WINGS

WINTER 2020
VOLUME 72 NO.2

MISSION CONTROL
THE ROLE OF A NASA FLIGHT DIRECTOR

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FROM TEST PILOT TO ASTRONAUT

BATTLE OF DARWIN
LEAD UP TO THE JAPANESE ATTACK

AIR FORCE ASSOCIATION MAGAZINE

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FROM THE MANAGING DIRECTOR

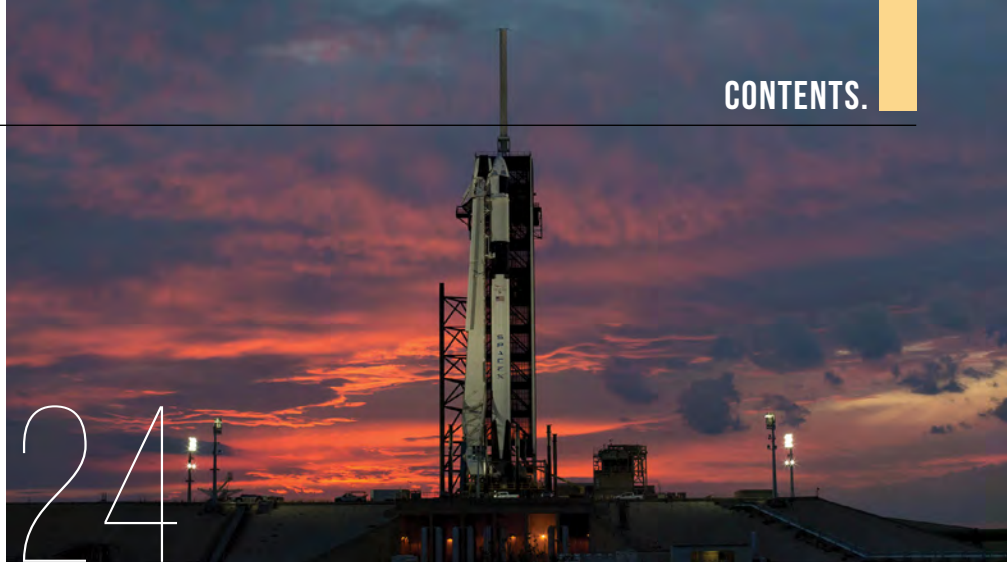
THIS WINTER EDITION marks the first 'birthday' for RAAFA Publications with respect to *Wings*. When we first agreed to take on the publishing task, we were fully aware that this icon of the Association needed modernisation. The previous publisher placed great store in its claim that the Air Force Association was about to change direction. However, they didn't realise that real aviators think in three dimensions, and that the direction we were taking on behalf of the Association was Up! Countless comments and letters in the past 12 months confirm we are well on that trajectory.

As I write this introduction, Australia is in the midst of a COVID-19 pandemic. We, like many businesses, are feeling the financial effects, as we have lost a number of advertisers. However, we fully understand the reason and are grateful for their past support. We're confident we will see them again when circumstances allow.

Needless to say, we are also extremely grateful for those who continue to support us. Without those businesses, we would be unable to continue to serve the Association and the RAAF in the way we do. One supporter that bears special mention is our sponsor Rolls Royce who has been with us for many years.

In becoming the universal symbol of quality, Rolls Royce owes its success to Sir Henry Royce, who, as the engineer half of the original partnership with the Hon Charles Rolls, was fanatical in his pursuit of perfection. We at RAAFA Publications, and particularly our dedicated *Wings* team, strive to follow his example, and we particularly thank the folk at Rolls Royce for their inspiration.

NEIL SMITH AM, MBE
Air Vice-Marshal (retd)
Managing Director
RAAFA Publications



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FROM RAAF BASE DARWIN

THIS EDITION OF *WINGS* features RAAF Base Darwin and as the Senior ADF Officer for RAAF Bases Darwin and Curtin (Derby), I am delighted to contribute the forward address.

RAAF Base Darwin has a long and proud history in the contribution to aviation in Australia and our aviation links to the rest of the world.

From the England to Australia Great Air Race in 1919 through the defence of the nation during the Second World War to the current regional hub, RAAF Base Darwin continues to play an important role in regional and global relationships.

Air bases are pivotal to the projection and sustainment of air power for both civilian and military employment. Aviation's reach and speed, however, is a double-edged sword; it facilitates efficient engagement for commerce and social and cultural integration across the globe, while also providing a convenient conduit for the transmission of diseases such as COVID-19.

Throughout history, aviation has adapted to new challenges and the current trough in this dynamic enterprise will pass. Refined processes and procedures will be introduced to mitigate a similar recurrence, and the future will be more digital and pervasive as a result.

As we all know, Air Force is evolving deliberately and rapidly into a 5th generation capability through selective acquisitions of complimentary assets, and the professionalism and agility of our people, to deliver an integrated force.

Our small posture is enhanced by the breadth and depth of our interoperability exercises with allies and likeminded regional forces. RAAF Base Darwin provides a solid and versatile geographic platform to support that evolution.

This is the fifth edition of *Wings* in its modernised format. Enjoy.

WGCDR Andrew Anthony
Commanding Officer No.13 Squadron
Senior ADF Officer
RAAF Base Darwin & Curtin

ON THE COVER
Space Shuttle Atlantis lifts off from Kennedy Space Center, Florida, on mission STS-112. Photo: NASA.

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Membership is open to serving and former members of the Australian Defence Force and Allied Armed Forces, their family members, current and former Air Force Cadets, Air League Cadets and members of the public who have an interest in aviation and who support the mission and objectives of the Air Force Association.

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CORRECTIONS

Some errors in the Autumn 2020 edition have been brought to our attention:

- **PAGE 5 –** C-20J photo was identified as an Australian Army aircraft, we acknowledge 35 Squadron, RAAF as the rightful operators of the Spartan fleet.
- **PAGE 60 –** Ubon is located in north-east Thailand, not western Thailand as stated. We also omitted to acknowledge that AVM David Rogers AM (Retd), along with others, made a valuable contribution to the article.
- **PAGE 63 –** We would like to acknowledge WGCDR Peter Scully had a distinguished career and retired from the RAAF at the rank of Air Vice Marshal.
- **PAGE 44 –** No.11 Squadron moved to Edinburgh from RAAF Base Richmond, not Townsville as stated; 11 Squadron was never in Townsville.

PRESIDENT'S CORNER

Carl Schiller, OAM, CSM National President Air Force Association

COVID-19 HAS HEAVILY IMPACTED our lives from the plethora of news and social media and the implications of mandatory social distancing laws enforced by government. The Air Force Association is mindful that many of our members are elderly and therefore are among the most vulnerable groups. However, being in this age cohort, I am confident that social distancing is the best defence we currently possess to defeat the virus.

I am in weekly contact with Department of Veteran Affairs (DVA) as part of its Ex-Service Organisation Round Table dealing with COVID-19 issues. Secretary, DVA is providing weekly briefs on veteran services and veterans' needs to the Minister for Veterans' Affairs, and is in contact with other nations' veteran support agencies sharing strategies for supporting veterans and their families.

DVA staff around the country are mostly working from home to ensure veterans' support services are maintained. Of DVA's 300,000 clients, 101,000 are considered in the most vulnerable group and the Department is most eager to ensure it can do whatever is possible to support them.

Understandably, COVID-19 has created anxiety in the general community so it's very important we look out for our mates and neighbours. A regular, quick phone call rather than an email to remain in contact will do wonders for their wellbeing.

I have asked the Association's State/Territory Divisions to contact their members to see if they require assistance and let them know they are not alone in these circumstances.

COVID-19 has removed the opportunity to socialise with our mates at commemorations. Consequently, it is doubly important we remain in contact with our members during these challenging times.

I know some members have been on cruise ships and others are stranded overseas. Phone contact with stranded members is a great source of support and encouragement and warmly appreciated.

DVA reported 1,400 ADF personnel were assisting with COVID-19 preventative measures. This is a wonderful contribution to our national safety by our Defence personnel. It is the second time this year we have seen the ADF employed assisting the general community during disasters.

Also, there are many other front-line soldiers in this fight. Health workers, supermarket employees, teachers, police, public servants, and others in industries and support services essential to our wellbeing are battling to maintain normality. They are risking their health and their families to keep us safe. I am sure we are most grateful for their personal contribution.

Australia is more fortunate than other countries in the COVID-19 fight. We are resilient. We've coped with many disasters and we'll fight through this one.

Stay safe.

ANZAC DAY TRIBUTE

ANZAC DAY THIS YEAR adopted a very different complexion, a more individual, solemn but poignant reflection of the sacrifice and gift of earlier generations. It is very possibile that Light up the Dawn participation combined with a streamed dawn service from the Australian War Memorial will become a permanent feature of future Anzac Day commemorations.

This year's wonderful address by WGCDR Sharon Bown (pictured right), one of our senior nurses, on the theme of service to others engendered a deep sense of pride in our belonging to the RAAF and now the Air Force Association. Service to others is what both organisations are about. Sharon's address is reproduced below to acknowledge her compassionate contribution to a very special event.

Good morning Australia. My name is Sharon Bown.

I am an Australian veteran. I am a Returned Service Nurse. And I am a descendant of the Anzacs.

My great uncle, Private Albert Arthur Reader, landed at Gallipoli 105 years ago today. He was a stretcher bearer.

Like all who landed at Gallipoli that day, he was a man who lived his life in the service of others. After rescuing the wounded under fire for two long years, he was killed on the Western Front.

Uncle Albert is commemorated here, in the heart of the Australian War Memorial. His name is listed on the Roll of Honour alongside the names of the friends with whom he served, but also, amid the names of friends with whom I served. Friends who were killed on more recent operations.

They represent two distinctly different generations of Australians, an entire century divides them, yet they all lived their lives in the service of others.

An image that reminds us of such selfless service, looks out over us here today. A woman in a scarlet cape, standing beneath a universal symbol of charity – the Red Cross, and above a single word – Devotion.

She is a nurse. She casts a powerful image of peace and yet she stands resolute and ready.

We each have the opportunity to cast ourselves in the image of the nurse. The image of the Anzac.

Let us do more than just honour those who have defended Australia. In this time of crisis, let us recognise our innate capacity to do the same. To unite and protect the more vulnerable among us. To realise that the qualities for which we honour the Anzacs, live on within all of us.

Endurance, courage, ingenuity, good humour, mateship and devotion – to duty, to each other, to Australia.

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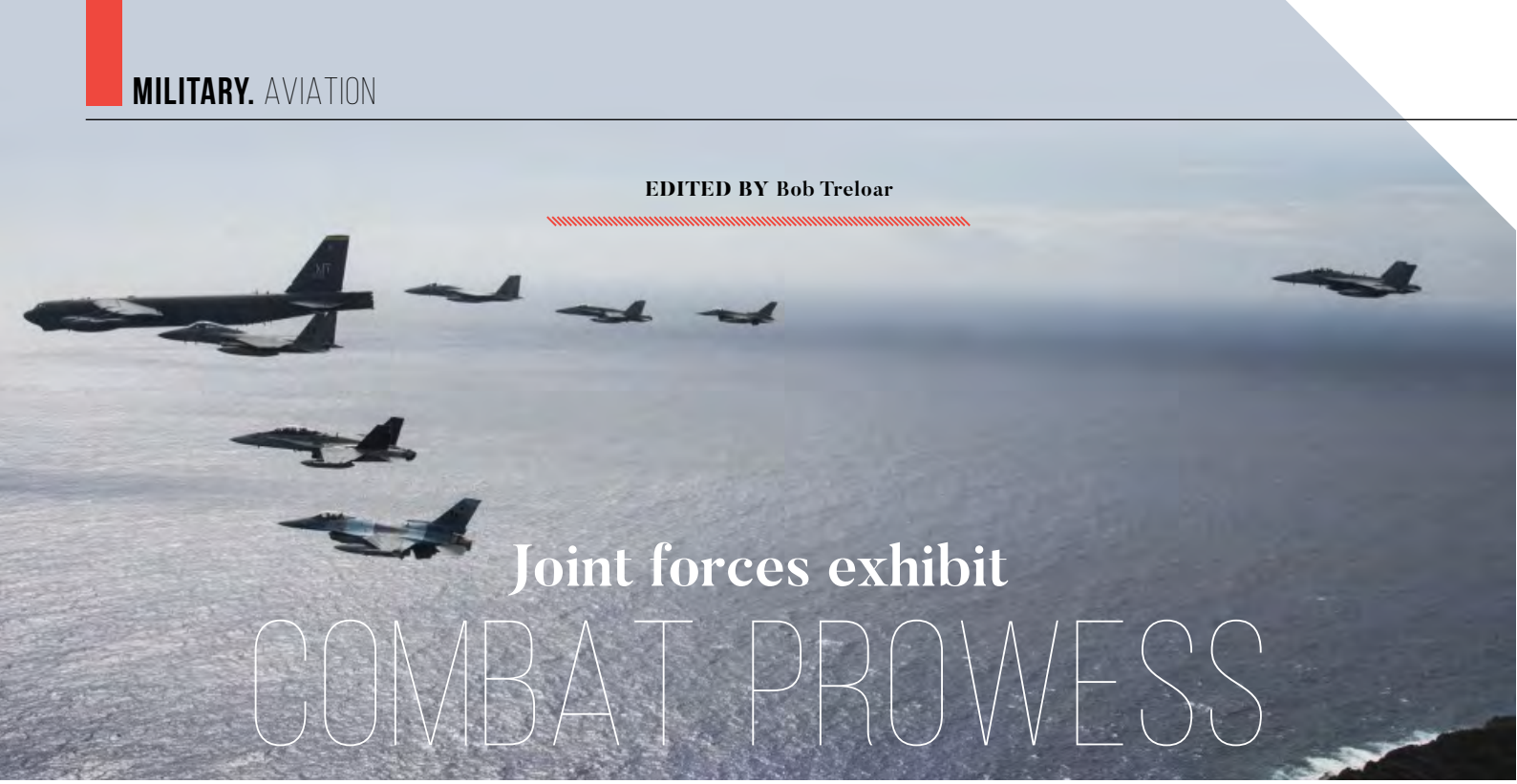
EDITED BY Bob Treloar



Joint forces exhibit COMBAT PROWESS

ON A HOT FLIGHT LINE with multiple runways that stretch for a combined 6.7km in the heart of the Western Pacific, more than 100 aircraft from the United States military, Japan Air Self-Defence Force (JASDF) and the RAAF took to the skies over the North Mariana Islands in February.

Exhibiting their military might, the three nations teamed up for the Joint Forces Large Force Employment (LFE) exercise – Cope North held at Andersen Air Force Base, Guam. An Air Task Group from the RAAF involving F/A-18A Hornet, E-7A Wedgetail, KC-30A multi-role tanker/transport aircraft, as well as combat support and medical elements deployed for the exercise. It involved more than 2300 personnel and approximately 100 aircraft, and increased the combat readiness and interoperability of the US Air Force, JASDF and the RAAF.

The 2020 Cope North exercise was historic as instead of employing control groups nationally, the three nations' forces were integrated along functional lines and performed as a multinational joint task force.

"One thing the RAAF will take away from Cope North is our interoperability with our Japanese and American allies," said Group Captain Hinton Taylor, Cope North 20 RAAF executive director.

"Our forces comprise three parts: machine-to-machine, human-to-machine and human-to-human integration. Practising our interoperability more closely was a big challenge as we were completely unified."

ABOVE USAF B-52 Strategic Bomber leads a formation of USAF F-15, RAAF F/A-18 and JASDF F-16 Aircraft.

SUPPORTING NORTH KOREA SANCTIONS

RAAF P-8A Poseidon. Photo: USAF Tech Sgt Heather Redman.

A RAAF P-8A POSEIDON MARITIME PATROL AIRCRAFT deployed in February as part of Operation Argus to support the global effort to enforce United Nations Security Council sanctions on North Korea – the first Australian Defence Force contribution to the operation for 2020.

Defence Minister Linda Reynolds said the deployment demonstrated Australia's commitment to regional security.

The Poseidon, operating from Kadena Airbase, Japan carried out airborne surveillance and monitored and deterred illegal ship-to-ship transfers.

Source: Air Force Technology

A decade of SUPER HORNETS

No.1 Squadron F/A-18Fs during the most recent multi-national Pitch-Black exercise in northern Australia.

ON MARCH 26 THE RAAF MARKED the 10th anniversary of operation of its fleet of Boeing F/A-18F Super Hornet fighters. RAAF Super Hornets have deployed twice to the Middle East, in September 2014 and in May 2017. No.1 Squadron conducted strike missions against Daesh/IS forces in Iraq and Syria under the Australian Defence Force Operation Okra. The aircraft have also been regular participants in multilateral air combat exercises, returning in March from Red Flag at Nellis Air Force Base, USA, where they performed well against US and British F-35s, RAF Typhoons and USAF F-15s and F-16s.

Australia ordered 24 Super Hornets in March 2007 and the first five touched down at RAAF Base Amberley on March 26, 2009. The aircraft were originally acquired to fill the gap left with the premature retirement of the F-111C in December 2010, and the introduction of the Lockheed Martin F-35A Lightning II.

The 24 Super Hornets were initially distributed between two squadrons within No.82 Wing at Amberley, No.1 Squadron the operational force and No.6 Squadron serving as the operational conversion unit for the type. With the purchase of the Boeing EA-18G Growler airborne electronic attack aircraft, the Super Hornets were consolidated into an expanded 1 Squadron in November 2016 and the Unit became responsible for both operational and training roles.

A current trial at Amberley has seen six aircraft transferred to No.82 Wing Training Flight, which is overseeing the training of Super Hornet pilots and Air Combat Officers, leaving No.1 Squadron with responsibility for combat operations.

Source: AIN Online

Role models
TAKE FLIGHT

FOR THE FIRST TIME, an all-female Air Force crew flew a KC-30A multi-role tanker transport to mark International Women's Day on 7 March 2020. The flight, from RAAF Base Amberley to Perth, was crewed by female pilots, attendants and technicians, and directed by a female team of Air Force air traffic controllers.

Championed by the Australian chapter of Women in Aviation International, Air Force and industry partners, 10 domestic flights were also staffed by all-female crews to highlight the growing roles of female professionals in aviation.

FLTLT Nicole Forrester, the KC-30A co-pilot, said: "It's so significant for girls to see women sitting in a flight deck or in uniform. The next generation looks for role models to show them what they can aspire to."

Source: RAAF News

ABOVE The all-female crew from No.33 Squadron, RAAF Base Amberley, wearing pink T-shirts with their uniforms in support of International Women's Day.

More F-35s for
US MILITARY

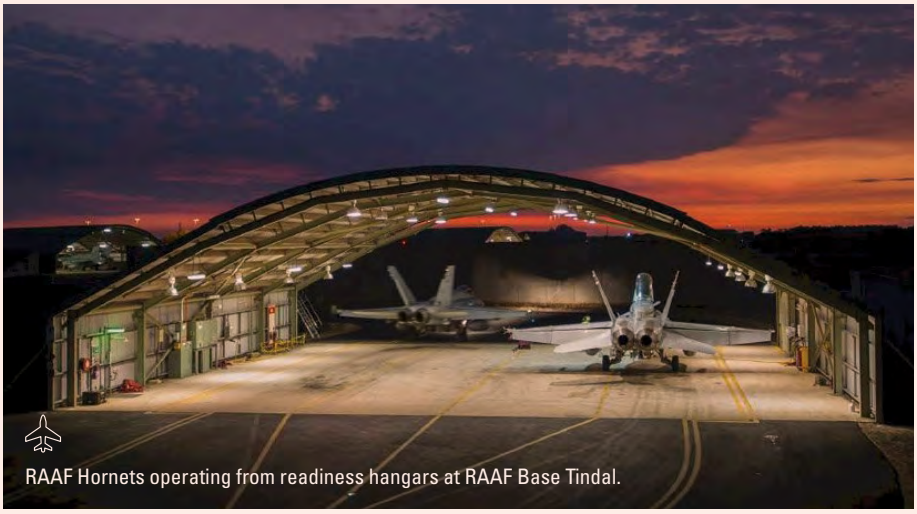
LOCKHEED MARTIN has been awarded $US4.7 billion to build 78 new F-35 fifth-generation combat aircraft for the US military. The contract includes 48 conventional take-off and landing F-35As for the Air Force, 14 short take-off and vertical landing F-35Bs for the Marine Corps, and 16 carrier-borne F-35Cs for the Navy.

According to the US Department of Defence, the aquisistion is expected to be complete by March 2023. Lockheed Martin handed over 134 F-35s in 2019, 91 aircraft in 2018, and 66 in 2017. Last year, 81 F-35s were delivered to the US armed forces, 30 to international partner nations, and 23 to foreign military sales customers. Those deliveries included 102 F-35As, 25 F-35Bs, and seven F-35Cs.

The 500th production-standard F-35 was delivered by Lockheed Martin and the Joint Program Office in March this year.

Source: The Diplomat

UPGRADE FOR RAAF BASE TINDAL



RAAF Hornets operating from readiness hangars at RAAF Base Tindal.

A $1.1BN WORKS program has been approved for the Northern Territory's RAAF Base Tindal, in addition to $495m already invested in New Air Combat Capability infrastructure.

Upgrades include an extension of the runway, construction of a new air movement terminal, aircraft parking apron and extra fuel storage facilities.

As a consequence, RAAF Base Tindal will be able to deliver enhanced air-to-air refuelling and air support capabilities to prosecute critical ADF operations, from air combat missions to natural disaster response throughout the northern region.

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Training contractor buys SURPLUS F/A-18S

AIR COMBAT TRAINING COMPANY AIR USA is set to buy up to 46 retired RAAF F/A-18 Classic Hornet aircraft, a move commentators say will create the world's most advanced and largest private air force.

Over the next three to four years, workers at RAAF Base Williamtown will service and prepare the Classic Hornets, which are being phased out as the F-35A Joint Strike Fighter enters service. Air USA will use them to provide training services to the US Air Force.

Air USA president Don Kirlin has spent the past 25 years building a private air force that currently includes Hawk, Alpha Jet, L-59 Super Albatross and MiG 29 aircraft.

LEFT Don Kirlin on the tarmac at Williamtown with A21-16.

TYABB AIR SHOW

THE TYABB AIR SHOW, held at Tyabb Airfield, Victoria in March, attracted some 9,000 spectators and enthusiasts.

The Australian Defence Force showcased its technological capabilities and highly trained personnel at the air show.

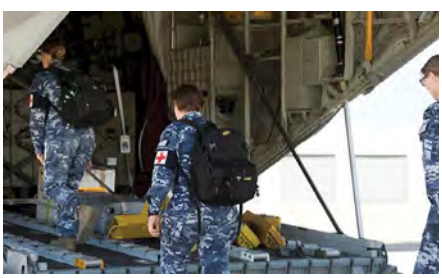
The RAAF participated in the biennial event with handling displays and flyovers featuring the Roulettes in PC-21 aircraft, a No.35 Squadron C-27J Spartan, a No.36 Squadron C-17A Globemaster III and RAAF Museum Historic Aircraft including Boomerang, Spitfire and Mustang aircraft.

Ground displays showcased the Royal Australian Navy Unmanned Aerial Systems, a Naval Aviation Prospects Scheme simulator and Defence Force Recruitment.

Legacy warbird trainers including former RAAF CT-4s, Winjeels and a Harvard, as well as the popular Southern Knights aerobatic display team with their North American Harvards took to the sky.

ABOVE P-51 Mustang on the Tyabb Airfield.

DEFENCE MEDICAL TEAM DEPLOYED TO TASMANIA



ABOVE ADF medical and scientific personnel board a C-130J Hercules at RAAF Base Amberley. Photo: TPR Jonathan Goedhart.

THE AUSTRALIAN DEFENCE FORCE deployed personnel to Tasmania as part of an Australian Medical Assistance Team (AUSMAT), following a request for assistance from the Tasmanian Government after an outbreak of coronavirus in the Burnie hospital.

