER, the Wing Aviation Liaison Officer for No.7 Wing, reports that a successful flying day was held at Jandakot thanks to the support of Airflite.

Cadet Aviation Experience flights are designed to foster an early interest in flying. The intention is that every Cadet in their first year of membership, with parental consent, will have access to at least one non-instructional flight, at no cost to the Cadet.

Participants receive a formal pre-flight briefing, then fly as passengers where they partake in and observe a complete flight experience.

The goal of the AAFC flying training program is to give Cadets exposure to, and inspire their interest in, the aerospace industry through education in theoretical and practical skills of aircraft handling, aircraft engineering and flight operations.

Leading Cadet Daniel Parks said: "It was an extremely fun experience and has given me more inspiration to move into a flying career. As a direct result of the day I have decided to take steps towards beginning the process of receiving my Recreation Pilot's License".

Cadets, instructors and staff taking part in a formal Dining-In Night held in the hangar.

FLYING CAMP 2022

FOR THE PREVIOUS TWO YEARS the COVID pandemic has had a major impact on the Australian Air League's ability to operate. However, with an easing of restrictions and appropriate safety measures, the NSW Group saw a return to its regular flying camp at its Air Activities Centre at Camden Airport, southwest of Sydney.

Established in 1986, the Camden Air Activities Centre is owned and operated by the Air League's NSW Group and provides cadets the opportunity to undertake air experience flights and flying training, as well as take part in the annual flying camp held during the January school holidays.

This year 18 student pilots attended the nine-day camp where they ate, studied and worked together as a team while undertaking flying training with the Air League's volunteer instructors. The cadets came from nine squadrons across NSW and while some had undertaken flight training at previous camps, for many it was their first taste.

Sergeant Lara Wilbow of Doyalson Squadron was among the student pilots attending camp for the first time. Sgt Wilbow had already undertaken many air-experience flights, both with the Air League and her father who owns a Skyfox ultra-light aircraft, however this was her opportunity to take the controls. During the camp Sgt Wilbow completed five hours of flight training in the Air League's Piper Warrior aircraft, and her goal is to eventually work towards her commercial pilot's license.

Despite some rain and strong crosswinds, the cadets made the most of the camp, completing 91 flights, 301 landings and 84 flight hours.

In addition to the *ab-initio* students several students had attended previous camps, including Corporal Kalin John of Manly Squadron. For Cpl Kalin the highlight of the camp was going solo in Piper Warrior VH-LRA, accompanied by the traditional dunking with a bucket of water after landing!

On the last night of the camp, the cadets, instructor and staff took part in a formal Dining-In Night in the hangar with guest of honour David Binskin, General Manager Aviation, Sydney Metro Airports. Awards were made and RPL pilot wings were presented to First Officer Darby Thompson of Sutherland Shire Squadron.

The camp would not have been possible without the assistance of the instructors, engineers and camp staff who volunteer their time to train the cadets, maintain the aircraft and look after the participants for the week and we thank them for their dedication to the aims of the Air League.

The Air League's Air Activities Centre maintains a fleet of training aircraft including a Piper PA-28 Warrior, Cessna 172 and Cessna 152. Over more than 30 years it has provided thousands of air experiences flights and training hours to members of the Air League, helping to achieve the League's motto *A Vinculo Terrae* – Free from the bonds of the Earth.

For further information call the Australian Air League on 1800 502 175, email info@airleague.com.au or visit airleague.com.au.

BELOW Cpl Kalin John completing his first solo flight at the controls of Piper Warrior VH-LRA.

Sgt Lara Wilbow conducting a pre-flight under the supervision of volunteer instructor Jonathan Nolan.

INVESTING ONLINE

THINKING OF STARTING AN ONLINE INVESTMENT PORTFOLIO? HERE ARE SOME TIPS TO GET YOU UNDERWAY.

WE'RE OFTEN ASKED during ADF Financial Services Consumer Centre education programs about how to start an online investment portfolio. Here are some tips to get you underway. Choosing the right investments will depend on a number of factors:

- **Investment goal –** Do you have something specific in mind, or is it a rainy-day fund or to supplement your superannuation?
- **Timeframe –** Do you have time to ride out market fluctuations? Share investments usually suit goals that are five or more years away, whereas shorter timeframes require flexibility. For example, if the market had a downturn, can you wait for the upswing so you don't lock in a loss?
- **Diversification –** Are the proposed investments different from other assets in your current portfolio? Diversification across different assets classes and markets helps to lower risk.
- **Risk tolerance –** Do your investments pass the 'sleep at night' test?
- **Understanding –** Do you understand how different types of investments work?

CHOOSING INVESTMENTS

In addition to purchasing direct shares online, you can invest online in assets like real estate, infrastructure, cash, bonds and currency through managed investment funds such as exchange traded funds (ETFs) and Australian real estate investment trusts (A-REITs):

- **Direct shares –** Research companies you are interested in, including share price movements and how much is typically paid in dividends. This option requires more time for initial research and ongoing monitoring.
- **ETFs –** You buy units in a fund and the fund buys the shares. An investment manager chooses and manages the investment for a small fee. That option requires much less time and skill, and provides instant diversification within a single investment.
- **A-REITS –** Similar to ETFs only instead of buying shares, the fund buys real estate with exposure to different types of property such as commercial, retail and residential.

BUYING INVESTMENTS

Having decided what to buy, you will need an online trading account, also known as a broking account. Opening a trading account is similar to opening a bank account. Most of the big banks have their own trading account offering, but there are also a number of cheaper online trading accounts available. You can compare online trading accounts using a comparison website. Type 'compare share trading accounts' into your search engine to find comparison websites. Check a couple of sites, as each site won't cover the whole market, and be mindful that comparison sites may receive compensation for listing or linking to a particular trading platform. Any investment that can be bought and sold on the ASX will have an ASX code which you will reference when buying and selling securities. After you have opened a trading account and transferred money into it, all you will need to do is select the investment you want and make the trade.

FEES AND TAXES

Some trading accounts charge ongoing fees and many charge a brokerage fee every time you buy or sell (trade). Before opening an account check all possible fees because in the long run, ongoing fees can add up to much more than one-off brokerage fees, unless you are trading frequently.

Choose investments carefully as you may pay fees every time you buy or sell which could eat into your capital if you trade often. Any profits you make (capital gains) will be added to your income and taxed at marginal tax rates, however, if you hold the investment for more than 12 months, only half the gain will be taxable.

TIPS

- Investment markets fluctuate, especially in the short-term, so be prepared for

the value of your investments to go backwards from time to time.

- Understand the risks and costs involved in regularly buying and selling shares, sometimes called 'stock picking' (if you can get your decisions right more than 50 percent of the time, you'll be doing well).
- Share trading orders provide an option to buy or sell at a specific price or at market price; understand the difference to ensure you enter or exit a trade according to your goals and not that of a speculator.
- Borrowing money to buy investments, sometimes called margin loans, adds substantially to your risk, so think carefully about your position should the market fall and the lender asks for some or all of your loan to be repaid.
- Never invest in something you don't fully understand.
- If you aren't confident about choosing your own investments, consider paying for professional advice, but before you do, understand the cost of advice and the way in which licensed financial advisers are paid (commissions, asset fees and other incentives create conflicts of interest and may impact on the independence and the worth of the advice on offer).

Need more information? Check out the ASX Investor Education Centre and the Australian Securities and Investments Commission's website moneysmart.gov.au.

A ROLLER-COASTER YEAR IN REVIEW

AT THE START OF 2021, we all hoped it would be better than 2020; instead, the year could be best described as, well, interesting. There were certainly some ups and downs, especially in the world of finance, so who were the winners and losers and what had us scratching our heads?

HOUSE PRICES

Over the course of the pandemic, house prices, on average, have increased (so far) by a whopping 20-25 percent, contrary to most predictions at the start of the pandemic which prophesied dramatic price drops. It just goes to show how market movements are impossible to predict accurately, even for the experts.

What will happen in 2022? There are many and varied predictions around, but 2021 proves once again that no one really knows. The lessons here are to think about property as a long-run investment and to manage debt levels so as to have a buffer should interest rates rise.

BUY NOW PAY LATER

Labelled by some as "the future of millennial finance", buy-now-pay-later (BNPL) schemes have exploded during the pandemic. There have never been more ways to spend your money or ways to pay for purchases interest-free. There are now more than a dozen BNPL companies operating in Australia. Even the banks are jumping on the bandwagon and, according to the Reserve Bank, in the 2019/2020 financial year BNPL providers processed more than $9 billion in payments.

If used wisely it can be an easy way to spread out payments on a purchase. Used poorly, BNPL can result in missed payment fees, the inability to meet other expenses and a black mark on your credit file. So be careful not to let the euphoria of instant retail therapy turn into an emotional crash of debt regret.

CRYPTOCURRENCY

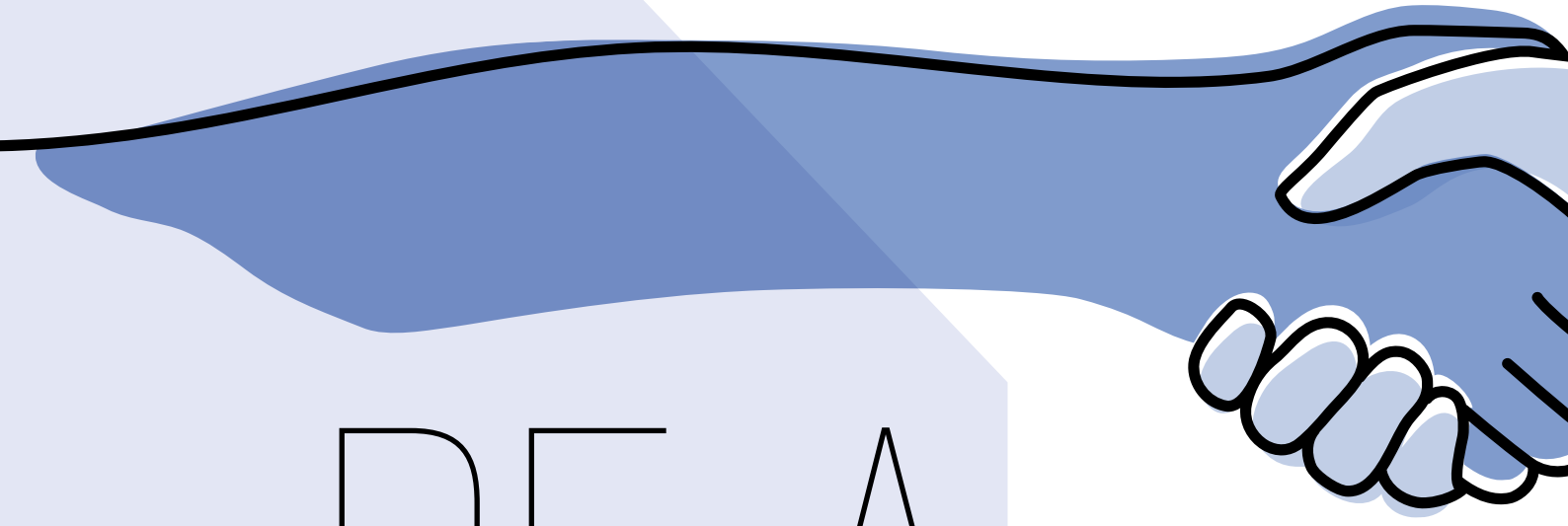
For anyone taking a punt on crypto, 2021 was a rollercoaster ride. The value of cryptocurrencies can move more in a day than some shares move in a decade, up and down. In November alone, the price of Bitcoin was as low as $53,000 and as high as $68,000. Those bets are definitely not for the faint-hearted or risk-averse investors. The disciples of crypto are confidently predicting new highs in 2022. Time will tell, but the principal message is to accept that the world of crypto is volatile and may well not live up to the rhetoric. So be warned.