In April, about 40 Defence and seven civilian medical professionals were flown to Burnie on a RAAF C-130 aircraft, before moving to the North West Regional Hospital once a deep clean of the facility had been completed. The personnel then reopened and operated the facility's emergency department, after local staff were sent home for two weeks' quarantine following an outbreak of COVID-19. AUSMAT is one of a few World Health Organisation globally verified Type-2 Emergency Medical Teams in the world. ADF AUSMAT teams typically include general duties medical officers, emergency nurses, a pharmacist, a radiographer and an environmental health officer.

Source: Defence Connect

RAAF Edinburgh on display AT ADELAIDE 500

RAAF EDINBURGH ONCE AGAIN showcased to the Adelaide community its capabilities and people at this year's Superloop Adelaide 500 Supercar Championship. The event is one of South Australia's premier tourist and community events. The Air Force display recorded more than 25,000 visitors of all ages, who were able to explore the equipment and technology that defends our nation and speak to the highly trained people skilled in its operation.

Schools Day saw more than 5,000 school children from around Adelaide visit the Air Force marquee. In a first, RAAF Edinburgh Indigenous Liaison Officer Flight Lieutenant Steve Warrior, a Kaurna man, organised a display that highlighted air power within an Indigenous context including boomerangs, spears, hunting sticks, woomeras and waddies.

"I wanted to show a timeline to the modern weapons we use and it was reassuring that so many people responded and were interested in our cultural history," Flight Lieutenant Warrior said.

The indigenous air power display was a huge success showcasing Air Force as an Indigenous leader in the community and providing many with their first understanding of those who have practised air power perhaps longer than anyone.

The cyber security display of 462 Squadron featured screens listing passwords that had been hacked and real-time geospatial monitoring of cyber-attacks and virus infections taking place around the globe.

Weapons technology generated enormous interest at the 3 Security Forces Squadron tables, where machine guns, grenade launchers, pistols and rifles could be safely handled by visitors.

Outside the Air Force Marquee, an enormous satellite dish called 'Hawkeye' attracted attention as it constantly rotated, tracking objects in space and providing internet connectivity under the control of visitors. The dish was part of the advanced equipment operated by 1 Combat Communications Squadron to provide critical communication during Operation Bushfire Assist.

For the second year in a row, No.3 Security Force Squadron took a G Wagon Surveillance Reconnaissance Vehicle on track with the RAAF Ensign flying proudly. Aside from the V8 action, spectacular F/A-18 flyovers provided by a 75SQN pilot dazzled the crowd with his skilful handling of the Hornet.

ABOVE Flt Lt Steve Warrior introducing school children to Indigenous air power on Schools Day at the Adelaide 500.

ABOVE A RAAF G-Wagon Surveillance Reconnaissance Vehicle conducts a lap of the track. Photo: LACW Jacqueline Forrester.

RAN begins FOC trials OF ROMEO HELICOPTERS

THE ROYAL AUSTRALIAN NAVY (RAN) has conducted first of class (FOC) flight trials for MH-60R 'Romeo' helicopters off the Queensland coast.

The trials, from HMAS *Adelaide*, will establish the safe operating limits of the Romeo helicopter on the landing helicopter dock (LHD) in a range of sea states and wind speeds, both day and night.

Adelaide's Commanding Officer, Captain Jonathan Ley, said: "The results will provide a new standard of operational capability, informing how Navy can employ the MH-60R and LHD together in the future to increase both lethality in combat and responsiveness during humanitarian assistance and disaster relief tasks," Captain Ley said.

The MH-60R is the RAN's next-generation submarine hunter and anti-surface warfare helicopter, and 24 are in service.

ABOVE A MH-60 Romeo helicopter conducts a running take off as part of first of class flight trials on board HMAS *Adelaide*. Photo: ABIS Jarrod Mulvihill.

Connecting with YOUNGER COMMUNITIES

RAAF ASSOCIATION (SOUTH AUSTRALIA DIVISION) has been working to connect more with serving veterans and members of the broader community to understand their needs and improve services.

In a major initiative, SADFO Edinburgh Defence Precinct was invited to provide a serving representative to join the RAAFA State Council as an observer, to provide a younger current serving voice and to develop a future champion to connect with serving members on Base. SQNLDR Craig Keane was appointed and welcomed on State Council – and has since become an active member of the Association.

RAAFA SA also had two outstanding opportunities to connect with the public earlier in the year with stalls at major RAAF Edinburgh community events. In February, the Adelaide Defence Community Organisation's Welcome to Adelaide event at Adelaide Zoo attracted more than 2,000 people, and RAAFA SA representatives discovered a surprising number of current serving members were unaware of the RAAF/ Air Force Association.

The Association was also invited to be one of RAAF Edinburgh's valued veterans' support stallholders in the Air Force Marquee at the Adelaide 500 Supercar Championship. Alongside RSL SA, Legacy SA and DVA, RAAFA SA staffed a stall from 20-23 February providing *Wings* magazines, stickers and pens to the broader community and introducing them to the Association. It was an unprecedented opportunity with 25,000 members of the public visiting the Air Force display over four days. Schools Day saw more than 5,000 students venture through the tent.

ABOVE RAAFA SA President Rob Black giving *Wings* magazines to school children at the Adelaide 500. Photo courtesy Department of Defence.

Sharing the Air Force marquee with serving Air Force members, who were showcasing current RAAF capability, also provided a great opportunity to introduce them to the Association and to better understand life in the Air Force now and their aspirations and concerns.

Interestingly, five serving members have become members of the RAAF Association SA so far in 2020.

Exposed Firefighters battle FOR RECOGNITION

PROGRESS IS BEING MADE IN A DECADE-LONG STRUGGLE TO ACHIEVE RECOGNITION, COMPENSATION AND HEALTH SUPPORT FOR ADF FIREFIGHTERS EXPOSED TO TOXIC CHEMICALS.

DURING THE LATE 1950S through to the latter part of 2000, firefighter initial and continuation training conducted by Air Force involved intensive burning of a wide range of toxic materials. Personal Protection Equipment (PPE) considered appropriate by today's standard was not available, leaving servicemen exposed to highly poisonous contaminants. Many have died prematurely, others have been left to manage serious health conditions.

Most of the firefighter training was conducted at the RAAF Fire School at RAAF Base Point Cook, where more than 750 former ADF firefighters were trained.

A Parliamentary Standing Committee on Public Works Hearing held on July 26, 2011 into the contamination and remediation works at the former Point Cook fire training area revealed the serious site contamination created by firefighter training, identifying more than 120 compounds. The committee noted a Department of Defence proposal to excavate and treat about 55,000 tonnes of contaminated soil and 950,000 litres of liquid hydrocarbons, from the area to ensure ongoing environmental protection and to eliminate potential risk to human health.

A total of 163 toxic chemicals were subsequently identified at the site and it has been decontaminated at

great expense to the Commonwealth. However, the effects of exposure by our former firefighters cannot be as easily remedied.

An ADF Firefighter Action Group was formed when former serving Air Force firefighters discovered the ill effects from their exposure. They lay no blame on the Service due to the ignorance of health hazards associated with firefighting practices of the time, but have been seeking recognition of the exposure and assistance with medical and wellbeing support.

The matter was initially brought to the attention of the Department of Veterans' Affairs (DVA) in 2004, but was dismissed through a lack of evidence. Following the Public Works Hearing, five submissions to various Veterans Affairs ministers have been made to raise awareness of the health impact of the contamination that compelled remediation works at the site.

DVA commissioned a series of studies. However, most report outcomes were inconclusive or did not address the chemicals that were the basis of those submissions.

However, a more recent study by consultant occupational physicians revealed that, although some chemicals were benign, most posed significant health risks. Many of the serious cancerous and non-cancerous conditions listed by those experts have been or are being experienced by our former Service firefighters.

The incidences of exposure occurred on non-operational service. That factor, the associated standard of proof required, and the complexities of the suite of veteran support legislation have frustrated attempts for successful claims to DVA.

In 2018, the Firefighter Action Group sought assistance from the Air Force Association to progress their decade-long struggle to obtain government acknowledgement of the health issues suffered by those Service personnel.

Since then, several meetings with Air Force, DVA and Defence have occurred. Air Force Compensation Advocates have assisted our former firefighters with claim submissions but those are not directly related to chemical exposure. The veteran support legislation is inadequate and unable to provide a suitable solution. Fortunately, Secretary of DVA, Liz Cosson, has now directed her Policy Reform Team to investigate possible remedies and provide options to the ADF Firefighter Action Group for consideration with a view to DVA preparing proposals to government for solution.

The process will take 12-18 months, but this positive approach is likely to give some relief to members and their families who have suffered anxiety and a sense of rejection.

BOOK LAUNCH

THE SECOND BOOK IN A TRILOGY recording the rich heritage of 7 Wing, *Wings of Time* by Charles Page, was launched on 7 December 2019 by Dr Ken Michael AC at RAAFA WA Merriwa.

Dr Michael is a former Governor of Western Australia, Patron of the AAFC Branch of RAAFA WA and a former air cadet. The occasion was also attended by RAAFA WA Secretary Ron Onions and Squadron Leader Andy Shearman, representing 7 Wing.

Wings of Time recounts the experiences and achievements of 80 air cadets. Many went from cadet to instructor and mentored and inspired succeeding generations. Two of the cadets became WA Governors, and several others have earned a high measure of fame. Some joined the RAAF or became commercial pilots, and there are all manner of trades and professions, from architects to yachtsmen. Honours and awards include 3 ACs, 1 AO, 2 AMs and 5 OAMs.

The many notables in the book include WA Governors Dr Ken Michael and Malcolm McCusker, author Robert Drewe, Ray Hartley who wrote songs for Vera Lynn, yachting champion Rolly Tasker, and pilot Brian Edwards, who flew his Tiger Moth *Matilda* from England to Australia.

Others featured include Graeme McGlashan, who recalls how he met his future wife, Berice, at a dance organised by 3 Flight Fremantle, and Graham Wilson, whose Uncle Lyle had a dogfight with the Red Baron. Then there is pilot Harry Brown, who flew Hurricanes, Tempests, Mustangs and Vampires, and has many enthralling anecdotes.

There is so much variety in these stories, which date back to WWII and the decades since. However, one thing the cadets and instructors have in common is the camaraderie of those halcyon days in the air cadets.

The first book in the trilogy, *Wings of Valour*, commemorated the cadets and instructors who died in service. It led to the construction of an Honour Board and a Book of Remembrance Cabinet at 7 Wing HQ, Pearce, WA. An Honour Board was also placed in the Aviation Heritage Museum, Bullcreek.

Research is well under way for a third book, *Wings of Eagles*, which will include cadets and instructors from WWII through the Korean War, Vietnam War and Middle East up to the present. As an example, one ex-cadet is leader of the RAAF Roulettes, another is Commandant of Army Aviation, and yet another flew Phantoms in Vietnam. The aim is to shine a light on stories that deserve their place in the annals of the RAAF and the AAFC.

• Wings of Time *is an illustrated A4, soft-cover book of 304 pages. It was funded by a grant from RAAFA WA.*

ABOVE Roll of Honour for Australian Air Force Cadets 7 Wing Western Australia who died in service. Photo: Charles Page.

Western Australia
HISTORY PROJECTS

WA'S AUSTRALIAN AIR FORCE CADETS (AAFC) Branch Historical Committee has continued several projects. It has added some text and images to the Honour Board registration with the Places of Pride website of the Australian War Memorial. Meanwhile Flt Lt (ret) Mike Hampson has initiated the 7 Wing AAFC Photo History Project, which is identifying AAFC cadets and instructors in group photos. The project in itself brings back memories and reconnects former colleagues. Reunions will resume, once restrictions are lifted.

Charles Page, AAFC Branch Historian, RAAFA WA

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AIRMAN FOR LIFE

EDITED BY John Kindler

ABOVE The fuselage in the assembly jig.

LEFT Loyal Wingman prototype on its feet.

LOYAL WINGMAN PROGRESS

THE FIRST PROTOTYPE of Loyal Wingman, an unmanned aircraft developed by Boeing Australia in collaboration with the RAAF, was powered by internal electrical sources and stood on its wheels for the first time recently.

Boeing Airpower Teaming System program director Dr Shane Arnott said: "This is an exciting milestone for the development program and the Australian aerospace industry, as we progress with production of the first military aircraft to be developed in Australia in more than 50 years. We're continuing at pace toward our goal of flying later this year, so that we can show our customer and the world what unmanned capability like this can do. The strong contributions from our industry team are powering our progress."

The company achieved the milestones just two months after completing structural assembly of the fuselage. As Boeing completed structural assembly, RAAF Director-General of Air Combat Capability Air Commodore Darren Goldie said: "The partnership with Boeing is key to building our understanding of not just the operational implications for these sorts of vehicles, but also making us a smart customer as we consider options for manned-unmanned teaming in the coming decade."

BAE Systems Australia delivered hardware kits including flight control computers and navigation equipment for the program. Other companies involved include RUAG Australia, which delivered the landing gear system, Ferra Engineering supplied precision machine components and sub-assemblies while AME Systems delivered wiring looms.

The 11.7m drone will have a range of about 2,000nm.

Source: Airforce Technology

Local manufacturer boosts production for F-35 program

NSW COMPANY LINTEK has developed a cutting-edge manufacturing system that doubles the production capacity of its printed circuit boards for phased array radar and electronic warfare systems for the global F-35 program.

Minister for Defence Industry Melissa Price and NSW Senator Jim Molan joined Lintek at its Queanbeyan site to announce the new capability.

"This development is a terrific example of Australian defence industry's ingenuity and commitment to enhancing our local aerospace manufacturing capability," the minister said. "The government is investing $200 billion in Australian defence industry, creating new jobs and delivering more opportunities for small business to export their capabilities overseas. So far, 50 Australian companies have shared in almost $1.7 billion in the production of F-35 components and are employing over 2,400 skilled Australians."

Synergy-centred MAINTENANCE FOR F-35A

A maintainer prepares a F-35A Lightning II for launch at Nellis Air Force Base. Photo: USAF.

AS CAPABLE AS THE F-35A is proving itself to be on the battlefield, it can be just as capable in reliability and quick combat 'turns' when maintainers leverage the synergy designed into the maintenance systems – something the US Air Force (USAF) is in the process of developing and perfecting.

Colonel Michael Miles, 388th Maintenance Group commander, has been running a maintenance operation for the past three years, overseeing the efforts needed to keep the USAF's first combat capable F-35A wing airborne and lethal. He said that while there have been notable program-wide challenges with F-35A sustainment and the Autonomic Logistics Information System, improvements have been made with continuous system updates and more are in the work. It's not the individual programs, but the concept – synergy-centred maintenance – that is the core that makes fifth-generation sustainment unique, he said.

Col Miles likened the F-35 maintenance concept to a patient going to a doctor for a regular exam. The patient may have high-blood pressure that bears monitoring. The doctor wants the patient to come back in a few days for a check-up. Medication may be required, but the initial reaction isn't to put the patient on bed rest.

"To me, the most valuable part of the maintenance system is the prognostics health-management capabilities," he Miles said. "The ability to look at what the jet is reporting on its health and make maintenance decisions early, before something breaks, is a huge leap in maintenance management from previous aircraft."

If an issue requires more than monitoring, the system can provide the recommended fix in the associated electronic joint technical data, create a work order and even request the proper parts be sent to the Unit. Meanwhile, while each Squadron is tracking the health of its fleet, engineers at the F-35 program level are constantly looking at the most commonly reported issues, delivering solutions and adjusting the supply chain where needed.

That synergy is key to continued progress in F-35A maintenance, Col Miles explained, and maintainers will learn to trust the system as the program matures, which will continue to improve performance. Currently, the 388th Fighter Wing is generating a mission capable rate of more than 80%, which means it can generate enough F-35A sorties to support the operational demands of the Wing.

People are also a large part of the mission-capability equation, said Col Miles. As new maintainers, and maintainers transitioning from legacy platforms, learn the most efficient ways to leverage the synergy designed into the F-35 maintenance concept, the platform's reliability should only increase across the program, he explained.

Source: Defence Connect

Next-generation fighter contract awarded

A CONSORTIUM OF DASSAULT AVIATION, Airbus and other partners has received an initial framework contract (Phase 1A) for the development of a next-generation fighter (NGF). Partners include MTU Aero Engines, Safran, MBDA and Thales. The 18-month contract has been awarded by the governments of France and Germany for the launch of the demonstrator phase for the Future Combat Air System (FCAS). Preliminary work under the deal includes the development of demonstrators and innovative, advanced technologies.

The NGF is the core element of the FCAS with Dassault Aviation as a prime contractor and Airbus as the main partner of the project.

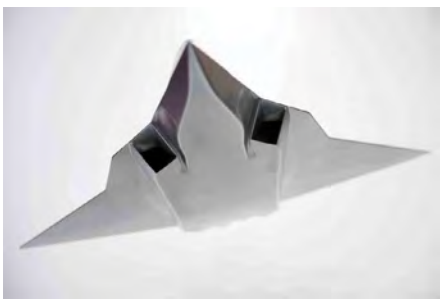
Development of unmanned components such as remote carrier platforms will be assigned to Airbus as prime and MBDA as the main partner. Responsibility for development of the Combat Cloud component will see Airbus partner with Thales. The system's engine is be developed by Safran and MTU in collaboration.

Last year, Spain inked a framework agreement with France and Germany to join the program and appointed Indra to lead its efforts.

Test flights are expected to commence by 2026.

Source: Airforce Technology

BELOW
Future Air Combat System shape model.



A Litening sensor pod on the wing of a No.37 Squadron C-130J Hercules.

Hercules fitted with LITENING SENSOR

WITHIN PLAN JERICHO, Airforce intends to incorporate a suite of enhanced capabilities in its Hercules fleet that include the Northrop Grumman AN/AAQ-28(V) Litening sensor, a high-speed satellite communications system, and an augmented flight deck crew station to operate the sensor and communications.

The AN/AAQ-28(V) Litening pod incorporates a forward-looking infrared camera capable of capturing optical imagery in both day and night conditions and, once integrated with satellite communications, will enable the Hercules to share high-definition video with ground-based units or a command centre.

The RAAF originally acquired the Litening pod as a targeting sensor for the F/A-18A/B Hornet and it is now surplus to requirements. Its targeting function will be disabled when fitted to the C-130J.

C-130J A97-448 is the first of six to be fitted with the capability and will undergo a series of flight trials to qualify the installations.

Airbus Australia Pacific designed the system integration and performed the pod and pylon installation on the Hercules with support from Northrop Grumman and Lockheed Martin.

Source: Airforce Technology

AVALON 2020 POSTPONED

AS A CONSEQUENCE OF COVID DISRUPTION, the 2021 Australian International Airshow and Aerospace and Defence Exhibition (AVALON 2021) will now be staged from Tuesday 23 to Sunday 28 November 2021.

A century of distinguished service by the Royal Australian Air Force will remain the AVALON 2021 theme and the focus for the world's aviation, aerospace and defence industries will be on promoting business for the future.

QUIKSTEP POWERS AHEAD

SYDNEY-BASED AEROSPACE COMPOSITES manufacturer Quickstep is ramping up production on a number of contracts for global defence customers such as the F-35 Lightning II strike fighter and the C-130J Super Hercules military transport.

The company recorded a 16% increase in sales for the third quarter over the corresponding period last year, and sales for the nine months to April were up 14% to $57.7 million.

During the quarter Quickstep delivered batches of MJU-68 aircraft flare housings to Chemring Australia for further qualification testing. The company has also increased production of enclosures for lightweight portable x-ray machines manufactured by Micro-X, which are experiencing increased demand as part of the fight against Covid-19 coronavirus.

The company said it was continuing discussions with aerospace manufacturers in the United States and Europe on the deployment of its AeroQure process for manufacturing carbon fibre composites. The process does not require an autoclave and offers the potential of faster production times and lower costs than traditional curing processes.

Source: AuManufacturing

BELOW
RAAF C-130J Super Hercules.

Raytheon-Kongsberg JSM carried on USAF F-16. Photo courtesy Raytheon.

F-35 TO FLIGHT TEST JSM

RAYTHEON TECHNOLOGIES EXPECTS a flight test of its Joint Strike Missile (JSM) on F-35As to happen this year. Raytheon Missiles & Defense business development lead Kurt Neubauer told *Breaking Defense* the flight test will build on the successful 2018 JSM flight test of a live warhead with a second live-warhead demonstration later this year.

Norwegian firm Kongsberg Defence & Aerospace has also completed internal weapons bay suspension and fitting tests of the JSM on the F-35A and C aircraft variants. In addition, fit checks have been completed on all F-35 variant external wing stations, as well as the US Navy and RAAF F/A-18E/F Super Hornets.

In previous tests, in 2018, a Norwegian F-16 successfully launched the JSM, with an approximate stand-off range of more than 150 nautical miles. Norway and Japan are confirmed as the first customers for the new missile; Japan also selecting the weapon for the Japan Self-Defense Force's joint strike fighters.

The JSM can be launched against targets on land, at sea and in littoral environments for suppression/ destruction of enemy air defences and offensive anti-surface tactics.

Neubauer described the missile as "a fifth-generation weapon for fifth-generation aircraft". He also advised that Raytheon expects the Norwegian Air Force to declare JSM initial operational capability on their F-35As in 2023.

An improved infra-red seeker is a new feature of the missile. "JSM's seeker is cooled, scans a wide field of view, uses multi-banded imaging infrared and can track a large number of contacts simultaneously. It rejects decoys and can complete autonomous target identification of both ship and land targets," Neubauer said. "JSM is capable of tailoring en-route ingress and attack courses to enhance its survivability."

The TacNet link further "allows for inflight updates and route adjustments". JSM's survivability is enhanced through mission planning, both on the ground and when mated to the aircraft.

The JSM platform's high survivability is accomplished by:

- Passive sensors
- Low-observability signature
- Sea skimming altitude
- Terrain following flight
- High agility with selectable end-game flight profiles
- Precise designated time-on-target information.

BAE Systems Australia has partnered with Kongsberg Defence and Aerospace to support future integration of the JSM into Australia's F-35 fleet.

There has also been strong interest in introducing the JSM onto maritime patrol aircraft such as the Boeing P-8A Poseidon for internal weapons bay carriage as well as on external wing stations.

Source: Breaking Defense

F-35 transmits target data to missile command system

A US AIR FORCE F-35 has successfully communicated with the US Army's Integrated Air and Missile Defense Battle Command System (IBCS). The fighter transmitted information to the IBCS using the F-35's ground station and a bespoke F-35-IBCS adaptation kit. The technology allows the F-35 to work as an elevated sensor for targeting ground-level threats.

The Northrop Grumman-built IBCS tracks data from sensors to map aerial threats including aircraft and missiles. The system can then select the best weapon to engage the threat. The capability creates additional battlespace awareness and the ability to track incoming targets and take action, if necessary.

The test builds on Lockheed Martin's push to make the F-35 functional across multiple combat domains, not just the air. The F-35, with its advanced sensors and connectivity, is able to gather and seamlessly share critical information enabling greater joint force protection and a higher level of lethality of Army Integrated Air and Missile Defense forces.

Previous F-35 testing saw the aircraft interface with the Aegis Combat System and the Naval Integrated Fire Control-Counter Air system.

Source: Airforce Technology

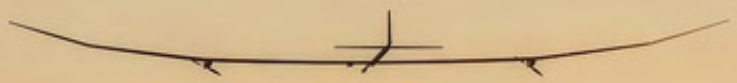
ABOVE An F-35 approaches a tanker to refuel.

RAYTHEON-UTC MERGER COMPLETE

RAYTHEON AND UNITED TECHNOLOGIES CORPORATION (UTC) completed their long-planned merger on 3 April, creating a US-based defence contractor called Raytheon Technologies Corporation (RTC).

The combined company has about $US74 billion in annual net sales and about 195,000 employees, making it one of the largest aerospace and defence firms in the world.

RTC executive chairman Tom Kennedy said RTC will be an "innovation powerhouse". "The combined company expects to introduce breakthrough technologies at an accelerated pace across high-value areas such as hypersonics, directed energy, avionics, and cybersecurity."