WORLD EVENTS

From serious milestones to the weird and wonderful, here are some interesting news stories from 2021:

- More than 3 billion people were double vaccinated against COVID-19.
- The United Nations declared 2021 the International Year of Fruits and Vegetables.
- The 2020 Olympics were held in Tokyo… in 2021.
- Civilian sightseers went to space, including (the original) Captain Kirk.
- Elon Musk became the wealthiest person in the world.
- Scientists finally got to the bottom of why wombats poop in cubes.
- US scientists calculated Santa would have to visit 822 homes a second to deliver all the world's presents on Christmas Eve, travelling at 650 miles a second.

Air Commodore M C Brown AM (Ret'd)
Chartered Accountant
AD Financial Services Consumer Centre



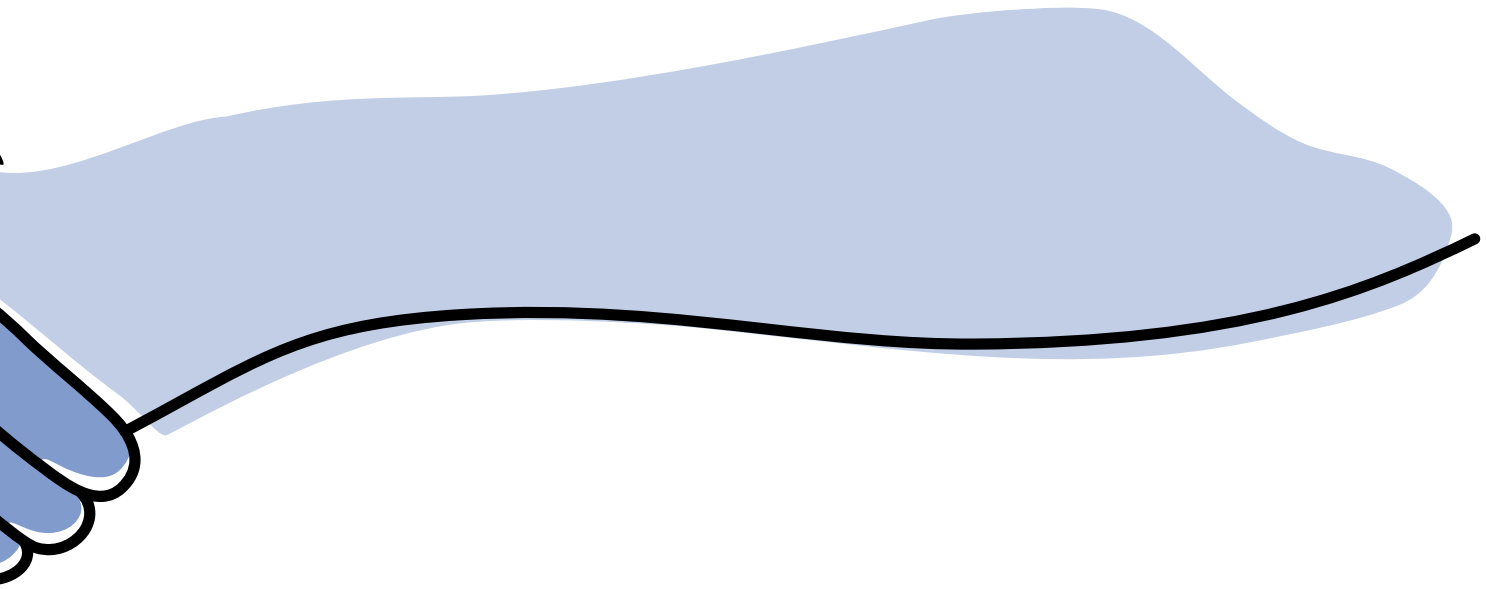
BE A RIGHT MATE

PETER RING MUSES ON THE IMPORTANCE OF MATESHIP – AND RIGHT-BRAIN ENGAGEMENT – IN LEADING A HAPPY, FULFILLED LIFE.

AUSTRALIA IS STILL IN GOOD SHAPE despite many recent events that might have handicapped our nation. COVID, bushfires, weather events have all tested our being and we have come through, mostly, with flying colours despite some of our political leaders and other renegades setting poor standards in circumstances where mateship was needed.

Australia is known for its mateship: an attitude that engenders a sense of support and equality. Mateship leads to a deep pool of personal benefits including mental health at all sorts of emotional levels, not just for the deeply wounded.

Mostly, mateship takes very little to practice. A simple example occurred recently. I was approaching the post office door when a lady, with her three kids, came from the other side. She



insisted on holding the door open for me, and she had a brilliant smile. I left with a smile also and a good feeling.

LIFE BALANCE

Roughly speaking life has four elements: task, intellect, human emotions and spirit. When our attention becomes too heavily focused on task and intellect, an imbalance occurs and our emotional and spiritual qualities tend to waver. We do tasks to earn money and/or support our lifestyle. Intellect helps us make rational judgements. Emotions are numerous and sometimes confusing – often satisfying, sometimes not. We would all like to tackle life with passion and spirit but task and social boundaries interfere.

Our Australian culture does not naturally actively address the everyday of human emotion and spirit. We know those qualities have a tremendous impact on our life, but we mostly only see emotions and spirit supplant task and intellect in circumstances that draw on our human bond during emergencies like fire, flood, accidents, drought and national situations like COVID. Then they come to the fore.

Our task focus is understandable; everyday life is solidly linked to task. Success, status and pay are heavily influenced by task. And yet, our sense of belonging and value is stimulated by our emotions and spirit.

In his book *The Master and His Emissary: The Divided Brain and the Making of the Western World*, psychiatrist Iain McGilchrist delves into the world of difference between our left and right brain hemispheres and argues that the formal structures of modern society significantly – and dangerously – prioritise the left brain, resulting in a culture shackled by rigidity and bureaucracy, driven by self-interest and ultimately incapacitated by its own imbalance.

Drawing on a vast body of recent brain research, illustrated with case material, McGilchrist suggests that the left hemisphere is designed to exploit the world effectively but is narrow in focus and prizes theory over experience. It prefers mechanisms to living things, ignores whatever is not explicit, lacks empathy and is unreasonably certain of itself. By contrast the right hemisphere has a much broader, more generous understanding of the world but lacks the certainty to counter the left hemisphere onslaught because what it knows is more subtle and many-faceted.

It is vital the two hemispheres work together, but in Western culture there is evidence of a power struggle, with the left hemisphere becoming increasingly dominant. The result is a dehumanised society where a rigid and bureaucratic mentality obsessed with structure and mechanism holds sway at huge cost to human happiness and the world around us.

Mateship has never been the domain of the left brain and yet we, particularly through our leadership and educational institutions, often treat mateship using a doctrinal and structural approach. Perhaps winning and losing in task and intellect should only be contemplated after satisfying the need to provide an environment that encourages and allows all to give their best.

A PERSONAL RECOLLECTION

I met a 'head-hunter' in Irian Jaya, in a very remote area of steep terrain and thick jungle. I was winched down from a helicopter (in the company of a geologist) to the edge of a stream. The geologist disappeared down a steep embankment toward the stream while I pondered survival techniques. We were writing the mining company's survival manual. After a minute or so, I felt a presence and looked up to see a fierce-looking local wearing animal skins, paint and bones. Head-hunter? Cannibal? My brain said run, but where to?

However, another part of my brain was fascinated. After conquering my fear, I was compelled to put into practice what I'd been lecturing people on for years: engage the right brain. I smiled and looked at him curiously. Suddenly, he smiled, too. I walked towards him and he pointed to my survival vest and whistle. I looked at his body paint. I offered him my whistle and he gave me

a small spear. I was getting nervous again, but was still smiling when the geologist returned just as the helicopter arrived back overhead and the winch cable and collars were dropped through the trees.

I looked reassuringly at the local and put out my hand, which he took. The geologist and I hooked up to the winch cable and the last I saw of my new mate was him staring incredulously at us as we disappeared up through the trees with a blast of wind and noise.

On reflection, I had treated him exactly like I would have welcomed a person to our team or family. What I was oblivious to at the time was that there had been no commonality between us: no task, no intellectual interests, no culture, to help spark unity. Engaging my right brain was the catalyst for some sort of mateship.

Why did the Fuzzy Wuzzy Angels (the term Australian troops used for Papua New Guineans who came to their aid in the Kokoda campaign) engage to a dramatic degree with the Australian troops in World War II and save many Aussie lives? Maybe because some of the Aussies had treated them like mates.

There are things we cannot do with the left brain alone such as seeing the big picture, relating, empathy, happiness and intuition, to name a few.

The conundrum: when someone is not doing something well, we tend to counsel them and engage their left brain. The big picture and the underlying drive to do better largely is the domain of the right brain.

Some actions that help create right-brain engagement: the poem *A Smile* (see right); making time to talk; having an open mind; even when harassed, always having the space to say hello; listening intently; discussing the big picture frequently; yarning about goals and measurements and job and team satisfaction; always being available to help; asking how someone is and seeing the other's viewpoint, no matter how radical.