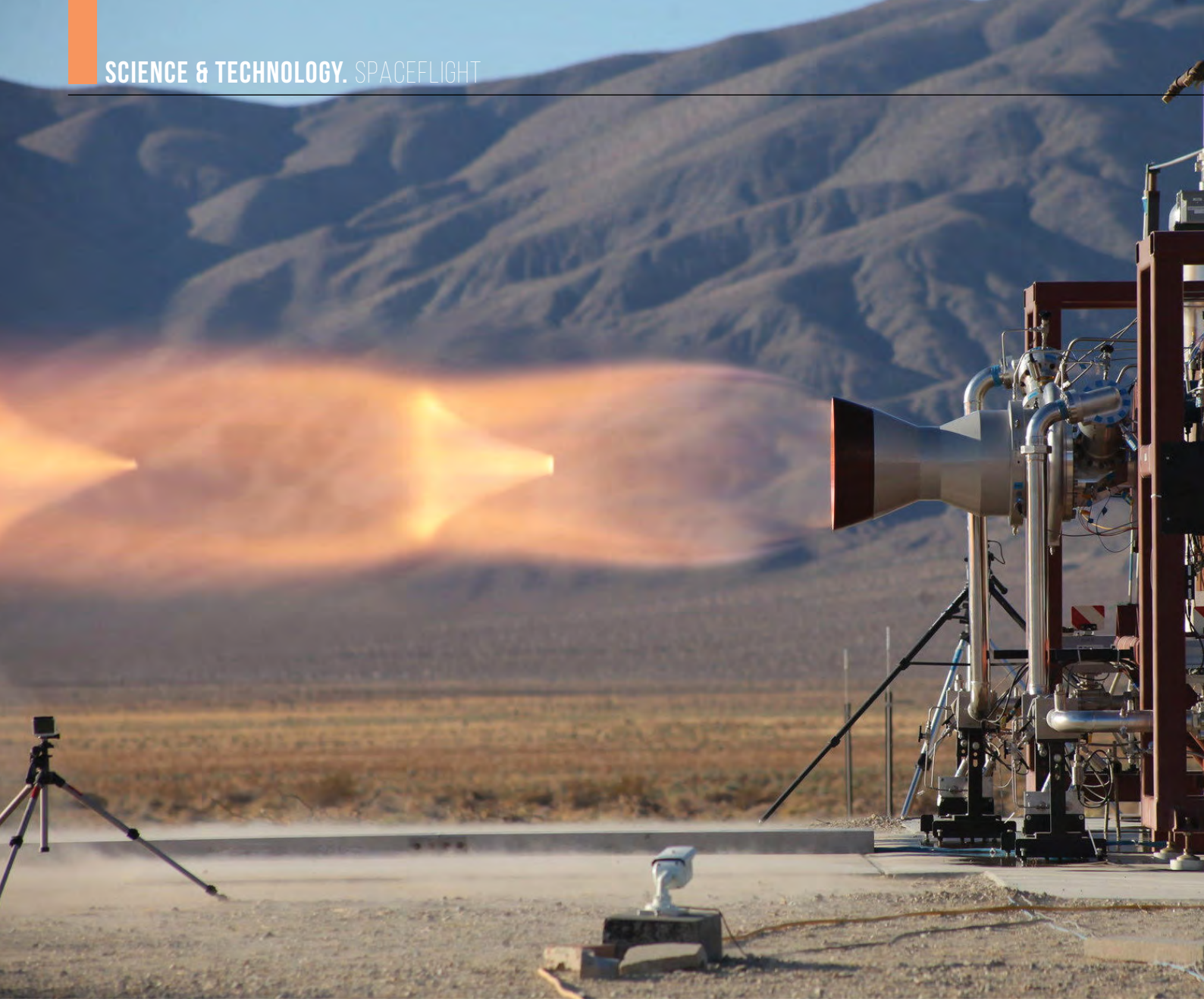
Solar aircraft takes flight

BAE SYSTEMS HAS completed the maiden flight of its Persistent High Altitude Solar Aircraft (PHASA-35) from the Woomera Test Range in South Australia.

The solar-powered aircraft was developed with sponsorship from the UK's Defence Science and Technology Laboratory and Australia's Defence Science and Technology Group. The aircraft has undergone a rapid design and testing process, going from concept to first flight in 20 months under a partnership between BAE Systems and its subsidiary Prismatic.

PHASA-35 uses solar power during the day and battery power to stay airborne at night; a combination which BAE Systems says could enable it to operate for up to a year before having to land. Touted as a game-changer, it could bridge the gap between satellite and aircraft surveillance and reconnaissance capabilities. The system can also be used to host 5G or other networks, providing network capabilities to areas beyond the reach of conventional communications equipment.

Source: Airforce Technology



IN THE HOT SEAT

NASA MISSION CONTROL FLIGHT DIRECTOR **ED VAN CISE** EXPLAINS HIS ROLE AND THE PATH HE TOOK TO ACHIEVE IT.

ABOVE Launch abort engine designed for use on Boeing's CST-100 Starliner spacecraft being hot-fired during tests in the Mojave Desert, California. Photo: Aerojet Rocketdyne

ABOVE RIGHT Ed Van Cise monitoring the robotic extraction of cargo from the SpaceX Dragon cargo vehicle during the SpaceX CRS-9 mission to the International Space Station. Photo: NASA.

"HOUSTON FLIGHT IS GO FOR LAUNCH," Flight Director reporting to the Launch Director prior to the start of the final countdown for a launch from Florida.

"Alright flight controllers, give me a go/no-go for TLI (Trans Lunar Injection)." Flight Director making a go/no-go poll of the flight control team in Mission Control.

"So, you're telling me you can only give them 45 hours? That brings them to about there. Gentlemen, that's unacceptable... I want this mark all the way back to Earth with time to spare. We've never lost an American in space. We're sure as hell not going to lose one on my watch. Failure is not an option." Ed Harris, portraying Flight Director Gene Kranz in the movie *Apollo 13*, as he led the flight control team through the challenging task of returning the Apollo 13 crew to Earth after an oxygen tank in their service module exploded.

From those quotes, it's clear that the Flight Director is usually a prominent person in Mission Control. But what is a Flight Director? What does a Flight Director do? And what does it take to become one?

As the 78th NASA Flight Director since NASA was established in 1958, I'd like to share with you how I came to be among the ranks of the now 97 people who have taken the role of NASA Flight Director for human spaceflight missions. Keep in mind that my path to this position is just one of many potential paths. The characteristics of a Flight Director can be adapted to any position in a high-performing, high-reliability organisation.

My path to the Flight Director's chair started in 1986, when I was nine years old. On 28 January, the Space Shuttle *Challenger* was lost just over a minute after launch along with her crew of seven. The first teacher in space, Christa McAuliffe, was on that flight.

Although the launch happened during our school hours, we didn't watch it live at my school. I didn't learn what had happened until I got home and saw it replayed over and over on every television channel. I was old enough to realise something important had happened and for the event to be ingrained in my memory. I was also young enough to not fully grasp the reality of the tragedy.

A couple of years later, my father bought me a book about the first 25 shuttle flights *(Space Shuttle Log: The First 25 Flights by Gene Gurney and Jeff Forte)*. In the overview of STS-51L, *Challenger's* final flight and the 25th shuttle mission, an excerpt of the Roger's Commission on the accident read: *Telemetered data indicate a wide variety of flight system actions that support the visual evidence of the photos as the shuttle struggled futilely against the forces that were destroying*

it (Report to the President by the Presidential Commission on the Space Shuttle Challenger Accident, page 20).

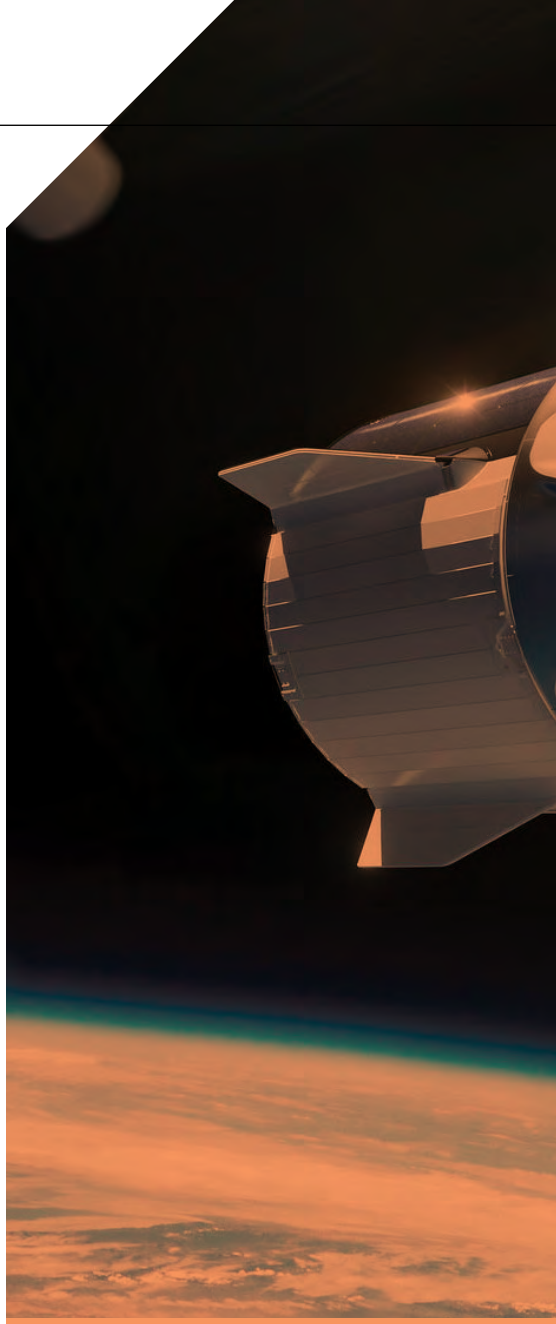
I was immediately hooked. Imagine creating a complex machine that was not only capable of going into space but was also designed, built and focused on doing whatever it could to keep flying and keep its human occupants safe. I humanised the machine, became enamoured and wanted to become a part of the business that could make that possible.

A couple of years later, I was able focus on my enthusiasm for human spaceflight by attending Space Camp in Huntsville, Alabama. I attended twice, once in 1990 at the end of elementary school and again in 1993 while I was in high school. There I learnt spaceflight wasn't just for smart people. Well, really I learnt that simply being smart wouldn't automatically mean you were going to be in the space business or be an astronaut.

Space Camp brought excitement, challenge and reality to my quest to help send people to space. We were taught about teamwork – not just the vague concept but how to really put it into practice. We learnt to rely on others, learnt the necessity for clear and precise communication, and learnt that we couldn't accomplish a mission on our own. If we tried to do it all ourselves, the team and mission would fail.

We also learnt to have fun. I made friends with whom, 27 years later, I am still in regular contact. At Space Camp, I was introduced to Mission Control and the roles of the people who work there, including the Flight Director. Perhaps as a nod to my future, my team even selected me to be the Flight Director for our Long Duration Mission in 1993. I was honoured to be selected to receive the Right Stuff Award that same year. In 2012, I was further honoured to be inducted into the Space Camp Hall of Fame.

When I left Space Camp, I knew I wanted to work in Mission Control. Soon after I learnt that working in



ABOVE The SpaceX Dragon cargo vehicle approaching the International Space Station.

ABOVE LEFT Boeing Crew Space Transportation (CST)-100 Starliner is being developed in collaboration with NASA's Commercial Crew Program. The Starliner was designed to accommodate seven passengers, or a mix of crew and cargo, for missions to low-Earth orbit.

LEFT Ed Van Cise monitoring the rendezvous of the SpaceX Dragon during the SpaceX CRS-9 mission to the International Space Station. Photo: NASA.

Mission Control meant working at the NASA Johnson Space Center in Houston, Texas. It also meant getting at least an undergraduate degree in a science, technology, engineering or maths (STEM) field. Since my mother was a school teacher and my father was a mechanical engineer, the STEM fields were always something I gravitated towards.

In order to work as a NASA civil servant, then and now, the most likely path is to take breaks away from university to be a NASA cooperative education student or an intern. I was fortunate that the University of Michigan and its aerospace engineering program was a mere 90 minutes from my home and had a great partnership with Johnson Space Center. I set my sights on attending school there.

While attending classes at Michigan, I never lost sight of my goal to work at NASA. I pursued and was admitted into the cooperative education program. I also created and led an undergraduate research team to develop an experiment we would fly on NASA's zero gravity airplane (the "Vomit Comet").

While we worked hard to become the first in the world to create single-walled carbon nanotubes in microgravity (which we succeeded at doing in 2000), I was continuing to learn the important skills of team leadership, communication – both receiving (pulling) and providing (pushing) information – teamwork and responsibility. Those attributes are considered to be the "soft skills" of working in Mission Control. They are the most critical skills to have (more important than knowing the engineering of how systems function) and are also the hardest to learn and master. Mastery of those skills is crucial for a Flight Director, and you can't start learning and perfecting them early enough.

In 2000, I was hired full time at NASA, working in Mission Control for the International Space Station (ISS). Technically, I started in January 1998 as a cooperative education student, 10 months prior to the launch of the first ISS component. Twenty years later, I've been an Operations Support Officer flight controller for the ISS (managing assembly and maintenance of the station), a TITAN flight controller (managing the guidance, navigation and control; communications; and

command data handling systems), and a manager of flight controller and astronaut instructors.

I was selected to be a Flight Director, along with my classmates Scott Stover and Dina Contella, in June 2009. After approximately six months of training, I was certified as the 78th NASA Flight Director on 20 January 2010.

Since then I have "flown" the space station Flight Director console for more than 4,700 hours, supported the STS-131 mission, led three spacewalks, led two visiting vehicle cargo missions, led two space station expeditions (Expeditions 28 and 41) and, most recently, I was one of four flight directors to fly the Boeing CST-100 Starliner Orbital Flight Test mission.

All well and good, but what does a Flight Director, or Flight, do in order to make the sort of grand statements quoted at the beginning of the article? To be truthful, the biggest thing is plan and listen.

Flight Directors are assigned various tasks to lead. Those tasks could be complete missions (such as a Starliner or Artemis mission where a Flight Director lead is responsible for planning everything prior to launch, through the mission, to the final safe and successful touchdown back on Earth) or segments of a mission (such as a spacewalk or an expedition of the space station's ongoing mission).

Leading a successful mission means understanding the priorities. We are fortunate in that the priorities are always the same: crew safety, vehicle safety, mission success. As long as we focus on those three things, in that order, we know the mission will be safe and successful. The key, however, is the details.

While the responsibility for the mission – both planning it before the mission starts and executing it from the mission control room – lies with the Flight Director, they do not do all the work. Instead, Flight works with an amazing and talented team of flight controllers, hardware and software engineers, analysts and programmatic engineers.

All of those talented individuals work on their assigned pieces of the mission, bringing the results to Flight. Together as a team, led by Flight, the results are reviewed and integrated into a single, comprehensive mission or task plan.

Those plans, which include mission rules, crew timelines, crew and ground procedures, engineering limits, and detailed activity priority lists, are then carried into the real-time environment.

This is the Mission Control function often seen on television or in movies. As the mission is executed, everyone, including the crews in space, work for the Flight Director. Flight makes the decisions on what to do or not do.

Those decisions are not based solely on Flight's own opinion but also all of the work that has gone into the mission up to that point from across all the teams involved. The responsibility for the success or lack of success of each moment of the mission lies on the shoulders of the Flight Director.

Flight communicates with the team, gathers information and recommendations, weighs the risks to crew and vehicle safety and then makes the needed decisions. Mission Success comes only because of the long hours of hard work by every member of the team. Mission complications, or even failures, are because Flight did not make the correct risk trades or decisions – the responsibility lies with Flight.

For that reason, the Flight Director

BELOW SpaceX Falcon 9, a two-stage rocket that transports satellites and the Dragon spacecraft into orbit. It is the first orbital-class rocket capable of reflight.

ABOVE RIGHT Falcon 9 ready for launch.

will insist that every team member always give their absolute best. Flight will always solicit input on whether team members are go or no-go. Flight will always be aware that failure may not be an option but it is definitely a very real thing that must be openly discussed and fended off at all turns.

So, what does it take to become a Flight Director? There's certainly no single path to getting there. My path is but one example of many options for the journey.

As NASA and space agencies around the globe look beyond low-Earth orbit, the path to Mission Control – and to some degree the function of Mission Control – will certainly change. Technology will certainly change.

Flight Directors will still be leading the missions and the key skillsets needed will be the same. A successful Flight Director is exceptional in the soft skills, in addition to the technical skills. Those soft skills include clear and concise communications; strong leadership and team coordination; and accurate situational awareness and risk assessment abilities.

Future Flight Directors should focus on developing and honing those skills. Work on those, and you are well on your way to earning your Flight Director pin and being at the forefront of leading human exploration outside Earth orbit – to the Moon, Mars, and beyond.

SPACE PROGRAMS

ARTEMIS

NASA is committed to landing American astronauts, including the first woman, on the Moon by 2024. The Artemis lunar exploration program will use innovative new technologies and systems to explore more of the lunar surface than ever before. NASA will send human and robotic explorers to new locations on the surface starting at the lunar South Pole. Mission objectives are to:

- Find and use water and other critical resources needed for long duration exploration
- Investigate the Moon's mysteries and learn more about Earth and the universe
- Learn to live and operate on another celestial body
- Prove the technologies needed to send astronauts to Mars.

STARLINER

Boeing's Crew Space Transportation (CST)-100 Starliner spacecraft is being developed in collaboration with NASA's Commercial Crew Program. The Starliner was designed to accommodate seven passengers, or a mix of crew and cargo, for missions to low-Earth orbit. For NASA service missions to the International Space Station, it will carry up to four NASA-sponsored crew members and time-critical scientific research. The Starliner has an innovative, weldless structure and is reusable up to 10 times with a six-month turnaround cycle. It also features wireless internet and tablet technology for crew interfaces.

WHEN THERE IS NO CHECKLIST

LEFT
The 100th Space Shuttle launch from NASA's Kennedy Space Center. in Ocotber 2000.

RIGHT
Pam Melroy in the shuttle.

FORMER SPACE SHUTTLE COMMANDER **PAM MELROY** DESCRIBES HOW AN EXPERIENCE AS AN AIR FORCE TEST PILOT HELPED HER THROUGH AN EMERGENCY SITUATION ON HER FIRST FLIGHT AS AN ASTRONAUT IN 2000.

WHEN THINGS GO WRONG – in a cockpit or anywhere else – it's a great comfort to have a checklist you've rehearsed to turn to. The sum of distilled knowledge, steps to follow with minimalist clear instructions; I sure wish I had one for the non-flying parts of my life!

But sometimes the checklist just isn't as much help as you need. Occasionally I get asked why all Space Shuttle commanders and pilots were test pilots. It's true that some of the experiences are completely dissimilar – for example, launching in the Space Shuttle is nothing like taking off in an aircraft (it's more like having a traffic accident). But one key similarity is that there is planning but not a lot of experience to rely on when developing malfunction procedures.

My first space flight was the 100th launch of the Space Shuttle. Unless you're a test pilot, the aircraft you fly will have had thousands – perhaps tens or hundreds of thousands – of take-offs and landings. And even in those aircraft there are occasionally situations that simply could not have been predicted. You have to put the pieces together and create your own procedure, sometimes out of other procedures and sometimes from your own systems knowledge. Then you hope you have enough situational awareness to do things in the right order and address the most critical issues first.

On one of my flights as a test pilot, I had an experience that prepared me for a similar situation in space.

After graduating from the United States Air Force Test Pilot School in June 1991, I spent the summer as a test pilot in Test Operations – the organisation at Edwards Air Force Base that does the "cats and dogs" flight testing. I moved on to one of the newest aircraft on the flight line, the C-17, undergoing developmental flight testing. The first aircraft had been

delivered the previous year but had not yet flown many sorties. More aircraft were finally being delivered and the initial testing of the C-17 was just getting into full swing.

It's a fascinating aircraft – the first heavy fly-by-wire (FBW) aircraft I ever flew (not surprisingly since the Concorde, the Space Shuttle and the Airbus 320 were pretty much the only other heavy FBW aircraft at the time). Rather than a yoke like the other heavy aircraft I had flown, it featured a centre stick and a heads-up display. The stick forces were light and comfortable – no need for significant strength like in some older manual flight control systems. The flight test program was very challenging and interesting as we learned to prove this uniquely capable aircraft.

Although the test pilots were qualified to fly any test mission, it was prudent to assign certain types of testing to a smaller cadre of pilots to simplify maintaining currency in the type of testing, familiarity with the technical issues, and of course overall safety through experience. Although I did many types of mission testing, such as short field landings, hot and cold weather, and airdrop, I was formally assigned to air refuelling, cruise performance and structural testing. In early 1994, almost three years into my tenure with the program, we were closing in on the final structural tests.

The way we performed structural tests was to load the airplane in configurations designed to stress given elements of the airframe (fuselage, wings, tail) and perform a manoeuvre to achieve a certain speed and g condition (a "test point"). Sometimes we had some pretty strange loads – like a "dumbbell load" where heavy cargo was strapped down at the front and the back of the cargo bay with a big open space between. Tests were performed in a "build-up" approach to an 80% load limit, followed by a period of analysis to refine the models. All test points were then repeated at the 100% load condition. Even then, we performed the test in a build-up fashion where we flew the 80% condition, then the 90% and then the 100%. That allowed the ground test conductor to monitor for unexpected structural load states and also gave us practice. But it doesn't always turn out the way you plan, which is why we flight test.

The C-17 Combined Test Force always conducted developmental tests with a US Air Force test pilot and a test pilot from McDonnell Douglas (the company that built the C-17) on board. We alternated seats as we were all qualified in the left seat.

While flying the very last sortie of the 100% load sequence, I was in the right seat with a McDonnell Douglas test pilot in the left seat. We alternated flying test points as well. My colleague had the last test card of the day and we were under a little pressure to finish with sunset approaching rapidly. As a safety precaution we flew hazardous missions only during day visual meteorological conditions.

My colleague nailed the 80% and the 90% points without incident, but when he tried to achieve the 100% test point, we weren't getting the appropriate load with the control input we had practised.

We talked it over and decided he should do what we briefed if this situation should occur – hold the stick full aft a few tenths of a second longer than he had been doing. When he did, both the test conductor and the chase ship called for termination. Not that we needed the advice – the Master Caution alarm was going off and it seemed like half of the (very large) Warning Annunciation Panel was lit up, including multiple flight control alerts.

I'd never seen so many lights on the panel except when performing a lamp check! At that point a series of things had to happen. We needed to get back to base as sunset was coming, we had to address our system issues and we needed to perform a controllability check (basically a simulated landing at altitude) to determine aircraft controllability and response during the landing phase.

There was no master checklist to walk us through all of the malfunctions our aircraft was telling us it had, so we had to logically decide which procedures we needed to do and in what order, including of course to continue to "aviate, navigate and communicate" like we have all been taught in pilot training. Fortunately, we had a test engineer with us to help back us up, ensuring there were always three pairs of eyes and minds on critical activities.

We managed to perform the most critical steps quickly. As the C-17 is a FBW system, one of the handiest buttons is the Electronic Flight Control System (EFCS) reset. It's a kind of a soft re-boot of the flight control computers. We had to dig deeper into what we called a "four-handed" reset that required the flight test engineer pulling certain circuit breakers in the aft cockpit while the pilot hit the EFCS reset simultaneously, which is more like a hard re-boot. Most of our flight control and system alerts went away (but not all). We performed the controllability check and managed to touch down while it was still light.

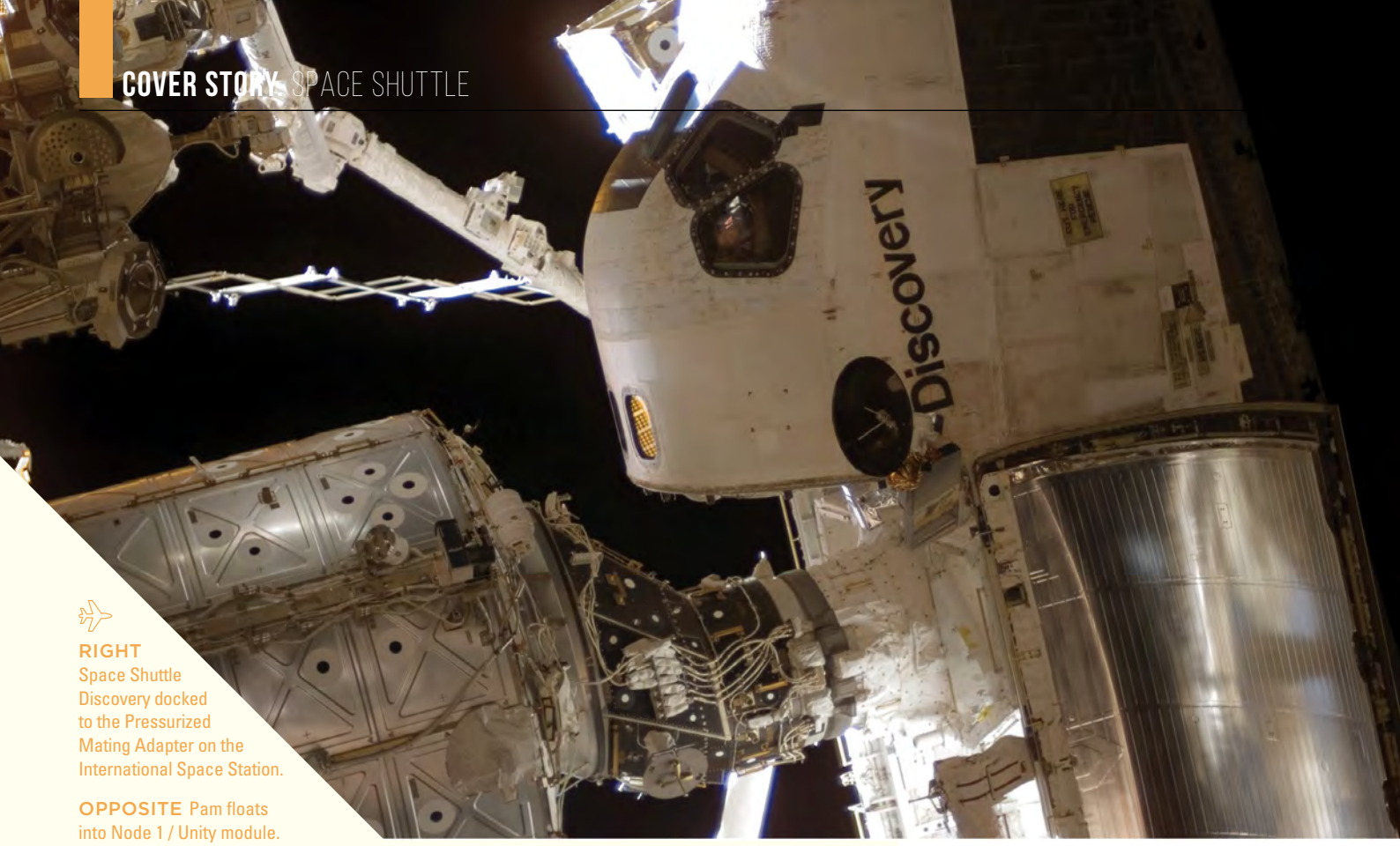
We later learnt that the applied g force had led to buffet on the control surfaces which just happened to be at the frequency to excite a natural structural elastic mode. That added additional structural load on top of the g we had applied with the pitch control input and significantly overloaded the tail during the test manoeuvre, as we discovered when we looked at the data afterward. The test conductor on the ground saw the load spike – and the chase pilot saw the tail vibrating like a buzzer, which is why they called to terminate.

Although I had encountered problems several times with one air vehicle or another, this one was unique because the cascading effects impacted both structure and the entire flight control

It's a fascinating aircraft – the first heavy fly-by-wire (FBW) aircraft I ever flew (not surprisingly since the Concorde, the Space Shuttle and the Airbus 320 were pretty much the only other FBW aircraft at the time).

RIGHT
Pam Melroy with C-17.

BELOW
From the left, Pam, Koichi Wakata and William McArthur preparing a cable to bypass the tripped AC bus.



RIGHT
Space Shuttle Discovery docked to the Pressurized Mating Adapter on the International Space Station.

OPPOSITE Pam floats into Node 1 / Unity module.

system, resulting in multiple alerts and warnings at once. Usually you get one or two lights or indications for a malfunction, but a whole series of failures at once presents a problem with prioritisation. Additionally, blindly following steps from one failure procedure may correct other existing failures (if you're lucky) or make another failure worse (if you're not).

I had had one or two particularly creative simulator instructors give me some complex cases, but that was definitely the first time in the air. It was very interesting to reconstruct the problem after we were safely on the ground. We also spent time thinking about the decisions we made and trying to absorb the lessons learned about prioritising and thinking through a multi-failure situation and how to manage it.

Flash forward six and a half years to my first flight as an astronaut on STS-92 in 2000. Our mission was to bring two new elements up to the as-yet-uncrewed International Space Station (ISS) and attach them. The ISS was very small at the time, with only three elements. We were to use the robotic arm of the Space Shuttle to lift each element out of the payload bay and manoeuvre them into position to be attached to the ISS. Once in position, we would remotely operate a series of latches to seat them onto the ISS, and then remotely drive bolts to permanently attach them.

One of the biggest challenges at the time was that when operating a robot arm you have to rely on out-the-window views and cameras to ensure you have clearance from other structure as you manoeuvre the arm. Then you must ensure alignment of the element with the ISS in all three axes.

The ISS had no cameras in place except on the docking system, which would not help. We were installing the elements in particularly awkward places for the robotic arm to reach, and our cameras in the payload bay did not have the field of view to watch. So we carried a multitude of cameras mounted on the robotic arm itself, and a very early form of machine vision technology called the Space Vision System (SVS). The SVS provided relative position information based on features on the ISS and the element to "fill in the gaps" for lack of camera views. We all knew the SVS and our cameras were essential to accomplishing the mission. We had simulated individual camera failures and were carrying a backup SVS unit.

On flight day four we were preparing to install the Z1 truss, which incorporates an electrical utility switching box to manage the electrical power coming from the solar arrays, plus an attitude control system for the ISS. We were ready for our first major robotic effort. My crewmate Koichi Wakata as the lead robotics operator and his backup, Bill McArthur, had positioned the arm to grapple the Z1 in the payload bay. As Koichi reached for the mike to tell the ground we were about to start, the Space Shuttle Master Alarm went off. As pilot, my job was to maintain the shuttle and perform any maintenance procedures necessary. I immediately floated over and strapped into my seat while attempting to process what I was seeing on the displays.

I had never seen so many failures annunciated at once, even in the most ingenious simulator scenarios. As I looked at the list of failures, I picked out a few really big indications such as loss of communications with the ISS, including the ability to monitor ISS systems and to transfer power to the ISS. I also caught sight of several other electrical system failures. Failure messages were piling up so rapidly they were scrolling off the bottom of the page before I could read them

all. Although there was no page two I could look at on board the Space Shuttle, the ground could see all of them. They rapidly deduced the root cause. The SVS had overheated and short circuited, which overpowered the circuit breaker system and cascaded to short one of the three AC payload power buses that powered all mission equipment, including the cameras. We were down a third of the shuttle's mission systems' electrical power and all the equipment attached to it.

Just like my C-17 "anomaly", we had a multitude of actions to take and no master procedure to guide us. I had an emergency checklist on the flight deck but knew it wasn't going to cover this situation. I vaulted out of my seat and dove headfirst down the ladder to the middeck. My commander called "slow down!" so I floated a little more sedately to the locker holding the bewildering array of in-depth malfunction procedures for the ISS and Space Shuttle. Juggling a handful of thick books, I floated back to the flight deck.

The first step was to switch as much critical equipment as possible to backups powered by the other two AC buses. We needed to keep the shuttle in good health and recover as much capability as we could. The commander and I got on those tasks right away with reference to our "systems cheat sheets" and the guidance of Mission Control.

We also needed to replace the SVS with the backup system, but there was no point connecting a new box to a failed electrical bus. Additionally, there were some essential cameras that had no backups on the other buses. Meanwhile, the timeline was ticking. We had a very busy mission and a lot to get done. Delaying installing the Z1 Truss today meant some important mission activity, maybe even a whole spacewalk, may have to be cancelled or shortened. Mission Control rapidly concluded that the fastest way to get back on track was to re-wire the Space Shuttle so one of the other AC buses could power our essential systems. I thought, I didn't even know you could do that on orbit! I'm not sure anyone outside a few experts did, either.

There was no procedure for this, but there was a generic procedure for rewiring a cable using a breakout box, another to replace the SVS, and others that had elements of what we needed to do. The In-Flight Maintenance team on the ground did wonders, calling up to Koichi, Bill and me to help us switch back and forth between procedures.

Finally, as the pilot I did the honours – scooted down on the floor and crammed my hand holding the final, rewired cable up behind one of the panels on the flight deck and locked it into place. I told the ground we were ready to turn the systems on and held my breath.

It worked! Talk about three heads being better than one. We triple checked every single wire pin together and I'm sure that is why we were successful in that incredibly finicky procedure. Amazingly, we were only down about four hours on the timeline and were able to recover and keep the mission schedule on track – at least until undocking day, but that's another story!

I was the only rookie on the flight and had no way of knowing how unusual it was. The In Flight Maintenance Team on the ground was honoured for saving the mission when we returned to Earth. It was incredibly rewarding to work with my crewmates and Mission Control to methodically organise and prioritise our activities, all while keeping the normal operations of the Space Shuttle and ISS continuing, and get back to the real event of the day, building the ISS.

There are many, many more stories from the rest of the building of the ISS. We evolved our checklists as time went on, developing more and more procedures that could be called upon in a variety of unusual circumstances. So, when that master alarm goes off, know your systems, what is – and isn't – in the checklist, and get a second or even third set of eyes on the problem. Fly safe!

After graduating from the USAF Test Pilot School Pam Melroy joined the C-17 Combined Test Force. She later qualified as an astronaut and flew on three Space Shuttle missions – two as a pilot and once as Commander.

After leaving NASA, Pam worked in industry and government, including managing the Air Technology Developmental portfolio at the Defense Advanced Research Projects Agency.

In 2018, she moved to Australia to help launch our space industry, joining Adelaide-based Nova Systems as Director of Space Technology and Policy. She is also an independent consultant, board director and advisor to the Australian Space Agency and the US National Space Council.

RAPID FIRE

AT THE UNIVERSITY OF QUEENSLAND'S CENTRE FOR HYPERSONICS, RESEARCHERS ARE LOOKING INTO WAYS TO IMPROVE THE EFFICIENCY OF SCRAMJET ENGINES OPERATING AT MACH 7+ FLIGHT SPEEDS.

Anand and Will with an Experimental Axisymmetric Supersonic Combustor Model.

WORKING IN THE BEATING HEART of the global hypersonics scene at the University of Queensland (UQ) is exciting and inspirational for aerospace engineering researchers Dr Will Landsberg and Associate Professor Anand Veeraragavan.

UQ's Centre for Hypersonics has a long history of experimental hypersonics research as the home of Australia's first Professor of Space Engineering, Professor Ray Stalker, who pioneered the world's fastest jet engine, the scramjet (supersonic combustion ramjet). The centre conducts research on a plethora of high-speed related work. It has two main sub-groups, one examining high-speed propulsion within the atmosphere (faster than five times the speed of sound, Mach 5+), and the other examining planetary re-entry where flight speeds typically exceed Mach 25.

A/Prof. Veeraragavan (Advance Queensland Research Fellow, Mid-Career), has carved out a niche research space within the first of those sub-groups, where Dr Landsberg also works as a post-doctoral research fellow. Together with a team of PhD students and a number of post-doctoral specialists, they are looking into ways to improve the efficiency of scramjet engines operating at Mach 7+ flight speeds.

Scramjet engines operate as any other jet engine does. Air is captured from the atmosphere and compressed, fuel is injected, the mixture burns and the exhaust expands out of a nozzle producing thrust. The big difference for scramjets, however, is the speed envelope in which the vehicle operates and the speed of the airflow through the engine. "Normal" aircraft jet engines (e.g. on a Boeing 787) only operate at speeds up to about Mach 0.9 (about 1,000 km/hr), so the engine is designed such that the captured air passes through the engine at subsonic speed. As a consequence, a stable, consistent fuel air mixture can be achieved and the engine operates efficiently.

Scramjets, however, operate at speeds greater than Mach 5; Dr Landsberg's project is specifically examining scramjet operation in the Mach 7 or 10,000 km/hr flight regime. Air entering the engine at those speeds cannot be slowed to the extent needed for typical turbojet operation. All the energy within the Mach 5+ airstream has to go somewhere, and when it slows down, the air becomes very hot. So hot, that a normal jet engine would simply burn apart or melt. To avoid the heat load associated with the conversion of kinetic energy into thermal energy if the airmass was slowed too much, scramjet design allows the airstream to pass through the engine at supersonic speed.

Because of the high-speed airflow, fuel has to mix and burn efficiently within one thousandth of a second (1 millisecond) for scramjets to work at all. Current scramjet design requires a highly energetic hydrogen fuel to be able to achieve a stable combustion process. The project is exploring engine designs that allow conventional fuels that contain sufficient energy to make high-speed flight possible, to be used in a scramjet. However, achieving stable and consistent ignition and combustion of conventional fuel in the hypersonic environment is

extremely challenging. Researchers have likened the challenge to trying to light a match in a hurricane 20 times stronger than the strongest ever recorded.

"We have to carefully design and engineer methods inside the scramjet to make consistent, stable combustion possible," says Dr Landsberg. "The key aim of my research is in the creation of carefully designed pockets (or cavities) inside the engine where gases swirl and recirculate. Imagine removing a rock from a fast-moving stream of water; the water will get caught inside the newly created pocket/cavity, swirling about, mixing the sediment inside the pocket with the fast-moving water stream. That is exactly what Anand and I are researching."

Recirculating regions in the combustion section of the scramjet permit the fuel and air to swirl about, mix rapidly and ignite. The key challenge for that process is to do it in an efficient manner, and also one in which the heat loads sustained within those regions of the engine can be safely contained (the temperatures can be immense, higher than 2,500C).

IMPORTANT RESEARCH

While research groups around the world have developed scramjets at (comparatively) lower flight speeds, UQ researchers are looking into using safer and more economically viable fuels within scramjets operating at 7+ times the speed of sound. If a design can achieve efficient combustion, with fuels that can be easily manufactured, transported and stored, scramjets become viable.

A/Prof. Veeraragavan's work was made possible by a Queensland government research scheme called the Advance Queensland Research Fellowship (mid-career) and awarded to him in 2017.

"We work to advance the core physical sciences needed to broaden our knowledge about supersonic combustion utilising hydrocarbon fuels," says A/Prof. Veeraragavan.

Successful development of a viable scramjet would open up a range of civil and commercial aviation applications that are currently not possible. It would permit transpacific and transatlantic flights in mere hours. The high-speed flight offered by scramjets may also permit their integration into a multiple-stage launch vehicle to place small satellites into Earth orbit. Those objectives are critical to advancing utilisation of the aerospace domain, and in particular, to help put Australia on the map in this exciting industry.

Dr Landsberg and A/Prof Veeraragavan are gearing up to conduct a major experimental campaign. After spending the past year or two working with the PhD students and post-doctoral team members to refine the design elements to be examined experimentally, Dr Landsberg has spent the past few months designing an experimental model that's capable of withstanding the extreme heat loads and forces sustained at high Mach number flight conditions.

"At UQ, we are fantastically lucky to have an array of hypersonic test facilities on-site that are only located in a small number of research groups world-wide (UQ researchers are actually helping Oxford develop their own hypersonic wind tunnel right now!)," Dr Landsberg said. "We are just months from conducting an experimental campaign to validate the performance gains we predict from our improved scramjet cavity designs. We'll take pressure data to examine the stability and consistency of combustion, and we will use laser-based diagnostics to examine the combustion chemistry exiting our scramjet exhaust. Very exciting times!"

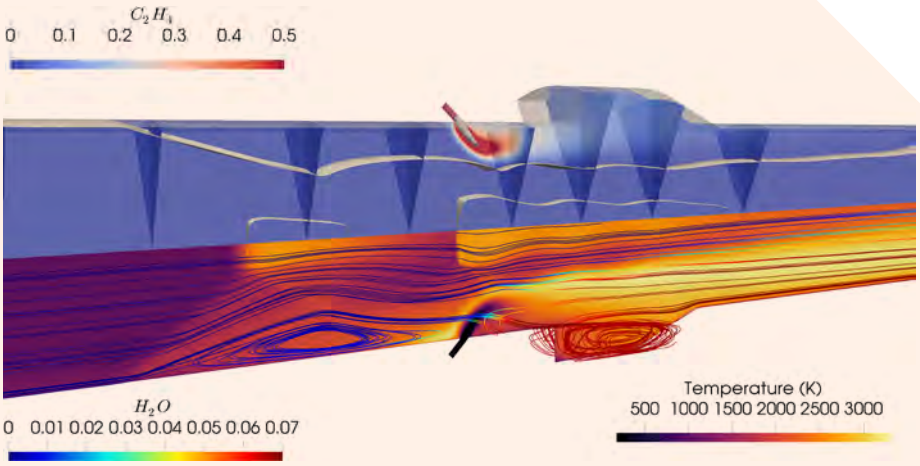
UQ HYPERSONICS

Professor Ray Stalker established UQ as one of the largest university-based hypersonic research groups in the world. His invention of the free-piston driven shock tunnel (T4 is UQ's current 'work-horse' hypersonic tunnel) put UQ on the map as one of the most dominant groups in the field. That helped bring in an array of funding and support throughout the 1980s and the legacy continues.

Today, the Centre for Hypersonics brings in research staff and PhD students from around the world. "The fact people from around the world come to study and research within our group is an incredible testament to the legacy of Ray Stalker, and to our centre. It's just an exciting place to be," says Dr Landsberg.

Hypersonics is such an open-ended field that sometimes all the diagnostics, simulations and analysis the researchers do on paper isn't enough to predict what's going to happen. Sometimes they have to make an experimental model and shoot hypersonic flow at it in the shock tunnels. And who wouldn't love making big noises and burning fuels in a multi-million-dollar facility?

"This work is already attracting attention beyond our borders, the US Air Force Office of Scientific Research is keen to partner with us to further the knowledge arising out of this Advance Queensland Research Fellowship," concludes A/Prof. Veeraragavan.



LEFT Supersonic cavity flameholder simulation showing fuel injection, recirculation regions, temperature, fuel (ethylene, C2H4) and combustion product (water, H2O) species contours.

CURTISS P-40N KITTYHAWK WORLD WAR II FIGHTER AIRCRAFT VH-ZOC

WINGS VOLUME 72 NO.2

RAAF Williams, Point Cook, Australia - 1 March 2014
PHOTO Ryan Fletcher


NO STEP

A RICH MILITARY HISTORY

ESTABLISHED IN 1940, RAAF BASE DARWIN PLAYED A VITAL ROLE IN WORLD WAR II AND REMAINS A SIGNIFICANT STRATEGIC ASSET.

RAAF BASE DARWIN has a rich military history dating back to the start of World War II and is the only RAAF Base operating today to have been directly attacked by an enemy force. Strong links between the Australian Defence Force and the Darwin community forged during WWII have endured and the people of Darwin are seldom perturbed by military aircraft activity. The civil-military relationship has been mutually supportive, most notably in the aftermath of Cyclone Tracy.

Darwin is Australia's most northern city and a location of strategic significance. A five-hour flight from Darwin can reach all of Australia's towns and cities, and also most of Southeast Asia. RAAF Base Darwin's airfield not only supports military aircraft, it has been shared with civilian traffic since 1945 under a joint user agreement with Darwin International Airport (DIA). Darwin is an aviation hub between Australia and Southeast Asia, with both civilian and military aircraft using it as a platform to project into the northern region.

ABOVE B-52 parked on the Bomber Replenishment Apron at RAAF Base Darwin during Exercise Lightning Focus.

RIGHT RAAF Base Darwin in the early years.

FAR RIGHT Parade at RAAF Base Darwin with the cinema building in the background.

EARLY DAYS

The need for a military airfield at Darwin was identified in the late 1930s and the current site was purchased as woodland in 1937. RAAF Base Darwin was officially formed in June 1940 as RAAF Station Darwin, with Numbers 12 and 13 Squadrons operating Wirraway, Anson and Hudson aircraft. The advent of war in the Pacific saw increased activity, including improvements to the airfield and facilities, and additional movements by American aircraft.

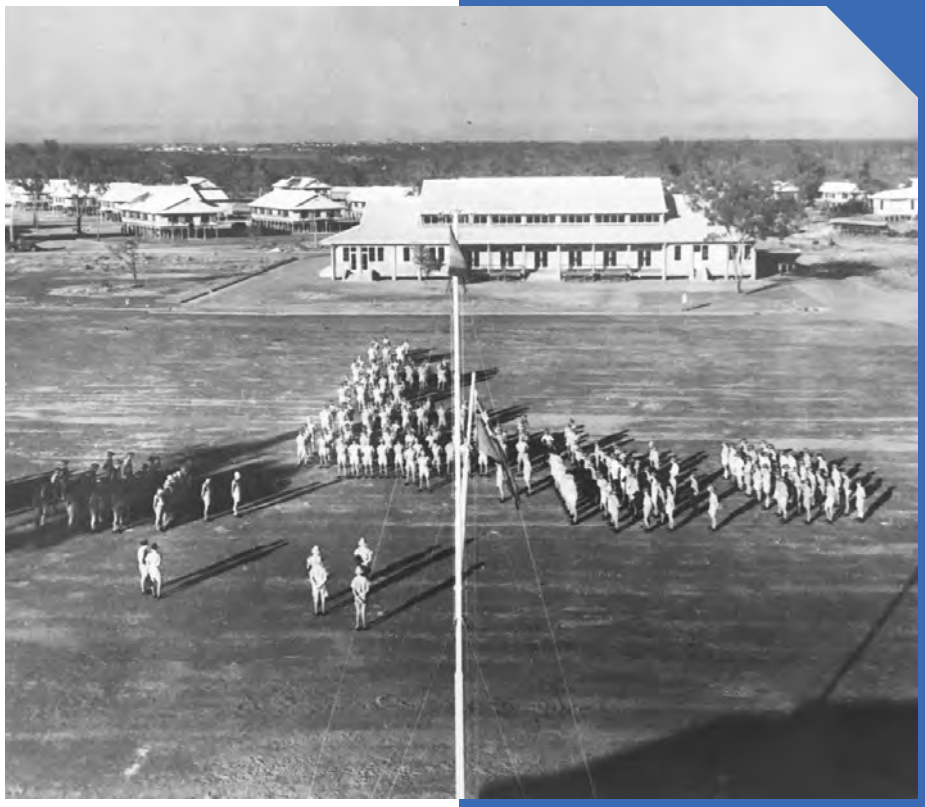
On 19 February 1942, the Base was attacked by the Japanese forces that bombed Pearl Harbour (see page 48). Those raids on the Base cost seven lives and over 20 allied aircraft were lost in the ensuing melees. Few people are aware that over twice as many bombs were dropped on Darwin as on Pearl Harbour. By the end of WWII, Darwin had hosted a wide range of Australian and US combat and transport aircraft, including Hudsons, Ansons, Wirraways, Beaufighters, Boomerangs, Kittyhawks, Dakotas, Catalinas, Mitchells, Liberators and Fortresses.

RAAF Base Darwin still bears the scars of the Japanese air raids. Evidence of strafing runs can be found in buildings such as the Officers Mess and the Cinema, and remnants such as bombing shells are found during excavation for new construction.

Facilities on the Base were again damaged by Cyclone Tracy on Christmas Day 1974. The airfield played an instrumental role in the aftermath of the cyclone as more than 20,000 people were evacuated by air before the year's end.

Civilian air traffic operated from the airfield from 1945 and used a terminal at the RAAF Base until a civil terminal was constructed north of the airfield in the 1950s. International flights to the north of Australia transited through Darwin until the introduction of longer range aircraft in the 1970s, which allowed carriers to fly into Asia and beyond from Australia's eastern population centres. Today Darwin International Airport supports regional, domestic and international aircraft movements.