Some modern practices kill any concept of mateship. Business help lines that fob you off or the promised call back never eventuates. Forms that many companies insist you complete, which do not make sense and yet may be used to judge you. People who greet you with a plastic smile and disingenuous attitude but expect genuine reciprocity. You the person being judged: instead of being judged on what you did. Road rage sparked by some event only known to the perpetrator. Our general culture of trying to rule us by using "just" penalties. People in power who feel superior and push the "lesser" being around. People who use rank to lead. So many attitudes that are mate destroying.

And yet mateship is the fabric of strong performance. Mates will help you. Mates will stick with you. Mates will do their best for you. Mates greet you like you are important. Mates spark life, emotion and spirit in you. Everyone in the world can be a mate to some degree.

Children, teenagers and adults, sometimes, are slowly dying because they need a word of thanks, admiration, encouragement and congratulations to put them back on track. You can die physically: spiritual and emotional death is worse.

No doubt, training and understanding of job outcomes etc is essential. Those elements help establish confidence, but people's higher-order needs as well as their skills will enrich the sense of confidence and achievement.

I kept telling myself that I had to change to be more confident in offering mateship to all ages and types no matter what their state of being: my emotions kept telling me that all this was way out of my comfort zone. I suddenly realised that activating my right hemisphere constantly was going to take some crashes. Develop affinity for every person: not what they do but for them and their existence.

Everything we have done, learned and practised gives us some sort of leverage on this earth. A person who practises mateship creates all sorts of advantages for themselves and their contacts. Mateship gives us the best leverage to live a happy, fulfilled life.

Put aside any reservations and live 2022 with mateship.

Peter Ring,
Principal, Lingk

> "There are things we cannot do with the left brain alone..."

A SMILE
BY JEZ ALBOROUGH

Smiling is infectious,
you catch it like the flu.
When someone smiled at me today
I started smiling too.

I passed around the corner
and someone saw my grin.
When he smiled I realised
I'd passed it on to him.

I thought about my smile and
then I realised its worth.
A single smile like mine could travel
right around the earth.

If you feel a smile begin
don't leave it undetected.
Let's start an epidemic quick
and get the world infected.

From Shake Before Opening *(1991)*

AVM B J GRAF AO (RET'D) BSC BE(AERO) FRAES FIEAUST

10 March 1937 - 9 February 2022

BRIAN GRAF JOINED No.7 RAAF College course in 1954. Although starting as a General Duties cadet his exceptional academic abilities in the maths and science disciplines led to an offer to transfer to Engineering while retaining the opportunity for pilot training. He spent the following four years at Sydney University completing a Bachelor of Science and then a Bachelor of Aeronautical Engineering, graduating with First Class Honours and the Sydney University Medal, an outstanding and rare achievement.

After graduating from Pilots Course, Brian was posted East Sale, first to Central Flying School (CFS) for flying consolidation, and then Maintenance Squadron East Sale where he was introduced to RAAF aircraft engineering and maintenance while continuing to fly the Vampire at CFS.

During Brian's next posting to the Aircraft Research and Development Unit (ARDU) at Laverton, he developed a strong desire to become an experimental test pilot. However, he required more hours than ARDU could give him to qualify for the Empire Test Pilot School in the UK. When I met him for the first time in 1963 at Laverton, he was submitting one of a number of applications for a conversion to the CAC Sabre, and I remember him saying: "you've gotta keep kicking the can".

Brian's determination paid off and he was posted to Williamtown for a Sabre conversion, and subsequently to the Empire Test Pilot School. On completion, he was posted back to ARDU, filling the dual roles of performance engineer and test pilot. However, his test flying was short lived, terminated by a posting to RAAF staff college followed by command of Maintenance Squadron East Sale.

A variety of senior staff appointments followed, including Senior Maintenance Staff Officer at Operational Command (the forerunner of Air Command), followed by various engineering, maintenance and logistics appointments at both Headquarters Support Command and at Air Force Office. Together with a year at the Royal College of Defence Studies, UK, those appointments prepared him well for his final two appointments: first as Assistant Chief of Air Staff – Engineering, and then as Assistant Chief of Air Staff – Materiel.

Brian's senior appointments occurred at a time when the RAAF was experiencing engineering and maintenance problems with an ageing fleet of aircraft, while simultaneously managing the issues associated with the new technology and materials of replacement aircraft. At the same time, the RAAF and Defence were undergoing significant organisational change.

It is no exaggeration to say that those were very challenging times, and the RAAF was fortunate to have engineers with the intellectual ability, dedication and determination of Brian Graf to lead them through.

Neil Smith AM,
MBE Air Vice Marshal (retired)
Managing Director, RAAFANSW
Publications Pty Ltd

WING COMMANDER VICTOR ROY MEYN

18 January 1934 - 6 December 2021

VIC MEYN GREW UP IN CURRABUBULA, NSW and attended Tamworth High School. He worked as a survey draftsman for a short while before joining the RAAF in 1952 on No.9 Pilots Course. He trained at Archerfield, Uranquinty and Point Cook, graduating as a sergeant pilot in October 1953 and was posted to No.2 Squadron at Amberley.

He completed a Lincoln conversion and was posted to No.6 Squadron as a co-pilot where he was involved in Operation Totem, conducting air sampling flights in the atomic cloud during the British nuclear test program at Maralinga, SA.