BELOW Remnants of a United States Army Air Force (USAAF) Kittyhawk in a 12 Squadron hangar following Japanese bombing raids on 19 February 1942.



Damage incurred at RAAF Base Darwin following Cyclone Tracy.

FIGHTER BASE

Mirage III aircraft from 75 Squadron operated from RAAF Base Darwin for a short period in the 1960s before the Unit transferred to RAAF Base Butterworth, Malaysia. The return of 75 Squadron in 1983 marked the first time a fighter squadron was permanently stationed at RAAF Darwin since WWII. It moved to the newly established RAAF Base Tindal once re-equipped with the F/A-18 Hornet.

Remnants of 75 Squadron around the Base include a Mirage III, A3-100 on permanent static display and a Mirage III tailfin near the old headquarters building. The Base continues to host combat aircraft from various nations through a series of annual and biennial exercises, typically conducted during the dry season to make use of favourable weather conditions.

From the early 1980s, Exercise Pitch Black became a biennial feature at RAAF Base Darwin, and throughout the 1990s evolved into an international exercise. It is now the RAAF's largest Air Power exercise. In 2018, 12 countries and more than 130 aircraft took part.

Despite significant noise and disruption generated by a large number of fighter aircraft movements, the Darwin community remains supportive.

An open day is scheduled during each Pitch Black exercise as a way of giving back to the community and an aircraft handling display is conducted adjacent the popular Mindil Beach.

Both events enjoy high participation rates. Regrettably, COVID-19 social distancing requirements have led to the cancellation of Exercise Pitch Black in 2020.

LEFT A 6 Squadron member returns from a mission at RAAF Base Darwin.

RAAF Base Darwin's historic front gate, which continues to be used as the pass office.

FORWARD OPERATING BASE

RAAF Base Darwin has been used as a forward operating base for commitments to our north including ADF contributions to peacekeeping efforts in Timor Leste, transport of medical supplies following the Bali bombings and humanitarian support for tsunami-effected Banda Aceh.

Operations of that nature often take place with minimal notice, requiring the Base to be vigilant and ready at all times.

A detachment of AP-3C Orions deployed to RAAF Base Darwin in 2001 to support border security patrols as part of Operation Relex. The AP-3C Detachment (92 Wing Detachment B) became a permanent feature at the Base under subsequent Operations Relex II and Resolute, enabling deployments to forward airfields such as RAAF Base Learmonth and Cocos Keeling Islands.

AP-3C operations ceased in recent years following the introduction


AP-3C departs RAAF Base Darwin.

into service of the P-8A Poseidon. Construction of new facilities for 92 Wing to support P-8A operations commenced in April 2020 and is scheduled to conclude by the end of 2021.

RAAF Base Darwin also supports regular flights moving ADF personnel and material for operations in the Middle East and Malaysia.

THE BASE TODAY

RAAF Base Darwin has been, and will remain, a significant strategic asset. The Base will continue to function as a military exercise centre and as a staging point for commitments to our north and further afield.

The Base is now home to two surveillance units, No.114 Mobile Control and Reporting Unit (114 MCRU) and No.452 Squadron, responsible for military Air Traffic Control services.

Management of Base services and infrastructure rests with No.13 (City of Darwin) Squadron as the RAAF Base Darwin Airbase Operations Squadron.

Stringent security is essential for aircraft operations from or through RAAF Base Darwin and a detachment from 2 Security Forces Squadron (2SECFOR SQN) provides a persistent response capability for the Base and airfield. RAAF Military Working Dogs employed by 2SECFOR SQN provide a credible deterrent and response to any potential threat. Other functions of the Squadron include weapons training, tactics development for higher threat environments and tactical weapons storage.

Medical services are provided by Joint Health Unit Central Australia through the Darwin Health Centre, supported by a detachment from 2 Expeditionary Health Squadron. Available medical capabilities include general practice, physiotherapy, psychology, dental and aviation medical support for flying operations.

In addition to military personnel, Joint Health Unit Central Australia employs Australian Public Service and contracted civilian staff.

Public Service staff are employed in most Units at the Base, particularly within the Estate and Infrastructure Group to sustain the estate through oversight of the contracted workforce responsible for maintenance and upkeep, and oversight of the many current and future infrastructure projects.

The large number of current and forecasted projects at RAAF Base Darwin will increase its capacity to project air power in the future.

A significant investment under the United States Force Posture Initiative (USFPI) includes extended hardstand areas for wide-bodied aircraft, enlarged aircraft parking aprons for deployed forces and enhanced aviation fuel storage capacity.

New facilities constructed under the USFPI program will support visiting US Air Force aircraft such as B-52s and KC-135s, and US Marine Corps forces participating in the Marine Rotational Force Darwin, which completed its eighth deployment to the Darwin region in October 2019.

The Aviation Combat Element stationed at RAAF Base Darwin last year operated MV-22 Osprey, UH-1 Huey and AH-1 Cobra aircraft in support of Marine forces exercising in the area.

Like other military activities scheduled in 2020, the Marine Rotational Force Darwin was delayed in light of Covid-19 restrictions.

BELOW United States Marine Corps Osprey aircraft at RAAF Base Darwin as part of the Marine Rotational Force Darwin Aviation Combat Element, and with members of the RAAF Indigenous Youth Program.

BOTTOM RAAF Base Darwin Headquarters building, now home to Headquarters 13 (City of Darwin) Squadron.

75 Squadron Mirage III A3-100 on static display at RAAF Base Darwin.

13 SQUADRON

Number 13 Squadron was formed in June 1940, originally with Anson aircraft until the Squadron's newly assembled Hudson aircraft arrived from 2 Aircraft Depot Richmond later that month.

On the eve of the Pacific War, on 7 December 1941, No.13 Squadron deployed forward to Laha airfield at Ambon. Advancing Japanese forces were attacking Allied bases in the area and on 28 January 1942, 13 Squadron was ordered to evacuate back to Darwin. Two 13 Squadron Hudsons returned to Laha from a reconnaissance mission on 29 January confirming an invasion was imminent and remaining personnel were to evacuate that night on those aircraft. A fuel leak deemed one aircraft unserviceable and the remaining Hudson departed leaving 12 members behind. Their escape plan involved travelling by a small vessel to rendezvous with a flying boat at an island off Ceram. However, the vessel was intercepted by Japanese forces and the remaining 13 Squadron members were executed.

Aircraft and staff who returned to Darwin saw little relief. The Bombing of Darwin on 19 February destroyed six of the nine Hudsons at the Base and took the lives of another four 13 Squadron members. No.13 Squadron regenerated over the following months and participated in offensive operations against the Japanese after moving to Hughes Airfield in May 1942.

Subsequent operations against Japanese forces through August and September 1942 saw 13 Squadron awarded a US Presidential Unit Citation, one of only two to be awarded to RAAF squadrons (the other went to 2 Squadron). No.13 Squadron later re-equipped with Ventura aircraft and operated from Cooktown and Gove in the later stages of WWII, before being disbanded in January 1946.

In 1989, 13 Squadron reformed as a RAAF Reserve Unit taking the name 13 (City of Darwin) Squadron. A subsequent restructure within Combat Support Group in 2010 saw the Squadron take on its present role as the RAAF Base Darwin Airbase Operations Squadron. The Squadron has an establishment of approximately 180 staff and provides personnel and resources to support deployed operations as well as delivering persistent support to flying activities 365 days a year.

BELOW Indigenous dancers perform a traditional dance for visiting members during Exercise Pitch Black 2018.

BOTTOM A 13 Squadron member services the arrestor cable at RAAF Base Darwin.

114 MCRU – TEAM TAIPAN

No.114 Mobile Control and Reporting Unit (MCRU) is a ground-based air defence Unit with primary responsibility to deliver deployable Air Surveillance and Air Battle Management capabilities in support of integrated air and space defence of Australia and its national interests. The Unit currently operates Tactical Air Defence Radar Systems (TADRS) to provide an airspace surveillance and communication function and, in combination with a Mobile Control and Reporting Centre (MCRC), provides a deployable networked air defence capability. That capability is essential to the success of the high-tempo air defence exercises involving many fighter aircraft that take place in exercise air space over the Northern Territory.

The Unit was formed during WWII, on 23 May 1943. It was equipped with mobile radar systems, which over the years have been replaced and upgraded to more modern equipment. Throughout the war, 114MCRU was involved in operations throughout the Pacific region, with notable campaigns including The Liberation of Borneo on Tarakan Island.

After the war, 114MCRU established itself at RAAF Butterworth, conducting day-to-day operations for eight years, and supporting fighter control services throughout the Malayan Emergency. During that era, 114MCRU earned a number of battle honours and was awarded a Squadron Standard, one of only a few ground-based units in the RAAF to hold a Standard. The Squadron Standard recognises 114MCRU's contribution to conflicts in the Pacific (1943-45), New Britain (1943), New Guinea (1943-44), Borneo (1945) and Malaysia (1963-66).

114MCRU falls under control of No.41 Wing, an element of the Surveillance and Response Group. 41 Wing's Units contribute to one of the Group's primary functions to conduct Intelligence, Surveillance and Reconnaissance operations and Air Battle Management. 114MCRU regularly deploys and operates over 30 heavy, medium and light vehicles to provide the mobility to relocate personnel and equipment across Australia. When required 114MCRU relies on the RAAF's heavy lift capability to transport the large TADRS and MCRC systems to offshore deployment.

The Unit participates in a number of domestic and foreign exercises, which often involves partnering with coalition, allied and neighbouring nations as an integrated force. Exercises Talisman Sabre, Pitch Black and Diamond Storm are regular events on the 114MCRU calendar.

Most recently, Australian Government support to the 2018 APEC Summit in Papua New Guinea involved a whole of Defence effort to deploy to location. In late 2018, for the first time since operations from Goodenough Island during WWII, 114MCRU was mobilised and deployed to the Port Moresby area. The Unit provided airspace surveillance and security in conjunction with other ADF assets to establish a protective shield over the summit. 114MCRU also deployed to the Gold Coast under Operation ATLAS to provide 24/7 surveillance and security of the airspace over the 2018 Commonwealth Games.

A highlight of 114MCRU's long operational history was the support it provided to Operation SLIPPER, the ADF contribution to the war in Afghanistan. In 2007, the Unit deployed a TADRS and MCRC to Kandahar Airfield and delivered critical control and surveillance services to coalition and allied partners over a significant area of airspace within the Middle East until 2009.

Afghanistan was the first 114MCRU overseas deployment of a RADAR capability since deployment to Malaysia in 1958. The success of the Afghanistan deployment demonstrated that the RAAF was able to rapidly mobilise and provide a highly effective and extended air defence capability in support of international operations.

The key to the Unit's success lies within its professional workforce and a one-team ethos. Currently, the Unit is undergoing equipment upgrades to both the MCRC and TADRS. Further upgrades to be implemented under Project AIR6500 will expand the Unit's ability to fully integrate as part of a modern and highly effective air defence force.

114MCRU deployed in support of Operation Slipper in Afghanistan.

LEFT 452 Squadron during World War II.

BELOW 452 Squadron now provides Air Traffic Control services at RAAF Bases Darwin, Townsville, Tindal and Amberley, and the Army Aviation Training Centre at Oakey.

NO.452 SQUADRON

Number 452 Squadron (452SQN) provides military Air Traffic Control (ATC) services and communications, navigation and surveillance systems at five locations across the Northern Territory and Queensland. 452SQN is also responsible for Air Force's deployable Air Traffic Control systems. However, air traffic control was not always the Squadron's mission.

452SQN was formed under Article XV of the Empire Air Training Scheme at RAF Kirton-in-Lindsey on 8 April 1941, as a fighter squadron. It was the first Australian squadron formed in Britain during WWII and flew Supermarine Spitfires throughout the war, operating over Britain, North Western Europe, Northern Australia and the Dutch East Indies. 452SQN was awarded battle honours from Fortress Europe, and for operations in the Pacific, at Darwin, Moratai and Borneo.

Declared operational on 22 May 1941, 452SQN operated from a series of airfields in southeast Britain under control of 11 Group, Fighter Command. Its focus was occupied France and Belgium, where it escorted bombing raids and conducted sweeps to engage enemy aircraft. Consequently, 452SQN's motto, *Mundos pro nobis,* refers to sweeping the world before us. During its first year of operations, 452SQN established itself as one of the most successful Squadrons in Fighter command, destroying 62 enemy aircraft and damaging another 17.

It withdrew from operations in Britain on 23 March 1942 and sailed for Australia. Squadron aircraft were commandeered by the RAF while in transit. On arrival in Australia, 452SQN conducted refresher training at RAAF Base Richmond until, re-equipped with Mk.Vb Spitfires, it again became operational 17 January 1943 at Bachelor Airfield in the NT. Operating under control of No.1 Wing, 452SQN was tasked to defend Darwin. The Squadron relocated to Strauss Airfield on 1 February 1943 and remained there protecting Darwin until 30 June 1944.

On 1 July 44, now under control of No.80 Wing, 452SQN moved to Sattler Airfield where it was employed in ground attack missions against targets in The Dutch East Indies. On 11 December 1944, 452SQN was assigned to the 1st Tactical Air Force and relocated to Morotai in the Dutch East Indies to support Australian operations in Borneo. On 29 June 1945, 452SQN established its base at Juwata Airfield on Tarakan and remained there until it was disbanded on 17 November 1945.

On 1 December 2010, 452SQN was reformed, without Spitfires, as an Air Traffic Control Squadron, under control of No.44 Wing, within Surveillance and Response Group. 452SQN's historic association with the north continues with its headquarters now located on RAAF Base Darwin.

Staff of 452SQN provide Air Traffic Control services at Darwin and Townsville Airports (including management of all civilian aircraft movements), RAAF Bases Tindal and Amberley, and the Army Aviation Training Centre at Oakey. In 2019, 452SQN assumed responsibility for the management of Air Force's deployable Air Traffic Control capabilities, based at Amberley.

Beyond the provision of Air Traffic Control at fixed bases, 452SQN controller, technical, administrative and logistics staff routinely participate in a broad range of exercises and operations, domestically and internationally.

A PRELUDE TO ATTACK

WORDS David Armstrong

ON 19 FEBRUARY 1942, JAPAN LAUNCHED A CARRIER-BORNE AIR ATTACK ON DARWIN WITH 36 FIGHTERS AND 71 DIVE BOMBERS, FOLLOWED TWO HOURS LATER BY 54 TWIN-ENGINED BOMBERS. DARWIN'S ONLY AIR DEFENCE WAS THE RELATIVELY INEXPERIENCED USAAF 33RD PURSUIT SQUADRON.

WORLD WAR II had been underway for over two years when Japan brought the United States into the conflict in December 1941. Two months after the Japanese armada launched its successful attack at Oahu, it was nestled off the coast of the then Japanese occupied Dutch Timor. The four-strong carrier fleet had steamed across the South Pacific and was awaiting orders to attack the seaport of Darwin approximately 400km to its south.

Australia had been watching Japan's increasing naval capability since well before 3 September 1939 with some concern, but the war in Europe and North Africa required troops and that is where the Second Australian Imperial Force (AIF) headed. Australian aircrew in England at the time stayed on as well and flew with the RAF in the battle for the skies over the Channel.

Meanwhile, Japan had taken all before her on a dramatic march west and south through Manchuria, the Korean peninsula and Southeast Asia. Japan's version of *blitzkrieg* had proven highly successful (as it had for Germany in 1939-40) in overrunning its Asian neighbours. Parts of northern China had been occupied since the mid-1930s and the capitulation of Hong Kong, Vietnam, Cambodia, Thailand, Philippines and Singapore was complete by February 1942. The Western Pacific was next.

The Japanese had gambled that the United States' appetite for commercial success (munitions and equipment had been moving to the European theatre since early 1939), and lack of appetite for hostilities, would lead to negotiations shortly after the attack on Pearl Harbor. It was expected that the US would be happy if Japan withdrew from some of her Southeast Asian conquests and kept a negotiated amount of rubber and oil-producing areas only, as well as the Korean peninsula and Manchuria.

However, Japan's wished-for negotiated peace with the US had not come as expected, so defence of its rubber, oil and tin-rich conquered territories became paramount.

COUNTDOWN TO 19 FEBRUARY

How this scenario might have played out if the US had lost all its fleet in Hawaii is unknown. A training exercise off the Big Island at the time of the strike on Oahu meant significant elements of the US fleet was absent from Pearl Harbor on the morning of 7 December 1941. Critically, its aircraft carriers were elsewhere, *USS Hornet* was undergoing maintenance in Norfolk, Virginia. The Doolittle raid on Honshu three months later made it clear that the US was still capable of a carrier offensive action (involving USS *Hornet*), and that there would be no agreement.

Regardless, Japan had started planning for a disruptive strike on either Ceylon (Sri Lanka) or Darwin as early as January, with the final decision made by Admiral Isokoru Yamamoto (Commander in Chief Japanese Combined Fleet) as late as 9 February. Steaming south, Australia's World War I ally was an enemy to be feared.

Darwin was the biggest threat to Japan's operations in the Coral Sea area and progress towards Java. It had been a staging post for months and United States Army Air Force (USAAF) aircraft had been passing through Darwin since September 1941. Works were well underway to establish facilities of all kinds and particularly to support long-range B-17 bombers striking into Southeast Asia, including the Netherlands East Indies (Indonesia) and the Philippines. Japan's plans to hold onto newly captured Ambon just north of Darwin, and its intentions to invade Java in mid-February, made the Darwin base and its bombers a target that could not be ignored.

Early in February 1942, the aircraft carriers *Akagi*, *Kaga*, *Hiryu* and *Soryu* were resupplying at Japan's base on Palau before heading to Kendari in Sulawesi (Netherlands East Indies). Once fully provisioned they steamed at maximum capacity across the Banda Sea and were in the northern part of the Timor Sea by the early hours of 19 February.

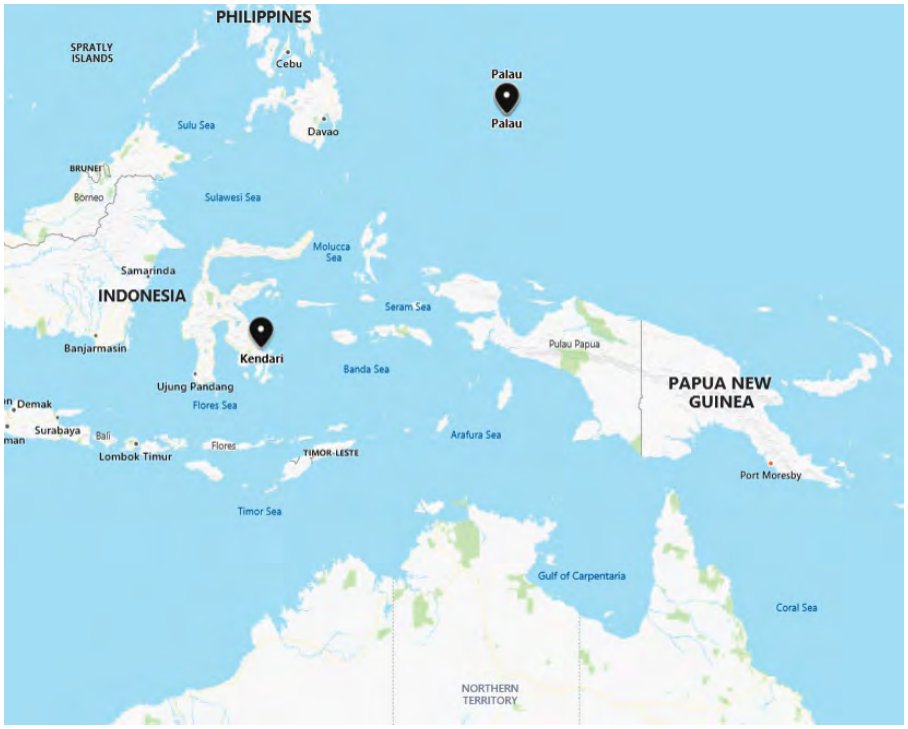
The task force included four heavy cruisers, nine destroyers, two light cruisers and the four aircraft carriers. As the task force headed southeast towards Darwin, it remained unnoticed by the allies and, incredibly, arrived at launching distance, 350km from Darwin, without resistance.

The operational range of the three types of Japanese aircraft to be used in the strike were about 1800km for the fighters (Mitsubishi A6M2 – allied codename Zero/Zeke), 1900km for the level bombers (Nakajima B5N – Kate), and 1400km for the dive bombers (Aichi D3A1 – Val). The return trip comfortably allowed for time over the target.

The task-force leader was 39-year-old Commander Mitsuo Fuchida, a veteran of action in China, and the chief tactician of the Hawaiian strike. He was well aware of the requirements for a successful raid on Darwin. Strong intelligence accumulated by aerial observation and Fifth Column operatives working in Darwin reassured the Japanese they would meet little resistance from allied aircraft, and only moderate danger from ground-based air defences.

At 0730 on 19 February, all four carriers turned into wind to launch the attack. Wind over the deck needed to be about 40km/h to enable a safe launch and conditions were ideal with a nice surface breeze. Engine run-up complete, and just before radio silence, Fuchida announced to all pilots: "It is a nice day for flying". Engines roared and the all-clear was given to launch.

It took until approximately 0845 to assemble the 36 fighters, 71 dive bombers and 81 level bombers above the fleet. A course of 148 degrees was set and expected flying time was just under an hour with a moderate tailwind.



OPPOSITE Japanese military expansion in February 1942. Map: Darwin Military Museum.

LEFT The Western Pacific Theatre.

33RD PURSUIT SQUADRON

The dramatic build-up of warlike activity by both the US and Japan in the Western Pacific led to the decision to start shipping aircraft from the Philippine campaign to the east coast of Australia, primarily Brisbane. Once assembled, the aircraft were ferried to Darwin, via various routes through Cloncurry, Mount Isa, Alice Springs and Daly Waters. Darwin would then be the main staging post for the short jump to Dutch and Portuguese Timor, and then further west towards Java.

The arrival of the third shipment of 70 P-40Es on the US Army Transport *Monroe* on 30 January 1942 provided for enough aircraft to establish two squadrons. On 10 February, USAAF General Barnes directed the newly formed 13th and 33rd Pursuit Squadrons (PS) to fly to Fremantle with their allotted 50 P-40Es, and then on to Java directly.

The first Flight of the 33rd PS under the command of Major Floyd J Pell left Amberley on 12 February taking the less-used route, flying to Perth to then be shipped north. However, when the Flight reached Port Pirie, South Australia, Pell was directed to Darwin immediately to protect convoys forming in Darwin for the Java campaign. From there they were to ferry their aircraft to Koepang (Kupang) in Dutch Timor to provide fighter cover for surface operations, including support for convoys heading north to resupply troops operating against the Japanese advance. Lead Units of the 49th Pursuit Group (umbrella formation of the Pursuit Squadrons), just beginning to form in Brisbane, would also be sent to bolster 33rd PS strength.

Due to mechanical and other unspecified issues, three 33rd Squadron P-40s were left at Port Pirie to follow later. The remainder arrived in Darwin late afternoon on 15 February, joining the sole airworthy 3rd Squadron P-40E of 2nd Lt Robert Oestreicher, at that time the only P-40 pilot in Darwin with a serviceable aircraft. Another three 3rd Squadron P-40s were in Darwin's No.12 Sqn RAAF hanger being repaired or salvaged for parts, and the remainder of the Squadron had previously headed north on convoy duty.

The 3rd had left Darwin within days of its arrival in an attempt to reach Java but seven had become lost, ran out of fuel and crashed or ditched along the Timor coast. Only eight made it through. Second Lieutenants Robert Buel and Robert Oestreicher had remained in Darwin with their unserviceable aircraft. Once those aircraft became serviceable and while waiting for more aircraft to arrive, they were assigned patrolling duties over the Darwin area.

In terms of preventing the Japanese advance, P-40 losses prior to arriving at the frontline in northern Australia and Java were catastrophic. Many were lost during test flights out of Amberley Field in Brisbane after being reassembled, and also along the ferry route to Darwin. Charleville, Cloncurry, Alice Springs and Daly Waters were the final resting place for many pranged P-40s (and tragically, many young, inexperienced American pilots).

Just before the 33rd arrived in Darwin, and four days after the 3rd had left for Java, the heavy cruiser, USS *Houston*'s convoy was returning to Darwin from an unsuccessful attempt to land troops on Timor to protect the airfield at Koepang.

Steaming for Darwin, the convoy was being shadowed by a Japanese Kawanishi H6K ('Mavis') flying boat sent to monitor the convoy's progress, with a view to attacking it if possible. The Mavis was capable of long-range patrol and had an offensive capability. *Houston* radioed Darwin with an urgent message that an attack was imminent.

Buel and Oestreicher were patrolling over Darwin at the time and were ordered to intercept the convoy and provide immediate protection. Oestreicher could not be contacted on his radio (a fairly common issue), but Buel promptly set out to cover the 180km flight past the Tiwi Islands and onto the convoy.

A solo mission of this nature over open water was considered high risk, but Buel was able to navigate his way to the convoy without incident. He had some trouble locating the Mavis and there was some cat-and-mouse flying at altitude among the clouds, along with some directional fire from *Houston* before Buel finally located and engaged the Japanese plane at about 9,000ft.

Pouring fire along the fuselage from the rear starboard quarter he was able to bring the big aircraft down. However, return fire from the Japanese tail gunner operating a 20mm cannon also found its mark at close range. Buel's P-40 shuddered, banked sharply and plunged into the sea. The gunner, Takehara Marekuni survived the crash of his Mavis and was eventually rescued by allied shipping and transferred to the Cowra POW Camp in NSW. In a post-war interview, he stated that the action by the lone P-40 was one of the bravest things he had ever seen, considering the defensive firepower his own aircraft possessed. Robert Buel's body was not recovered and the wreckage of his plane lies undisturbed north of Melville and Bathurst Islands (Tiwi Group).

Oestreicher, upon coming into radio range and hearing of the events north of the Tiwis, headed immediately out to look for Buel, but to no avail. Oestreicher was now the sole remaining fighter pilot with a flyable aircraft in Darwin. He was for all intents and purposes, the air defence of Darwin.

ABOVE Pursuit pilot running up his P-40E. The 'E' variant had an extra 0.5 inch machine gun in each wing but no nose gun. It also had a slightly more powerful Allison engine than the P-40D.

FAR LEFT US and Australian ground crew inspect the Allison engine of a delivered P-40E at RAAF Amberley. Photo: David Vincent.

BELOW LEFT 2nd Lt Robert Oestreicher on his P-40 , 13 February 1942. Photo: Darwin Aviation Museum.

TOP P-40s over Strauss Airstrip, Darwin 1942, one of the many airstrips lining the Stuart Hwy on approach to Darwin. However, the Parap Field (Civil/RAAF Darwin Drome) leading into Fannie Bay was used on 19 February.

ABOVE Kawanishi H6K 'Mavis'.

ABOVE RIGHT 2nd Lieutenant Robert Buel's P-40E (#54).

CRITICAL DELIVERY

By the time the 33rd Squadron finally arrived in Darwin on 15 February, USAAF Pursuit Squadrons were constantly engaged in air combat from Timor to Java. Delivery of the P-40 pursuit aircraft into the theatre was critical to support troops and B-17 operations.

After three days in Darwin spent repairing P-40s with various ailments (courtesy of the long hopscotch transit across the Australian outback – known by the pilots as the Brereton route after USAAF Commander General Lewis Brereton), the planes available for the defence of Darwin were in fairly ordinary condition. Regardless, USAAF pilots had been taking turns patrolling over Darwin in the three serviceable aircraft while work continued on the remaining seven.

Unfortunately, there was a distinct lack of pilot experience among the P-40 pilots. The opposite was true for the Japanese who had experienced pilots from the China, Hawaiian and Philippines campaigns and, at the time, the best fighter operating in the

Western Pacific. Arguably, the P-40 if flown well with appropriate tactics was a match for the Zero, but the superb lightweight design of the Zero was, in the hands of a combat-hardened pilot, an ominous foe.

At 0915 on 19 February, part of the 33rd Squadron prepared to deploy with 10 P-40Es to Java via Koepang in Dutch Timor. Nine of the original 33rd P-40s and one replacement (as Pell's original had an engine coolant leak that could not be located), were cleared as combat ready, and more importantly, ready for the trip to Java.

Considering the lack of experience among his group, Pell decided that the experienced Oestreicher should join the Flight. The newly formed 33rd consisted of Major Floyd Pell, and Second Lieutenants Robert Oestreicher, Jack Peres, Elton Perry, William Walker, Max Wieckes, Charles Hughes, Robert McMahon, Burt Rice and John Glover.

A B-17E Flying Fortress would lead the 10 P-40s and a LB-30 Liberator would transport the mechanics and ground crew to Java with planned stops in Keopang and Den Pasar, Bali. Not long into the flight, the B-17 received a radio message from Command Darwin that heavy rainfall over Koepang meant a recall to Darwin. That was, in hindsight, a lucky break for the 33rd.

The Japanese had by that stage put their plans of attacking as far west as Bali into operation. Japan needed Bali for an offensive air base for its planned attack on Java, and the 33rd was flying into a hot zone with very little ground support. Complicating the endeavour that morning was the absence of radio contact with their intended final airfield on Java.

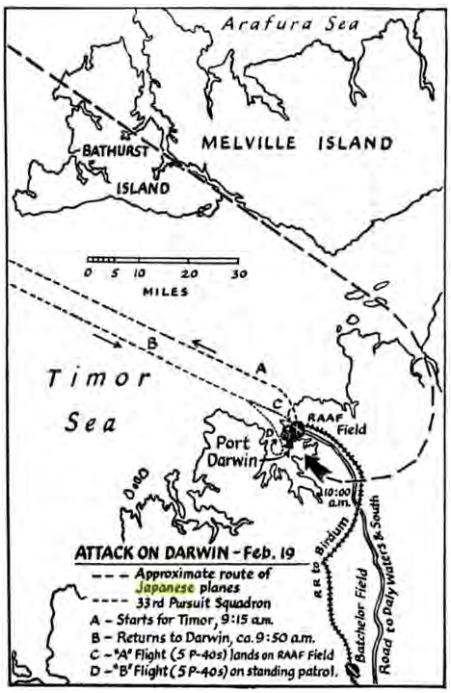
The relayed message from Command via the B-17 allowed Pell to quickly change course back to Darwin. Making that decision a little easier was awareness that apart from Oestreicher and himself, none of the other pilots had more than 20 hours flying experience, although Peres was senior to Oestreicher in time served.

The unfortunate B-17 continued on to Den Pasar only to come under heavy ground fire on approach. The Japanese were already there. The pilot applied full throttle and was able to avoid landing, fly through the flak virtually at ground level, gain height and escape to Malang, remarkably with only one crew member slightly wounded. Had the P-40s been in the same situation, low fuel would have meant a landing or ditching somewhere on or near Bali to escape capture or worse.

All 10 fighters turned and headed back towards clearer skies over Darwin with the intention of refuelling and attempting to reach Koepang once the weather had cleared. Unbeknown to the 33rd, they had just placed themselves on a collision course with 188 inbound Japanese aircraft intent on the destruction of Darwin.

• To be continued next issue.

BELOW Collision course – 33rd Pursuit Squadron USAAF and 188 IJN aircraft side by side on route to Darwin, 19 February 1942
Map: USAF Aid Society.



BRIMMING WITH STORIES

WORDS Dr Craig Bellamy

SINCE ITS BEGINNING IN 1976, THE DARWIN AVIATION MUSEUM HAS WORKEDTO ACQUIRE, PRESERVE, RESTORE AND DISPLAY ITEMS PERTAINING TO THE AVIATION HISTORY OF AUSTRALIA AND THE NORTHERN TERRITORY IN PARTICULAR.

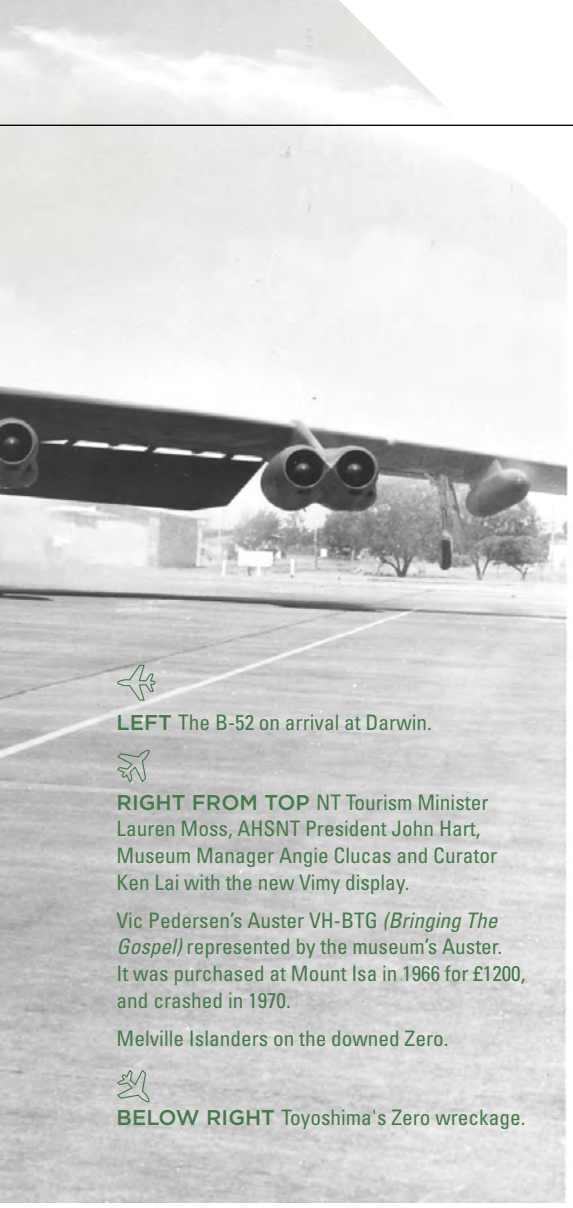
WHEREVER YOU LOOK in the Darwin Aviation Museum there are stories to be told. The entrance has recently been emblazoned with a large and impressive photograph panel, depicting the Vickers Vimy and its crew, who landed at Darwin on 10 December 1919. Unveiled in September 2019 by Northern Territory Tourism Minister Lauren Moss, it marks the centenary of the first flight from Britain to Australia.

Walking from the foyer and shop into the hangar, you can't miss the museum's largest exhibit. For 30 years now the B-52G Stratofortress, with its 56m span, has dominated the museum. Surrounding it is an equally significant array of recreational, civil and military aircraft and artefacts which tell the story of aviation in the Northern Territory.

Formerly known as the Australian Aviation Heritage Centre, the museum is the commercial arm of the Aviation Historical Society of the Northern Territory (AHSNT).

The AHSNT was established in 1976 by a group of enthusiasts aiming to preserve aviation artefacts and World War II aircraft relics salvaged after Cyclone Tracy in December 1974. Its objectives are to acquire, preserve, restore, house, operate and display items pertaining to the aviation history of Australia and of the NT in particular.

The original museum opened in 1988 in Gardens Hill (near the Darwin CBD) in a pre-World War II navy victualling building leased from the territory government. The AHSNT then began lengthy negotiations with the US Air Force and the territory government to obtain a surplus B-52, and to build a new museum to house and display its



LEFT The B-52 on arrival at Darwin.

RIGHT FROM TOP NT Tourism Minister Lauren Moss, AHSNT President John Hart, Museum Manager Angie Clucas and Curator Ken Lai with the new Vimy display.

Vic Pedersen's Auster VH-BTG *(Bringing The Gospel)* represented by the museum's Auster. It was purchased at Mount Isa in 1966 for £1200, and crashed in 1970.

Melville Islanders on the downed Zero.

BELOW RIGHT Toyoshima's Zero wreckage.

growing collection of aircraft and related artefacts. The then mayor, Alec Fong Lim, was instrumental in the acquisition of the B-52. The relocated museum was officially opened on 2 June 1990, with the fully refurbished bomber on display for the first time.

The AHSNT continues to use the Gardens Hill facility as a workshop, library and archives area.

Over 30 years the museum collection has continued to expand as one of Australia's largest non-government aviation collections.

An accredited Northern Territory tourism attraction, the museum hosts some 30,000 visitors a year. On the popular annual Legacy 'open cockpit' day about 10 aircraft, from the Tiger Moth to the B-52, are opened for people to sit in the pilot seats.

Proposed expansion plans for the museum can be found on the website in4d.com.au/darwin-aviation-museum.

AIRCRAFT HISTORIES

Auster Autocar (UK reg. G-AOFM)

Brigadier Vic Pederson, the Salvation Army 'Flying Padre', delivered pastoral services throughout the Territory and northern Western Australia in a number of light aircraft, including the Auster Autocar, during the period 1945 to 1972. Northern conditions were harsh on aircraft and two of his Austers and a Tiger Moth were so badly damaged they were struck off the register.

When the wrecked Austers were recovered by AHSNT, they were deemed too badly damaged to restore and it was decided to purchase a similar aircraft for display (1953 UK-registered G-AOFM, purchased in Melbourne). It bears the paint scheme of Pedersen's Salvation Army Auster, VH-UED.

Mitsubishi A6M2 Zero (serial BII-124)

A prized exhibit is the wreckage of a Japanese Zero naval fighter, shot down over Darwin during the first Japanese raid on 19 February 1942. Disabled by a single .303 bullet, it belly-landed in bushland on Melville Island. Significantly, this aircraft was earlier flown by a flight leader in the attack on Pearl Harbor.

Its pilot over Darwin, Hajime Toyoshima, was captured by Tiwi

Islander Matthias Ulungura, the first man to take a Japanese prisoner on Australian soil. Toyoshima was transferred to the prisoner of war camp at Cowra in southern NSW, where he died during the infamous Cowra breakout in August 1944.

North American B-25D Mitchell (serial 41-30222)

The B-25D bomber, one of the few extant Mitchells to have seen active service, flew with the 345th Bomb Group US Army Air Force (USAAF) in New Guinea before being declared 'war weary'. It was then acquired by the 380th Bomb Group USAAF at Fenton Airstrip (160km south of Darwin) and used as a 'fat cat' hack aircraft transporting food and supplies from Adelaide to the troops in New Guinea.

On its last flight from Adelaide to Fenton, a compass error resulted in a forced landing in the Tanami Desert. On departmental orders, its tail section was destroyed to prevent the aircraft from being re-used. Salvaged in 1972, it was transported by truck to Darwin and stored at East Point, where it fortunately survived Cyclone Tracy. It has now been partially restored to the colour scheme and nose art of its 1943 New Guinea service.

Spitfire Mk VIII replica

The Queensland-built replica was flown to Darwin in a RAAF Hercules in 1991, and in 2014 it was refurbished and given a new paint scheme. Its port-side carries the markings of SQNLDR Bruce Watson (No.457 SQN) while the starboard side displays the markings of SQNLDR Lou Spence (No.452 SQN).

Spitfires of No.1 Fighter Wing defended Darwin from January 1943. Eventually more than 300 operated there and accounted for many Japanese aircraft destroyed.

GAF Mirage IIIO (serial A3-36)

The French designed Mirage III, Australia's frontline fighter 1965-1989, was built under licence in Melbourne by the Government Aircraft Factory. Mirage A3-36 was delivered to the RAAF in May 1966. On 27 May 1985 the aircraft, while being flown in a circuit by FLTLT (later AVM) John Quaife, lost power and crashed on the Ludmilla mud flats near the Darwin suburb of Coconut Grove. Quaife ejected at 1,000 feet and landed safely in mangroves, while the unmanned aircraft landed largely intact. Acquired for the museum unrestored, it was refurbished by No.75 SQN from 2001 and re-joined the museum four years later.

de Havilland DH-82 Tiger Moth (serial A17-4)

The former RAAF aircraft was built in Australia in 1939 and served with No.22 SQN and No.2 and No.5 Elementary Flying Training Schools. After the war it was sold to the Royal Aero Club of South Australia for £100. In 1981 Territorian Stan 'Bones' Phillips bought and restored it. He flew it around Darwin for many years. In 1998, it was purchased for the museum through a Territory government grant.

General Dynamics F-111C (serial A8-113)

Built as an F-111A for the USAF in 1969, the aircraft flew 44 combat missions over Vietnam in 1972-73. In 1982 Australia purchased A8-113 and three other former USAF F111As as replacements to cover RAAF losses, and they were modified to F-111C standard. In 1997 it was converted to 'Pave Tack' capability and retired in 2010 after logging 7,478 flying hours.

de Havilland Dove (reg. CR-TAG)

A 1950s commuter aircraft, the Dove was flown by East Timor Airlines (Transportes Aereos de Timor) on domestic passenger services between towns in East Timor. Named 'Manatuto' after a town on Timor's north coast, it was flown to Darwin around the time of the Indonesian invasion of Timor in 1975. After sitting in the open at Darwin airport, it was donated by the Portuguese Government at the museum's request..

Westland Wessex Helicopter (serial N7-202)

During the Royal Australian Navy's Operation Navy Help in 1974/75 this Wessex, based aboard HMAS *Melbourne*, was one of six which assisted in the clean-up of Darwin following Cyclone Tracy. Later during the Kangaroo '89 defence exercise it was written off in a landing accident. Repaired at Darwin's naval base HMAS Coonawarra, it was presented to the museum in 1990. The Navy later refurbished the cockpit and also donated a Gazelle turbine engine which is now on display with the Wessex.

Boeing B-52G Stratofortress

The museum's centrepiece, the US Air Force B-52 with 'Darwin's Pride' emblazoned below the pilot's window, is permanently loaned by the US government. Built in 1959 as one of 193 G-model B-52s, it served during the Vietnam War during 1972-74. Its engines and avionics have been removed.

Span: 56m
Height: 14.5m
Length: 52m
Weight: empty 78t, maximum take-off 218t
Maximum speed: 1030 kph
Engines: 8 x Pratt and Whitney J57 jet
Crew: 6
Service ceiling: 52,000ft
Range: 13,200km
Unrefuelled endurance: 32 hours.

BELOW The B-25D in wartime (AHSNT Collection).

BOTTOM The B-25D on display.

The newly displayed F-111 in 2013.

BELOW Mirage A3-36 after its engine failure. Photo: AHSNT Collection via RAAF.

BOTTOM B-52G on display. Photo: Ron Innis collection.

A FEW OF THE RELICS

As well as whole aircraft, the museum displays many pieces of crashed or salvaged World War II aircraft recovered from various locations in the Top End. Many have tragic stories.

USAAF P-40E Kittyhawk wreckage

A propeller, tail section and wing were salvaged from a mid-air collision of two P-40s on 12 July 1942. Lieutenants John Sauber and George Preddy of the 49th Pursuit Group USAAF collided near Manton Dam south of Darwin. Preddy narrowly escaped his aircraft before it crashed, but Sauber was killed. Preddy was injured and sent south for recovery, where he became engaged to an Australian girl before being repatriated to the USA. Later the top US Mustang ace, he was killed by 'friendly fire' in Belgium on Christmas Day 1944.

Other P-40 pieces held are relics of the first attack on Darwin on 19 February 1942.

Wackett & Noble Beaufighter wreckage (serial A19-208)

Another pair of tragic pieces is the tail and cupola from a RAAF Beaufighter which crashed in Coirwong Creek (now in Kakadu National Park) on 24 September 1944. Its pilot, SQNLDR Wilbur Wackett (son of Sir Lawrence Wackett), and navigator, FLGOFF Keith Noble, evidently survived for some time, as a laid-out parachute and opened ration cans were found near the wreck. Despite several searches, the two airmen were never found.

Betty bomber wreckage (serial T-361)

Several artefacts from Japanese Mitsubishi G4M1 'Betty' bombers are displayed, including pieces from one shot down over Cox Peninsula near Darwin by a USAAF P-40 on 4 April 1942. A section of rear fuselage, with the waist gunner's window, and a compass from the cockpit are held. All crewmen were killed when the aircraft blew up in mid-air and crashed in scattered pieces.

B-24 Liberator wreckage (serial 42-41182)

A cockpit section from a 380th Bomb Group USAAF Liberator is displayed, converted into a caravan by Dick Stretton, an Aboriginal Inland Mission Christian missionary who worked in the gulf country for many years. An especially rare item is a slide used for parachute-dropping commandoes through the B-24's rear hatch. The waist section of a RAAF B-24 (A72-88) which fatally crashed at Fenton Strip, south of Darwin, is also displayed.

PBY Catalina parts

Catalina flying boat artefacts include a 'boat' anchor and a large wing float. The 'Cat' was used by both the US Navy and the RAAF in northern Australia, serving with distinction in the Pacific and elsewhere.

• Darwin Aviation museum is adjacent to Darwin Airport on the Stuart Highway, Winnellie (8km from the CBD). It is open 9am to 5pm daily except Christmas Day, Boxing Day, New Year's Day and Good Friday. For more information see darwinaviationmuseum.com.au

AIRCRAFT EXHIBITS

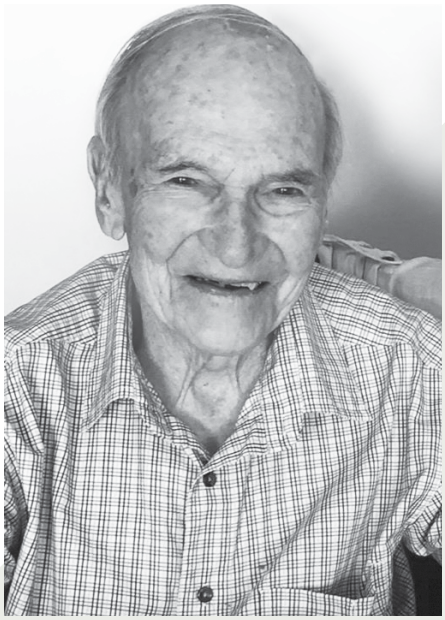
The museum displays 21 different engines including Rolls Royce Merlin Mk.XXIII V-12, Pratt and Whitney R1340 Wasp and R1830 Twin Row Wasp and an Allison V-1710 piston engines and Rolls Royce Derwent Mk.8 and Avon RA-6 jet engines.

MILITARY AIRCRAFT

- de Havilland DH.82A Tiger Moth
- North American B-25D Mitchell bomber
- Boeing B-52G Stratofortress bomber
- Lockheed AP-3C Orion maritime surveillance aircraft
- Supermarine Spitfire Mk VIII fighter (replica)
- CAC Avon Sabre fighter
- Dassault Mirage IIIO fighter
- General Dynamics F-111C all-weather strike fighter/bomber
- Bell Cobra attack helicopter
- Westland Wessex helicopter
- CAC Boomerang cockpit (unrestored)
- CAC Wirraway fuselage frame (part restored)
- Bristol Beaufighter cockpit (replica)

CIVIL, COMMERCIAL & RECREATIONAL

- de Havilland Dove
- Auster Autocar
- Rutan Long-EZ ultralight
- Wasp Air Buggy gyrocopter ultralight
- Hovey Delta Bird ultralight
- Skycraft Scout ultralight.



A LONG AND REMARKABLE LIFE

SHOT DOWN OVER ITALY AND INTERNED A THE INFAMOUS STALAG LUFT III, GPCAPT ALEXANDER ARNEL NOT ONLY SURVIVED WWII, HE HAS NOW CELEBRATED HIS 100TH BIRTHDAY.

LEFT Alec Arnel turned 100 in April.

Alec with a Hurricane.

ON 2 APRIL, RAAF veteran GPCAPT Alexander (Alec) Arnel turned 100. To honour the milestone, Chief of Air Force Air Marshal Mel Hupfeld surprised Alec by calling to wish him happy birthday on behalf of the Air Force.

AIRMSHL Hupfeld expressed a sentiment held by many when he reflected: "Alec doesn't know how special he is and what a hero he is".