Unfortunately, a few months later he lost an arm as the result of an accident at a swimming hole near Kingaroy. He subsequently changed category to Air Traffic Control (ATC), graduating from No.15 ATC Course at Point Cook in December 1954 with a posting to Williamtown. He soon developed a reputation as a very competent controller and, to quote Air Marshal Ray Funnell, "to watch Vic manage the circuit traffic at Williamtown in its heyday in the late 1950s was to see the very epitome of air traffic control".

Vic served at CFS before completing an operational tour at Ubon in Thailand as the Senior Air Traffic Controller (SATCO), where his effervescent personality and professional skills were admired and respected by all pilots. He later completed ATC tours at Richmond, Butterworth and Amberley where he was respected and acknowledged as the best ground control approach (GCA) operator in the RAAF at the time. For a man with only one arm, manipulation of the GCA equipment controls was remarkable and many pilots have attested to his calm demeanour in the worst of weather to keep them on 'glidepath and centreline' for a safe recovery.

Vic was also a superb squash player. At a competition in Butterworth in the early 1960s, a young Pilot Officer remarked, "I assessed my opponent as being slightly overweight and, as he couldn't disguise his serve, I thought this won't take long. I was right – I got a flogging!".

Vic was a superb man manager, attested to by his subsequent appointments as SATCO at Naval Air Station Nowra, RAAF Bases Townsville, Amberley, Williamtown and Butterworth, culminating in his promotion to Wing Commander (then the highest rank attainable in the ATC Branch) and appointment as the Command ATC Officer at Headquarters Operational Command in Glenbrook (now Air Command). He retired in August 1984 to Mermaid Waters on the Gold Coast.

Vic is survived by his wife Margaret and children Maree, Ian and Kate. His Air Force connection was strong; Ian retired as an AIRCDRE, Maree served in the Active Reserve as a FLGOFF Nurse in Butterworth and his sons-in-law AIRCDRE Jim Brown and GPCAPT Ted Prencel also chose to be part of the Air Force family.

SQUADRON LEADER RONALD DAVID GUTHRIE

5 July 1925 - 4 October 2021

RON GUTHRIE WAS BORN AT HAZELBROOK, NSW and enlisted in the RAAF on 3 July 1943, aged 18. After award of his wings a year later, Warrant Officer Guthrie was posted to RAAF Oakey for duty towing air gunnery targets in Fairy Battles. While at Oakey, he had the opportunity to fly an assortment of aircraft, including p-40 Kitty Hawks and P-51 Mustangs.

A follow-on posting to Schofields in Sydney provided further flying opportunities, this time on DC3s on the Australia-Japan run to support the Australian contingent of British Commonwealth Occupation Forces, following the end of the WWII.

With the declaration of the Korean War, Ron was posted to Williamtown to fly Mustangs in Nos 76 and 75 Squadrons. He was then posted to Korea to join No.77 Squadron, flying Mustangs, but when Russian-built Mig15s appeared over the battlefield, the squadron was re-equipped

with Meteors. At that time Ron, who had flown Vampires at Williamtown, was the only pilot in the squadron with jet experience.

On his 14th combat sortie (29 August 1951) in the Meteor, he was shot down. His ejection set a record, at the time, as the fastest and highest altitude for an ejection, M0.84 and 39,000 feet, with the descent taking more than half an hour. He was also the first RAAF pilot to escape from a jet fighter in combat using an ejection seat

Ron spent two years as a POW and was treated extremely harshly by his captors. After an unsuccessful escape attempt he was recaptured and savagely beaten.

On release at the end of the war, Ron became a flying instructor at Uranquinty (near Wagga) flying Wirraways and Winjeels. He subsequently recategorised to Air Defence and was posted to No.1 Control and Reporting Unit, Brookvale as Operations Officer. Much of his time at Brookvale was as the Temporary Commanding Officer.

Ron was a consummate pilot and by the end of his Service career, he had flown Tigermoths, Wirraways, Winjeels, Fairey Battles, Kittyhawks, Mustangs, Avro Ansons, Bristol Freighters, DC3s, Vampires, Meteors, Lincolns and Mirage and Hornet simulators.

BELOW Ron Guthrie in a Meteor in Korea.

AIR COMMODORE LYALL ROBERT KLAFFER AFC, OAM, DFC (US)

4 February 1928 - 20 November 2021

LYALL KLAFFER WAS BORN IN PROSPECT, South Australia. He left school at 14 to start work and attended night school to obtain his Leaving Certificate. He enlisted in the Citizens Air Force on 24 February 1947 and trained as a radar mechanic at the Air and Ground Radar School at Ballarat after which he was posted to RAAF Base Canberra serving with No.4 Tactical Reconnaissance Squadron and No.87 Squadron.

He transferred to the Permanent Air Force and joined No.1 Pilots Course in February 1948. On graduation, he was posted to No.3 Squadron, Canberra flying Mustang aircraft where he was involved in a mid-air collision, resulting in the death of a colleague.

Lyall served in Korea from 8 July 1950 to 7 April 1951 flying Mustangs and completed 105 combat missions. He was awarded the US Distinguished Flying Cross for action that destroyed three anti-aircraft positions, despite intense ground fire.

Completing his tour of duty in the Korean War, he was posted to No.24 Squadron, City of Adelaide, flying Mustangs and survived a crash landing. In 1952, he was posted to No.2 Operational Conversion Unit (OCU) converting to Vampire aircraft and then to No.75 Squadron in Malta, where he survived another crash landing. He returned to Australia to serve as the aide-de-camp to the then Governor General, Sir William Slim, from May to October 1952.