Alec was born in Ballarat on 2 April 1920 and began his adult life as a student teacher. He joined the RAAF at the end of 1940 and was trained as a pilot through the Empire Air Training Scheme. He did his advanced training, on Harvard aircraft, in what was then Southern Rhodesia (now Zimbabwe) before being posted to Egypt to fly Hawker Hurricane fighters with 208SQN RAF, a composite nationality squadron, where he flew army co-operation missions – essentially reconnaissance. One notable squadron mate was Frenchman Jean Becourt-Foch, grandson of the Supreme Allied Commander in World War I, Marshal Ferdinand Foch.

Alec then joined 451SQN RAAF in Lebanon, which after a year converted from Hurricanes to Spitfires. Quoted by squadron historian Adam Lunney in his recent book *We Together,* Alec described the Spitfire as "a gentleman's aircraft". "A Spitfire felt like a feather compared to Hurricanes. It was just so beautiful," he said.

Alec flew various missions, initially over the Middle East and later over Italy, went on detachments including to Cyprus, and moved with the Squadron to Corsica. On one mission, attempting to intercept a high-level German aircraft, Alec had his Spitfire at nearly 40,000ft. Although the enemy was just out of reach, another aircraft managed to shoot it down.

Many years later at a commemoration, Alec chanced to meet that pilot who was a fellow Australian.

On 29 June 1944, Alec's Spitfire suffered serious engine damage and he had to abandon it. He made three attempts to do so. After the second attempt, trying to escape by diving suddenly so he would 'float' out through the open canopy, he landed back in his seat. Telling himself, "Alec, you're the only one here, so you have to sort this problem out yourself!", he realised his seat harness was holding him in. He undid it and bailed out at just 2,000ft.

Landing in a cornfield, minus his shoes which had been whipped off, he saw German soldiers nearby. With his parachute spread across the field, he realised he would not be able to win the war by himself and surrendered.

Alec was taken to two locations for interrogation on his way to internment at Stalag Luft III, where the Great Escape had taken place a few months earlier. Alec was saddened to discover friends who had been held there had been among the 50 killed after the escape.

He said there was an uneasy feeling among prisoners and guards alike. Food was scarce and he lost significant weight. Prisoners who had been there for months or years were in a much worse state.

In late January 1945, with the Russians approaching, the camp was evacuated and the prisoners were forced to march through knee-deep snow during one of the coldest European winters of the 20th century. Alec said some prisoners fell asleep in the snow and never woke up, some were shot because they couldn't keep up, and on one occasion others were killed in strafing by 'friendly' Hawker Tempests.

After being trucked north near Bremen and Hamburg and held for some time, they were marched to Lübeck where they were liberated by the 51st Highlanders of the 2nd British Army. They were flown to London in May 1945, arriving just after VE Day.

After returning to Australia, Alec studied psychology at university and gained further experience in his pre-war occupation as a teacher.

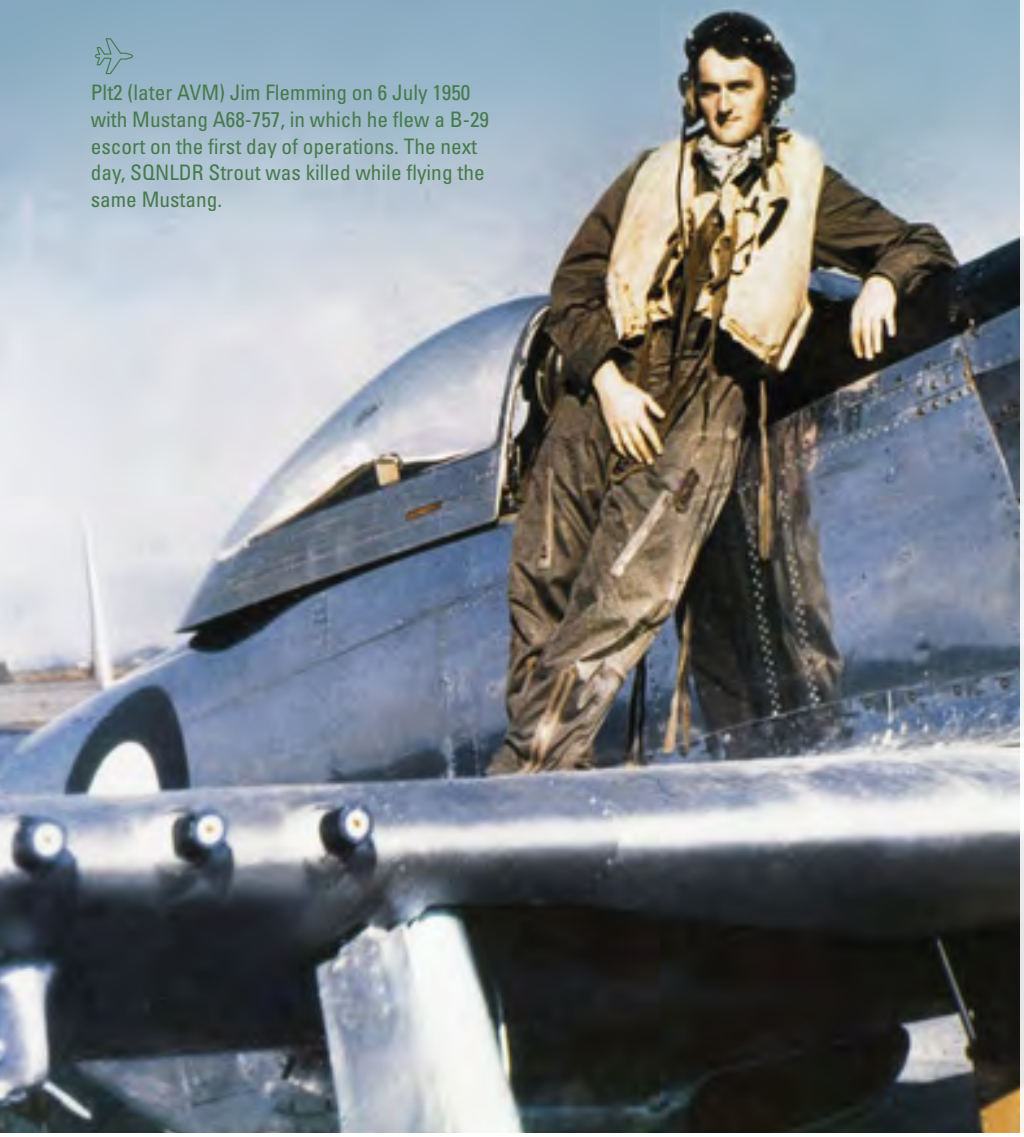
In 1952, he re-joined the RAAF as an Education Officer, lured by the promise of some flying. He served in numerous locations including Wagga, Rathmines and Canberra, and became influential in promoting the importance of a robust system of education in the RAAF, and the vital role education personnel played in achieving and enhancing capability.

He served a further 22 years until retiring as Group Captain in 1974, before becoming a counselling psychologist at Canberra University for 10 years.

On his 100th birthday Alec also received a birthday phone call from ACM Sir Allan Grant 'Angus' Houston AK AFC, whose father FLTLT Allan Houston RAF had met Alec when they were both POWs in Stalag Luft III.

FORGOTTEN MONTHS OF THE FORGOTTEN WAR

IN JULY 1950, RAAF NO.77 SQUADRON BECAME THE FIRST NON-US UNIT TO JOIN THE KOREAN WAR, FLYING PISTON-ENGINED MUSTANGS – A LARGELY FORGOTTEN CHAPTER IN MILITARY AVIATION HISTORY.



Plt2 (later AVM) Jim Flemming on 6 July 1950 with Mustang A68-757, in which he flew a B-29 escort on the first day of operations. The next day, SQNLDR Strout was killed while flying the same Mustang.

THE FIRST PAGES OF RAAF NO.77 SQUADRON'S Korean War operations diary record a relatively uneventful introduction to the conflict on 2 July 1950 (see opposite). But the next day's mission proved tragic when the Squadron mistakenly rocketed a train and trucks carrying US and South Korean troops. As planning for the strike had been an American responsibility, 77SQN was exonerated.

The 'limited' war in Korea, coming just five years after World War II and 15 years before the longer, more divisive war in Vietnam, became something of a forgotten war. The first nine months of 77SQN's involvement, flying piston-engine Mustangs before converting to Meteor jets, is less familiar still.

During WWII the Squadron, commanded by WGCDR Dick Cresswell, who later returned to the Squadron in Korea, flew Kittyhawks with distinction in the Pacific War. Then, after nearly five years in Japan with the occupation forces, 77SQN was finally about to go home when events on the Korean Peninsula dictated otherwise. On 25 June 1950, North Korea sent a barrage of artillery fire and nearly 100,000 troops across the 38th parallel into South Korea. With the South ill prepared for the invasion, American-led United Nations forces quickly moved in.

At UN forces commander General MacArthur's request, 77SQN became the first non-US unit to join the conflict. Operating under a US Air Force wing, it flew bomber escort (the Mustang's original role in WWII), armed reconnaissance and ground-attack missions. Targets included road and rail transportation, bridges, river barges, tanks, ammunition dumps and villages containing enemy troops – anything that supported the North Korean advance. Targets of opportunity often came under the Squadron's bombs, napalm, rockets and 0.5-inch machine-gun fire.

In the jet age, the decade-old Mustang fighter design, while still the pinnacle of piston-engined fighter technology,

was outclassed in aerial combat. It was slower than jet fighters and thus an easier target for enemy ground fire – especially as its engine had a vulnerable liquid-cooling system. But its great range and endurance made the Mustang a good choice for bomber escort and long-range ground-support missions. American, South Korean and South African squadrons also used it in Korea in ground attack, army co-operation and reconnaissance roles.

Six weeks into its operations, Australian Prime Minister Robert Menzies and a party of top brass visited 77SQN to present it with the Gloucester Cup, the award for the most efficient flying squadron during the year. A few weeks later the Squadron lost its commanding officer, WGCDR Lou Spence DFC and bar, when his Mustang crashed during an attack on enemy stores at Angang-ni.

In October the squadron moved from Japan to Pohang, South Korea, as UN forces pushed the communist forces back into North Korea. The enemy capital, Pyongyang, was captured and the prospects of a victory seemed good. By November the northward push approached the Yalu River and the Chinese border and 77SQN relocated to an airfield near Hamhung in North Korea. But the advance brought a much larger adversary, China, into the war.

Soon the UN forces had been forced back again, to a small perimeter around the south-east port town of Pusan. The Squadron, too, withdrew there. Winter conditions worsened and began to impair the war effort.

At that time a new, high-performance Soviet jet fighter appeared from the north. The MiG-15 was a game changer which far outclassed the Mustang in speed, high-altitude performance and armament. Luckily, in the five months that MiGs and RAAF Mustangs co-existed in Korea they did not clash. But numerous Mustangs and pilots were lost to ground fire during their nine months in action. In January 1951, for example, FLTLT Gordon Harvey was at low altitude when his Merlin engine was hit and blew up. Harvey belly-landed the aircraft on the frozen Taedong River, jumped out and ran from a group of North Korean soldiers. He was captured and for the rest of the war suffered brutal treatment including torture and forced labour.

On 6 April 1951 No.77 Squadron flew its last Mustang operation and returned to Japan to convert to British twin-jet powered Meteors, which it flew over Korea for the remaining two years of the war.

Hired South Korean labourers deliver air-to-ground rockets to Mustangs for a mission in March 1951.

PHOTOS: Australian War Memorial

BELOW WGCDR Lou Spence DFC and Bar, 77SQN commander, about to take his Mustang on a mission in July 1950.

77SQN KOREAN WAR OPERATIONS DIARY, 2 JULY 1950

Pilots Strout, Bradford, Murphy, Cottee: *Provided air cover for American C-47 aircraft evacuating wounded American personnel from Taijon, Korea, to Japan. No enemy aircraft were sighted nor any incidents reported…*

Pilots Spence (Commanding Officer), Adams, McLeod, Mosman, Nicolls, Rivers, Thornton, Flemming: *Close armed escort for 17 American B-26 aircraft. The Mustangs and the B-26 aircraft rendezvoused over Tongnae, Korea… Target being two rail bridges south of Seoul. Light, though inaccurate anti-aircraft fire was encountered.*

Pilots Bradford, Harvey, Noble, Flemming, Carroway, Turner: *Escort of American B-29 aircraft, rendezvousing at Kangnung… and proceeded to target area, the airfield at Hamhung… No enemy aircraft were sighted. Medium anti-aircraft fire forming a box pattern was sighted. No aircraft were damaged.*

77SQN KOREAN WAR STATISTICS 1950-53

- Nearly 4,000 sorites flown in Mustangs
- 15,000 sorties flown in Meteors:
- 40 died in service (14 in Mustangs)
- 7 pilots taken prisoner
- Air combat claims against enemy: 3 to 5 MiG-15s by Meteors, 3 aircraft on ground
- Ground claims: 3,700 buildings, 1,500 vehicles, 16 bridges, 20 locomotives, 65 railway carriages.

ODD BODS REMEMBERED

EARLIER THIS YEAR, A PLAQUE WAS LAID AT THE AUSTRALIAN WAR MEMORIAL IN HONOUR OF THE ODD BODS. **PATRON AVM (RTD) PETER SCULLY AO** GAVE THE FOLLOWING COMMEMORATIVE ADDRESS.

I **HAVE BEEN ASSOCIATED** with the Odd Bods Association for 35 years and have had the great honour of being their Patron – and their successors', the Friends of the Odd Bods – since 1996. And thanks to an Australian War Memorial (AWM) grant over a two-year period, I also managed to interview 50 RAAF members who flew in Europe and transcribed those interviews so they are now available to anyone interested.

Odd Bods, the name itself brings forth many blank looks, accompanied with a few smiles. Who were they and why are they being honoured here today? Allow me to provide a short historical background.

During WWII, Britain faced attack from the Nazi regime, mainly in the air. Britain could build the necessary aircraft for its defence but did not have facilities to train the great number of aircrews needed to fly them.

Nations of the then Empire agreed to share that training task – known today as the Empire Air Training Scheme. Australia trained 28,000 aircrew for service in Europe, an enormous undertaking.

The agreement provided for the RAAF to form 17 squadrons for use in the European theatre, but inadequate attention was given to maintaining a unique Australian identity. The Canadians were much smarter, forming a separate Canadian Group.

So RAAF airmen served on those 17 squadrons and were also scattered among 214 RAF or Canadian squadrons. Just on 4,000 of them lost their lives in combat and another 800 were killed in training. More than 1000 became prisoners of war.

Those who flew with non-RAAF squadrons became known as the Odd Bods and once they arrived in the UK were completely under the control of the RAF. Recognising this, the CAS of the day, Air Marshal Sir Richard Williams commented: "They did not know that most of their achievements were not recorded in Australian history".

That was brought home to me when I was asked by the ANU to write an entry for *The Australia Dictionary of Biography* for a RAAF pilot who commanded a RAF squadron of Spitfires in the Middle East. He lost his life just six months after his brother was shot down and killed over Berlin flying with a Canadian squadron. I searched our archives and his file contained just two folios – his enlistment and his discharge documents – absolutely nothing about his service. Sir Richard Williams had been correct.

Our wonderful AWM provides an extraordinary record with easy access to RAAF members who flew with RAAF squadrons but not for members of the Odd Bods – those are only available through the British Records Office, and for many at a prohibitive cost.

How many are we talking about? Of the 28,000 RAAF aircrew who served in Europe, I believe over half have no records of their service available in Australia. It is, then, so appropriate that their service is recognised here today. My grateful thanks to those at the AWM who have enabled this tribute to be established.

Now, let me stick my neck out. As next year is the Centenary of the RAAF I wonder if it might be possible to enter into an agreement between the AWM and the British Records Office to enable all British records of RAAF members who served in Europe in non-RAAF squadrons to be made available for access through our AWM's facilities. Those members deserve to be remembered.

ABOVE LEFT Odd Bods Association Patron AVM (RTD) Peter Scully.

BELOW Plaque laid at the AWM.

CL604 Challenger drops an air-sea rescue kit.

BELOW Airborne mission coordinator station.

RAPID RESPONSE

RESPONSIBLE FOR THE LARGEST SEARCH AND RESCUE AREA IN WORLD, FOUR SPECIALLY MODIFIED JETS AND FIVE-MEMBER CREWS ARE READY FOR TAKE-OFF WITH MINIMAL NOTICE.

AS PART OF A 24/7 12-YEAR $640 MILLION contract with the Australian Maritime Safety Authority (AMSA), Cobham Aviation Services has created the world's most technologically advanced civilian search and rescue aircraft. Four heavily modified Bombardier CL604 Challenger jets are currently in AMSA service and responsible for the largest search and rescue (SAR) area in world. With bases in Essendon, Vic, Cairns, Qld, and Perth, WA, the aircraft cover one tenth of the Earth's surface and 53 million square kilometres of ocean.

Each aircraft is fitted with a full suite of detection, communication and stores-delivery equipment. Wide area search is provided by a Seaspray 5000e multi-mode surveillance radar with a range of 370km (200 NM) while a Wescam MX15 electro optical sensor, mounted in a gimballed turret on the lower aft fuselage aids both visual and infra-red searches. Additionally, a visual anomaly detection system, ViDAR, used on the US Coast Guards' Scan Eagle platforms, is housed behind a fairing blister just aft of the nose wheel well.

The mission management suite on-board is linked to AMSA's Joint Rescue Coordination Centre in Canberra by state-of-the-art broadband satellite communications, allowing real-time sharing of streamed video, audio and sensor imagery.

The crew of five comprises captain, first officer, two visual observers and an airborne mission coordinator (AMC). One of the visual observers doubles as the drop master and is responsible for ejecting stores out of the air-operable door at the rear of the aircraft, as directed by the AMC. The AMC is responsible for directing the pilots, liaising with AMSA on the ground in Canberra and operating all of the on-board sensors.

Crew are rostered in shifts and when tasked for a search and rescue mission are required to call for taxi clearance within 30 minutes during the day and within 60 minutes at night. Once in the air, flight duration can extend up to eight hours and that endurance combined with a transit speed of 490 knots (about 900km/hr) provides a very capable emergency response asset that can cover Australia's vast land mass and maritime SAR area quickly.

During the Challengers time in service, since December 2016, Cobham's special mission team has conducted approximately 200 operations, ranging from dropping medical supplies to injured motorcyclists in the outback to searching for lost aircraft. The Challenger has flown in coordination with numerous emergency services and Defence aircraft such as the retiring RAAF AP-3C Orion.

The mission system on board the Challenger was designed and built by Cobham in Adelaide and the state-of-the-art mission system software was developed by Acacia Systems, also in Adelaide.

Cobham has a long history in defence services and space exploration. The company has participated in a wide range of projects including air-to-air refuelling systems on board the RAAF's KC-30s and F35s, electronic warfare training abroad and the provision of more than 250 components for the international space station.

FINANCIAL SHELTERS

IN TOUGH ECONOMIC TIMES, AS WE ARE EXPOSED TO NOW, THERE ARE SOME IMPORTANT ACTIONS YOU CAN TAKE TO HELP SHORE UP YOUR PERSONAL FINANCES. HERE'S OUR TOP 10.

1 PREPARE A FAMILY BUDGET

Preparing a family budget is always a smart move, but economic conditions like these should make it mandatory. It requires some effort but doing it properly can give you certainty and peace of mind. A budget can help you identify areas where you can reduce your personal expenses, direct money to savings and reduce your mortgage and other debts. In addition, you can use your budget to put money aside regularly for bigger expenses such as car registrations, school fees and insurance. Use a blank sheet of paper and a calculator, an Excel spreadsheet or one of the online budget calculators, including the template at moneysmart.gov.au.

2 SHOP AROUND FOR THE BEST PRICES

Make sure you shop around for the most competitive prices. Sadly, a minority of businesses will try to take advantage of consumers by manipulating the price of essential items. For example, we've seen the price of some handwash brands increasing by 200% and certain petrol retailers maintaining high prices when the world-wide wholesale price has fallen substantially.

3 MANAGE DEBTS BY TALKING TO LENDERS

If you are concerned about your ability to meet repayments on debts such as house mortgages, personal loans, car loans and credit cards, approach your lender and seek assistance. Most lenders have announced new and quite generous special terms and conditions for those facing financial hardship. Provided you can demonstrate your deteriorating financial position, you will almost certainly qualify for a special arrangement, at a minimum in the form of deferral of payments until the crisis has passed and you're back on your feet. You will achieve the best result if you approach the lender proactively. The worst thing you can do is fail to pay without first talking to the lender, thereby going into default on your debts. Defaulting without notice may have a bad impact on your credit rating, which is one of your most valuable financial credentials. That might not seem important now, but it will be when the current financial crisis is over. Helpful information can be found at ausbanking.org.au or from the relevant financial institution.

4 ADJUST RENTAL ARRANGEMENTS

If you find yourself in a position where you can't meet your private home rental obligations, ask your landlord for assistance in the form of a rent decrease, a deferral or even a holiday from paying at all. If you run a small business from leased commercial premises and the business is suffering financially, talk with the landlord about a rental holiday or reduction (preferably not just a deferral if the business is severely suffering, otherwise you'll be landed with a big deferred debt when conditions improve). Make sure you keep abreast of federal and state government announcements about

landlord and tenant regulations that will assist with the management of cash-flow during the crisis.

If you're a landlord (say an owner of an investment property), the new laws and regulations will apply to you. It's important to stay informed through government websites, the media, your managing agent or your professional advisers. The reality is that it is in everyone's interests, landlords and tenants alike, that compromises are reached. After all, it helps no-one if at the end of this, there is a severe shortage of financially viable private and business tenants to rent the thousands of properties that are likely to be on offer.

5 NEGOTIATE SCHOOL FEES

For most parents, children's education is a top priority. Therefore, it will be important for parents to not disrupt their children's education any more than it has been by temporary school closures. In the case of private schools, their financial viability and their students' education is directly linked to the ability of parents to keep their children at school, so fees continue to be paid. In times of financial crisis, many schools will offer assistance, often in the form of temporary fee reductions and deferrals. Keeping students at their chosen educational institution is as important to the school as it is to parents and students.

6 CONTINUING CHILDCARE

New and generous rules have been introduced for childcare during the current health crisis. There is more information at dese.gov.au and at services.australia.gov.au.

7 ACCESSING SUPERANNUATION

The government is allowing people who have lost their jobs as a result of the COVID-19 outbreak to apply for early release of their superannuation up to a maximum of $20,000; $10,000 in withdrawals up until 30 June 2020 and then further withdrawals of up to $10,000 from 1 July 2020 to 24 September 2020.

However, before you consider applying for the release of your superannuation, consider consolidating multiple superannuation accounts you may have accumulated over the years into one account. There are details on how to do that at moneysmart.gov.au.

Also carefully consider whether you really need to access your superannuation. Doing so will certainly provide access to some much-needed cash, but it may also mean your ultimate superannuation benefit on retirement may be significantly reduced because that money will no longer be growing in the fund.

8 AVOID ON-LINE GAMBLING

If you're stuck at home over the next few months, resist the temptation to engage in on-line gambling. Gambling in any form, especially online, is a guaranteed way to lose a great deal of money. While the opportunities to gamble on conventional sports have reduced considerably, they are quickly being replaced by more exotic opportunities, especially through social media.

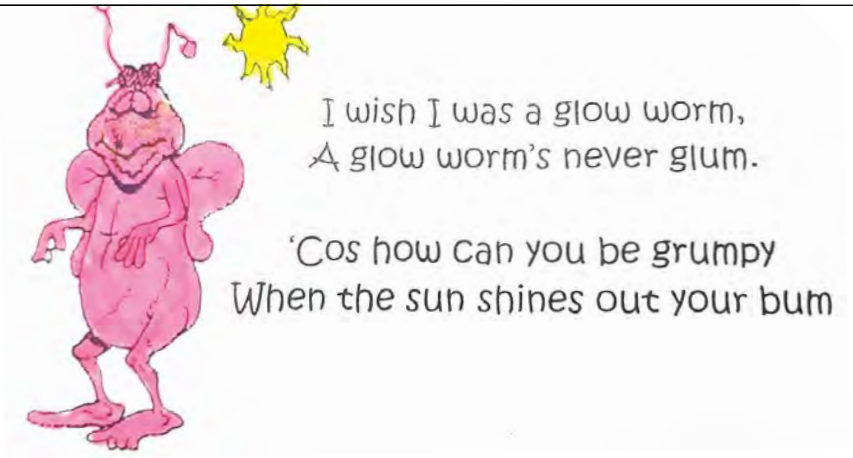
If you or someone you care about is, or is at risk of, suffering harm due to gambling, help is available. Free, professional and confidential counselling, information and support is available 24 hours a day, seven days a week from the National Gambling Helpline on 1800 858 858. There is an extensive range of information and resources, including email and chat counselling services available at gambinghelponline.org.au.