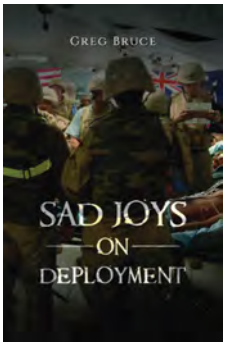
Following brief postings to No.2 OCU and the Directorate of Flying Safety, Lyall was posted to Central Flying School, East Sale and was a member of the newly formed Telstars aerobatic team.

From 1965 to 1967, he completed an exchange posting to the US, flying RF-4C Phantoms in the reconnaissance role and accomplished a 52 combat mission tour of duty in Vietnam with the No.16 Tactical Reconnaissance Squadron.

On return to Australia, Lyall served in Headquarters Operational Command, as Commanding Officer No.6 Squadron Amberley, Officer Commanding No.82 Wing, Amberley, and then served at Air Base Butterworth, Malaysia and Air Force Office, Canberra before assuming command of RAAF Edinburgh.

Lyall retired from the RAAF in 1981 after 34 years of service, with experience on a wide variety of aircraft types and the rare distinction of flying three generations of fighter aircraft in operations: Mustangs in Korea; Vampires in Malta; and Phantoms in Vietnam.

He was awarded the Air Force Cross for his service as a flying instructor at RAAF Base Williamtown in 1960 and, in 1989, was honoured with the Medal of the Order of Australia (OAM) for service to the community, particularly his contribution for air operations planning for the Australia bicentennial celebrations in 1988.



REVIEW BY Bob Treloar

SAD JOYS ON DEPLOYMENT

By **GREG BRUCE**
Austin Macauley Publishers; RRP$10.50

SAD JOYS ON DEPLOYMENT is an account of an orthopaedic surgeon deployed into war zones, peacekeeping operations and natural disasters as part of an Australian military response. Recruited into the RAAF Specialist Reserve, Dr Greg Bruce served on operational deployments ranging from Rwanda to Papua New Guinea, East Timor, Iraq and Afghanistan.

He has an easy writing style and a down-to-earth approach blended with a delightfully ironic sense of humour. He addresses a wide variety of issues without confusing the reader. Descriptions of the strengths and weaknesses of a deployed medical organisation are frank and balanced, as are his opinions of local populations, and Allied and hostile forces.

Military surgeons are faced with dilemmas not encountered by their civilian counterparts. Medical training instils an obligation for a doctor to do his utmost for his patient. In a combat zone, that presents difficult challenges. For example, when swamped with mass casualties, hard decisions can result in the most serious injuries being neglected so that a larger number of casualties can be given a chance of survival – a most vexing situation for a civilian surgeon deployed to a war zone.

Sad Joys on Deployment contrasts the comforts of civilian surgery and the challenges of military surgery on deployment and a fascinating account of a surgeon's perspective on military conflicts.

The exciting challenges, professional achievement and the dreadful nature of war and natural disaster-related injuries will appeal to a wide range of readers, military and non-military, medical and non-medical, alike.

REVIEW BY Bob Treloar

UNTRACEABLES: The Mystery of the Forgotten Diggers

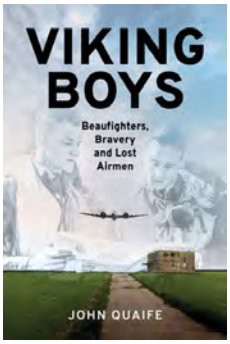
By **JOHN GILLAM AND YVONNE FLETCHER**
Legends and Lessons; RRP$35

UNTRACEABLES: THE MYSTERY OF THE FORGOTTEN DIGGERS is not a conventional military history text detailing the battles of World War I. It deals with the aftermath of war, focusing on its effects on veterans and their families – many of whom were at the margins of the Australian Imperial Force. It contains the stories of men killed while in the service of their country; those who forfeited their right to medals by their actions; and others who were "misplaced" by the Department of Defence. *Untraceables* contains the stories of 92 veterans who fell into the margins for a variety of reasons and who were denied their medals.

The result of 10 years' research, *Untraceables* details the many reasons why so many medals remain unclaimed, including: an inability to contact the next of kin of deceased soldiers; wrong name and information on attestation papers either as a result of underage enlistment or leaving behind an unhappy existence; soldiers suffering from mental incapacitation; and disillusionment from their experiences, often because of the loss of comrades.

Inability to identify the next of kin made medal collection extremely difficult and generally carried significant financial implications regarding the payment of pensions and resultant financial hardship.

Untraceables: The Mystery of the Forgotten Diggers is a combination of text book and historic narrative. While the focus is to encourage students to research "forgotten diggers" in their home districts, it serves equally well for the wider community as an excellent account of military history beyond the battlefield.



REVIEW BY Bob Treloar

VIKING BOYS: Beaufighters, Bravery and Lost Airmen

By **JOHN QUAIFE**
Big Sky Publishing, RRP$32.99

NO.455 SQUADRON, an Australian Article XV squadron formed under the Empire Air Training Scheme, was raised at RAAF Base Williamtown, NSW on 23 May 1941. Assigned to Coastal Command, the squadron was equipped with Beaufighter aircraft and tasked to attack enemy shipping, predominantly in the Norwegian fjords. Along with No.489 Squadron (RNZAF), it became known as the ANZAC Strike Wing. *Viking Boys* is an account of the squadron's operational activities from 1943 until the end of the war.

The conduct of anti-shipping attacks was perilous and early on resulted in significant aircraft losses. Aircrew learned quickly and engineered large-scale attacks to overwhelm the ship-borne and land-based anti-aircraft defences. There is an excellent description of the development of tactics, survival procedures and the skills required to concentrate large formations of aircraft from several squadrons to complete those missions. The author vividly captures the challenges, dangers and adrenalin filled moments experienced by the aircrew.

Viking Boys is the result of the author's experience on the Defence Honours and Awards Appeals Tribunal when he was made aware of the story of James Hakewill who was thought to have deliberately crashed his aircraft into a German escort to suppress anti-aircraft fire during an attack on a convoy in Orsta Fjord in 1944.

Viking Boys is a fascinating account of one RAAF squadron's experience during World War II and the contemporary consideration of the actions of one of its pilots in Orsta Fjord on 5 December 1944. It will appeal to all interested in military history.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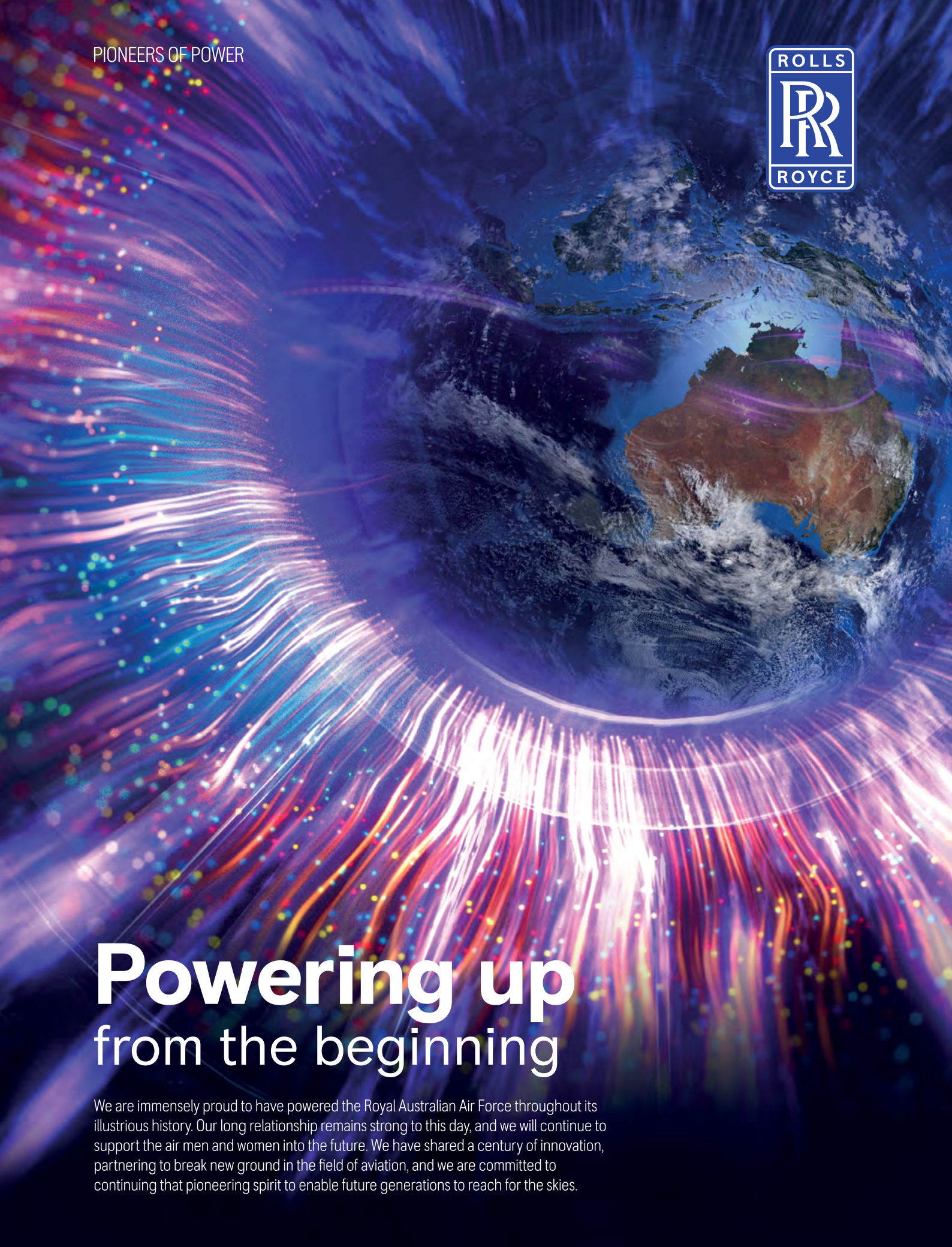

Powering up
from the beginning

We are immensely proud to have powered the Royal Australian Air Force throughout its illustrious history. Our long relationship remains strong to this day, and we will continue to support the air men and women into the future. We have shared a century of innovation, partnering to break new ground in the field of aviation, and we are committed to continuing that pioneering spirit to enable future generations to reach for the skies.