9 GOVERNMENT SUPPORT

Make sure you understand and consider applying for the considerable financial support that is currently available to individuals and households. There is extensive authoritative information on the proposed benefits at treasury.gov.au. The arrangements are evolving every day, so make sure you check that site and others on a regular basis for updates.

10 SEEK HELP

If you are in serious financial difficulties, you can access the National Debt Helpline on 1800 007 007 or go to financial counsellingaustralia.org.au to find a free financial counsellor in your area.



THE WISDOM OF YOUTH

A QUEST FOR THE HOLY GRAIL SETS TROUBLED YOUNG PEOPLE ON A POSITIVE NEW PATH.

I WAS ASKED IF OUR TEAM AND PERSONAL DEVELOPMENT BUSINESS could "help young people with significant social behavioural problems adjust to become contributing members of society".

We, probably foolishly, decided to accept the challenge. Why did we want to help them? Because they were chronically unhappy.

I was chronically unhappy until the age of 18, but by the time I was 21, I had changed into a happy young man. I knew intuitively what stimulated my change. I found a goal that was very exciting and important to me but realised my current behaviour would damage my chances of attaining that goal. I changed because what I wanted demanded change.

I figured that we all have a certain attachment to the characters and events portrayed in the Indianna Jones, Mission Impossible and Monty Python movie scripts. It seemed that if I incorporated all those attachments into an adventure and asked the kids consigned to my care to find the Holy Grail, it might awaken something in them that spiked a change of behaviour.

I found a vast area of rough bush country with useable shearers' quarters and an old abandoned settlers' cottage hidden deep in the wilderness, built a Holy Grail in the back shed, secreted it in the rough country and devised a complex battery of clues to be found along the way that would take seekers of the Grail through a testing course of obstacles for five days, just like Indianna Jones.

I assembled a team of three coaches and supervisors to implement the activity. Twelve kids arrived, much to our trepidation. We gave them a big feed for lunch, lots of friendliness, reminded them of Indianna Jones, Mission Impossible and Monty Python and asked them if they would like to go chase the Holy Grail.

They looked at us in disbelief but saw the evil grins on our faces and fell into the rhythm. We told them how an ancient note had been found by total chance in a decrepit old container under the shearers' quarters.

They set to the note with some excitement and worked out their first moves, albeit with a somewhat superficial analysis. We also told them that CAOS, an anti-social organisation determined to Callously Obliterate All Success, would be out to destroy their quest for the Grail.

As they were about to set off into the wilderness, we asked them some genuine questions such as: do you need a map to get back here tonight? Do you need to take some water? Do you need any safety equipment? That caused them to sit down again and listen to each other for a bit about what they might need. At no time did we instruct them; just questions.

Unbeknown to them at this stage was that in front of them for the next days were clues that would lead them to very complex and challenging situations that included river crossings, abseils down gorges, interpretation of vague clues, bush tracks that disappeared, weird mazes and blind gullies, and they had to work out the answers to the clue.

Later in different circumstances, elite sections of the military, police and SES tackled these same programs and often were humbled by the challenge.

> A participant reflection: "Because we were fugitives on foreign soil, we devised signals for communicating without writing or talking (any sound could give away our position). Phones became long-lost memories. We trekked to Hell Fire Gully where, like circus acrobats, we crossed a simulated steaming lava flow and an ad hoc bridge of planks and barrel pylons."

They quickly learnt that if they were cool and examined things thoroughly, they progressed faster.

Every night they were exhausted, well fed, had comfortable beds and an exciting next day that was delivering rewards.

They learnt to help each other, conquer fear, handle confusion, solve technical problems, and to use other people when they did not have all the answers. They learnt team dependence and not to leave anyone behind. They learnt all that through experiences and ensuing discussions about what was in their way to finding the Grail.

They were never taught. They became familiar with failure, excellent risk managers and created for themselves, over time, an environment where they trusted each other and experienced genuine satisfaction. The purpose written all over their faces was striking.

> "Because the season had been unusually wet and warm, the grass was an emerald carpet before us. 'Duck!' one team member yelled, spotting a CAOS vehicle on the horizon. Flat out on the earth someone groaned: 'Oh god, my face is in goat shit'. Our clandestine position nonetheless maintained, we soon reached a ravine of rushing water. With only three long pieces of rope, our route across became increasingly evident."

Their final quest last thing on the fourth day had them arriving at the settlers' cottage. Lost in their eagerness to get the Grail, they did not see the booby traps on the approaches to the shack that set off pyrotechnics to huge effect and pulled them up abruptly. They went back into a huddle. As they examined everything minutely they finally formed a plan to get the Grail.

> "Entering the hut, knowing one wrong step could trigger the sensitive alarm, my heart pounded. Inside, the hut was musty and dark. I squinted, scanning every corner. The others in before me signalled that they had spotted a bomb – it sat on a cage which encapsulated the Grail. As we surrounded it, I could feel my feet, and each separate toe, trembling in my boots. The alarm blared. We all froze. The bomb reset and we moved methodically, getting our hands through the wire mesh and lifting the Grail. When the Grail was safely in our clutches, we slipped out of the dark hut into the resplendent sunshine. The exhilaration burst out like champagne on New Year's Eve."

Back in the shearers' quarters the next day, they were each asked to write a log on what made them successful over the last days of the quest. They were then asked how they would adapt that knowledge into their lives.

They then constructed personal plans including a risk-management plan. They left us a copy. Many of their success factors listed below appear simple, but simple is the essence.

- I felt I owned my life and the goals that you gave us became mine.
- We were imbued with getting the Grail but then we saw that physically chasing down a goal was impossible without simultaneously building our team spirit and emotional smarts.
- It was fun.
- I felt I was truly accepted and valued for the first time in my life.
- You really challenged us but we were never mollycoddled.
- We had committed and genuine support from you but you never took us over.
- We had training available.
- We learnt to encourage each other.
- If I was weak at something, the team just pitched in to help me get strong, mostly mentally instead of physically.
- We listened to each other with intent.
- No-one was put down.

Their plan for the future was their bible when they left. We followed them for months after and we were always available for phone calls. Some stayed in touch for years. Some are still in touch 25 years later.

They were committed to their own change and development because, maybe for the first time, they felt so good deep down inside and they knew they could take charge of themselves.

The last question they were asked was: "What would be the single biggest factor that will cause you to regress to how you were before this adventure?". The answer, almost without exception, was "my friends will not understand the new me". But in true form they then worked out together how this could be handled while they set about their new future.

We continued those programs with young people for the next 15 years in both Australia and New Zealand. We recorded our results and were achieving about an 80% success rate in changing young people's lives.

In five days, a bunch of individual ragtag kids turned into an elite team, with no-one training them. All they had was an exceptional experience, support and themselves.

They actually found out that the quality of their existence and future was a matter they could determine. They found they needed to be instrumental in their everyday life. But they also found none of those monumental advances could be achieved alone. They needed teams of like-minded people in their lives. One of the greatest advantages of youth is that they have open minds.

It would seem that many organisations could take a steer from the youth development work described above. Work needs to be an adventure. Work needs to be a collaboration. People need to own their work.

People need encouragement to speak up and become more instrumental as many people in workplaces keep their counsel, for many reasons, and just do a job. People need genuine support. People need training at their request. People need encouragement and acknowledgement.

Most particularly, teams need to be encouraged to regularly talk about achieving the business goals while simultaneously discussing the "how to" of building team spirit and team emotional strength.

• This article is derived from life generally and many years coaching senior corporate executives and young people in self-leadership attributes.
Peter Ring, Principal, Lingk

ENHANCED FLYING

OPPORTUNITIES

Flight Lieutenant James Francis in DA40 NG VH-UEP and Wing Commander Joe Vine in VH-UEJ in the background at RAAF Richmond. Photo: FLTLT (AAFC) Kate Hobson.

WHEN NORMAL ACTIVITIES RESUME, Air Force Cadets will benefit from substantially enhanced flying training opportunities following the deployment of Diamond DA40 NG aircraft to RAAF Bases Amberley and Richmond.

Late last year, five DA40 NG aircraft were established in location at RAAF Base Amberley, and staff continuation and currency flying was conducted from December onwards. Then on 27 February, two DA40 NG aircraft were flown to RAAF Base Richmond. For the time being, one will make Richmond its home station. Two more are likely to follow when flying operations resume.

Air Commodore Gary Martin AM CSC, Director General Cadets – Air Force, announced the initiative. "The rollout of our flying training capability takes a significant step forward with the arrival in Amberley and Richmond of our new Diamond DA-40 aircraft," he said.

Those deployments coincided with the creation of two additional components of the AAFC's Elementary Flying Training School (EFTS) based at Point Cook: Amberley Flight and Richmond Flight. Flight Lieutenant Jonathon Harrington (RAAF) and Flight Lieutenant Kate Hobson (AAFC) were appointed respective Flight Commanders.

Richmond and Amberley Flights now become key components of the AAFC's national flying training effort.

In February, Cadet Air Experience (CAE) activities were conducted at Amberley and Redcliffe, with 30 cadets at each. On the weekend 7-8 March, another CAE activity was conducted at Amberley with 87 cadets. Then on the weekend 14-15 March, just before all AAFC operations began the operational pause, a large CAE was conducted at Redcliffe with 95 cadets.

By the time the operational pause came into effect, Amberley Flight had conducted powered CAE flights for a total of 242 Cadets.

"By providing this hub-and-spoke capability, the fleet of Diamond DA-40 aircraft and their great aircrew are able to bring the experiences of flying right to the AAFC Squadrons' doorsteps," said Air Commodore Martin.

"This will allow the cadets to share their excitement of flying with their

DIAMONDS OVER WARRNAMBOOL

Leading Cadet Dominic McCosh (413 Squadron) with a Diamond DA40 NG aircraft at Warrnambool airfield. Photo: PLTOFF(AAFC) Jane McDonald.

CADETS FROM NO.413 SQUADRON, Victoria started the year by participating in Pilot Experience (PEX) flights from Warrnambool airfield in the aerodynamically advanced Diamond DA40 NG aircraft, operated by the Elementary Flying Training Schoo (EFTS).

Air Force Cadets are entitled, at no cost to the cadet, to at least one instructional Pilot Experience flight each year under the supervision of a qualified flying instructor, to lay the foundation for an aviation career pathway.

The Diamond DA40 NG, leased for exclusive use by the AAFC, features modern avionics and a turbocharged jet-fuel piston engine, with contemporary

family members right there at the airfield and later at home. A truly rewarding experience for everyone involved. The continued rollout of EFTS capability is a direct result of the fantastic drive, passion and professionalism of the AOW staff and Cadet Branch – Air Force aviation operations staff."

EDITORIAL NOTE In mid-March the AAFC commenced an operational pause in all activities. After a review of the national situation, all three Cadet Service groups agreed to the suspension of all ADF Cadet face-to-face activities until further notice. The activities reported here took place before the operational pause. All members of the AAFC look forward to the resumption of normal activities as soon as it is safe to do so.

navigation and flight control systems. Commander AAFC, Group Captain (AAFC) Mark Dorward said: "The Diamond DA40 aircraft was chosen to provide a safe, comfortable and efficient means of positively inspiring young cadets' interests in the aerospace and technology industries".

Leading Cadet Dominic McCosh said his PEX flight was" absolutely amazing". "The best part was getting full control over the plane, mainly having to point up, point down and turn."

EFTS is a subordinate unit of Aviation Operations Wing, AAFC, which has the aim of delivering flying pathways through gliding and powered flying experiences and training.

IN GRANDFATHER'S FOOTSTEPS

ABOVE CSGT Chevvy Dolan prepares for an air experience flight from Gawler Airfield in a Cessna Skyhawk C172-S. Photo: FLGOFF (AAFC) Paul Rosenzweig.

CADET SERGEANT CHEVVY DOLAN from No.608 (Town of Gawler) Squadron enjoys the ceremonial aspects of life in the AAFC, but he really just wants to fly. His intention is to serve in the RAAF like his grandfather, Kenneth Dolan, who completed 22 years of uniformed service.

Sergeant Kenneth Dolan was an armament fitter and an Explosive Ordnance Disposal technician and instructor. He joined the Air Force in 1966 and served with No.481 and No.76 Squadrons at RAAF Base Williamtown. He saw service overseas at RAAF Butterworth with No.77 Squadron, then had postings to No.11 and No.492 Squadrons at RAAF Base Edinburgh, and was promoted to Corporal in 1976.

From 1979 to 1984 he was an Instructor at the RAAF School of Technical Training at RAAF Base Wagga, and was promoted to Sergeant in 1981. His final postings were with No.481 Squadron (1984-86) and No.2 Operation Conversion Unit, Williamtown until retiring in 1988.

Late last year, Air Force Cadets from Adelaide's northern squadrons had the opportunity to enjoy a non-instructional Cadet Air Experience flight from Gawler airfield, arranged by No.906 Aviation Training Squadron and using conventional tricycle configuration Cessna Skyhawk aircraft operated by Adelaide Biplanes.

The experience had a profound effect on CSGT Dolan. "During this experience, my mindset definitely changed on the aspect of flying. I have never thought flying would be such an amazing experience and opportunity, however this activity definitely changed my thoughts.

"Being in the air, flying, is more than a hobby and sport; flying is pure desire and passion which definitely fills a lifetime experience."

He noted that while with 2OCU, his grandfather had flown in one of the first McDonnell Douglas F/A-18B fighters delivered to Australia. The first 14 aircraft were all allocated to 2OCU to transition pilot and technical crews to the Hornet.

Flying Officer (AAFC)
Paul A Rosenzweig
Public Affairs Officer,
Aviation Operations Wing, AAFC

ADAPTING TO CHANGE

ABOVE A cadet from Forest Lake Squadron in Queensland takes part in an education class online during the COVID-19 shutdown.

IN MARCH OF THIS YEAR, the Australian Air League (AAL) along with many other organisations made the difficult decision to pause all face-to-face activities due to COVID-19.

In its 86-year history, the Air League has been through hard times before and has pulled through. In its early days, the Air League faced the uncertainty and disruption of World War II. Many of the organisation's officers left to serve our country, leaving a small number of dedicated people to keep the organisation going. Taking inspiration from those people, we can prevail.

Even though physical Squadron activity has been curtailed we can use technology to stay in touch and keep some of the activities going. Many Squadrons continue to meet virtually and are using their creativity and initiative to try out new ideas.

Forest Lake Squadron in Queensland now meets weekly online with a full Squadron complement joining in most evenings. They have even managed to incorporate their Squadron fall-in into an online format, with cadets coming to Attention before their web cams.

A full program of education classes takes place each week, and instructors deliver PowerPoint lessons online. A virtual online parade provides the opportunity to connect with fellow cadets to sustain esprit de corps and support general wellbeing.

The AAL also acknowledges these are unusual and difficult times for members and their families. We have been able to help by waiving the annual subscriptions for 2020. While subscriptions are a major component of the Air League's revenue (it is fully self-funded), we hope this measure will help as many members as possible to be involved with the AAL over the coming months.

CADET OF THE YEAR

ON 1 FEBRUARY, candidates for the Australian Air League Cadet of the Year award flew in from around Australia for the selection of the prestigious award.

Candidates met with Federal staff in Sydney where they went through a rigorous process that led to the final selection. The candidates were: Sgt Preethika Ganiger (Port Adelaide SA); Cpl Adam Glowacki (Sutherland Shire NSW); Cpl Callum Langille (Hervey Bay Qld); Sgt Hayden Borchard (Gawler Airfield SA); and Sgt Chithi Gunatilake (Waverley Vic).

As usual, it was a tough decision for the selection panel, with all of the candidates impressing in one way or another. They represented their squadrons and groups well, and their families in particular should be proud of their efforts.

Although she was the only female candidate able to attend on the day, Sgt Ganiger was still expected to meet the high standard required to be named Female Cadet of the Year, a standard she met comfortably. Cpl Glowacki saw out a close competition to become the Male Cadet of the Year.

Presenting the awards, Chief Commissioner James Dixon MSA said: "The standard this year was very high, and all nominees were impressive. My commiserations to the other nominees. The Federal team recognises your achievements and you should be proud of your efforts. You are a credit not only to your Squadrons and Groups, but also to your families."

LEFT Chief Comr James Dixon with the 2020 Cadet of the Year nominees.

Word from AN ADVOCATE

CASE LAW AND A CONDITION OF SERVICE.

A **KEY THEME EXPRESSED** in the Productivity Commission report, *A Better Way to Support Veterans*, is to move the beneficial intent of veterans' legislation closer to the entitlements in market-based workers' compensation schemes. Air Force Association (AFA) has opposed that proposal vigorously and engaged Alliance of Defence Service Organisations (ADSO) support in doing so. We have history to support our stance. Two parallel systems of entitlement have existed for at least 90 years. Veteran-specific entitlements were legislated first in the Australian Soldiers Repatriation Act in 1920 and workers compensation for other Commonwealth employees stems from 1930.

The Productivity Commission's recommendations are consistent with history. The Last Shilling (an excellent read) traces the evolution of veterans' legislation and its administration by DVA. It relates the efforts made by governments since at least the 1980s to reign in veterans' entitlements. At the risk of sounding paranoiac, a recent appeal in the Administrative Appeals Tribunal (AAT) draws attention to another potential risk for veterans' administration.

Unless you have had a claim rejected, you may not be aware that the matter can be appealed to the VRB (Veterans Review Board) and/or the AAT and then the court system. The successive levels of appeal are the Federal Court, the Full Court and the High Court. Applications for leave to appeal can be made either by a veteran/dependent or by the Repatriation Commission (Veterans' Entitlements Act – VEA) or the Military Rehabilitation and Compensation Commission (Safety and Military Rehabilitation and Compensation Acts – DRCA and MRCA). A court's judgement is an authoritative interpretation of the legislation and creates a precedent that is applicable as 'case law' across a wide range of legislation.

Two recent cases heard by the courts illustrate how important judgements are for ADF conditions of service. The first involved a sailor sustaining an injury while riding a moped on shore leave during and an overseas deployment. The second involved two soldiers, on short leave while deployed on a major exercise, walking back to their encampment when they were struck by a car. One soldier was killed and the other seriously injured. Both cases were found entitled to compensation.

In the sailor's case, the issue in dispute is whether the activity in which he was engaged at the time of the accident was appropriate to the conditions of shore leave.

The courts have established that entitlement to compensation rests on the 'place' at which the injury occurred and/or the 'activity' in which the person was engaged at the time of injury. Two recent court judgements have liberalised the established legal principle. Now, entitlement to compensation depends on the way in which the employer 'required' the injured person to be in the 'place' and 'activity'.

By this principle the sailor should be entitled to compensation as he was granted shore leave by the ship's commander. The Commission is, however, taking the position that the sailor's 'activity' removes his entitlement. That is to say, the Commission maintains that Navy did not 'require' the sailor to ride a moped. In the soldiers' case, the Army had provided transport. If the Commission had taken the same position, the soldiers would have no entitlement because their activity was 'walking' rather than taking the 'required' transport.

Which bring us to the broader significance of the Productivity Commission direction for all serving members. The Commission's current stance has potential ramifications for ADF conditions of service. The ADF Pay and Conditions Manual (PACMAN), allows a commander to grant 'short absence from duty to rest and recover from long or unusual duty'. By long practice, the local commander promulgates places and activities that are 'off-limits' and allows common sense and discretion to guide those that are acceptable. If the Commission is successful at the AAT (or on appeal in the courts later), its position suggests that the means of transportation on short leave and recreational activity would be restricted to those provided by the ADF or as stipulated by the local commander.

Along with the civil freedoms that personnel forego on enlistment, another – the right to reasonable rest and recreation activities while on authorised leave – would be lost. This will be of concern to all serving personnel and should also be a concern for all ESOs on behalf of the ADF command structure. Be assured that AFA is pulling out all stops to ensure the existing and long-standing conditions of service are maintained. In this case we are providing robust support to the sailor's appeal. With the help of ex-RAN personnel, AFA advocates are mounting that appeal.

The entitlements of veterans whose eligibility is covered by all three veteran rehabilitation and compensation Acts, another key area of misunderstanding and concern to current serving members, will be outlined in the spring issue of *Wings*.

• The thoughts expressed in this article are those of the writer and do not purport to be AFA policy.

JOHN ALEX SEATON MBE

21 April 1927 – 13 March 2020

JOHN ALEX SEATON was born in Launceston, Tasmania and attended Launceston Grammar School where he excelled at all sports and was a keen member of the school cadets. He moved to the warmer climate of Queensland after a bout of pneumonia and found work with the Shell company. He moved to Rabaul in 1949 on a two-year contract. Rabaul lacked decent facilities and the accommodation was very basic but John and other ex-pats managed to have fun and the two years passed quickly.

At the start of the Korean War John applied to join the RAAF while working for Shell in the Territory of Papua New Guinea (TPNG) but was not accepted until his contract with Shell had expired in 1951. He started flying training with No.8 Pilots Course in January 1952 at Archerfield, Queensland (No.1 ITS), then on to Uranquinty, NSW (No.1BFTS) and finally to Point Cook (No.1 AFTS) where he graduated in December 1952. Of the 37 who graduated, 15 went to Korea.

On graduation John was posted to No.2 (F) OTU, Williamtown, flying P51 Mustangs and Mark 30 Vampires before being posted to No.77 Squadron at Iwakuni, Japan and then to Kimpo, Korea, arriving there March 1953. At that time the squadron workload was fairly intense; on 15 June the Squadron broke its own record by flying 88 sorties in a single day, including solo night armed reconnaissance and interdiction missions.

John completed 49 missions during his time in Korea. After armistice was declared on 27 July 1953 he remained in Korea until 21 October and had the pleasure of welcoming his best friend, Don Pinkstone, back to the Squadron on his release as a Prisoner of War. John moved to Iwakuni to assist Gus Goy at the Conversion Unit for a few weeks.

After returning to Australia in November, he was posted the following February to No.11 Flight Instructors Course at East Sale, graduating as a Qualified Flight Instructor 7 June of that year and a posting to No.1 BFTS, Uranquinty as instructor on DH82, Tiger Moth and Wirraway.

LEFT John sporting his famous 18cm moustache.

RIGHT John Seaton with his best friend Don Pinkstone after his POW release at Koesong. Photo: R. Bastin.

After 18 months at 'Quinty', John volunteered for the Antarctic Flight (Australian National Antarctic Research Expedition) and was posted to that unit on 14 November 1955. He spent six weeks at Point Cook learning all about Beavers and Austers (wheels, skis and floats) before boarding the polar exploration vessel *Kista Dan* which left Melbourne 28 December. Mawson at the time was a primitive set up with warm, but very basic, accommodation. Having a hangar, which they assembled from kit form, meant flying could continue all year.

John spent 15 months away from Australia, including 12 months at Mawson doing a wide range of flying duties – photographic, transport of personnel, exploration, depot laying, etc. While on an exploratory photographic flight on 28 November 1956, he had the amazing good fortune to find the Lambert Glacier, the largest glacier in the world. If ever you are in eastern Antarctica keep an eye open for a prominent domed peak, one of the Amery Peaks, in the Prince Charles Mountains. It is Mount Seaton, and a little further away you will find the Seaton Glacier. Both formations are named after John Seaton.

In June 1957, on his return from Antartica, he was posted to 75 Squadron, Williamtown. At the end of the year John resigned from the RAAF to take up a job with Qantas. His six years with Qantas included two and a half years in TPNG, followed by three and a half years on B707 out of Sydney. When the opportunity presented itself

to join Solomon Island Airways as Chief Pilot and ultimately general manager John and Barbara moved to Honiara in October 1966. It remained their home for 10 years. Airfields were built and the airline became a very viable concern.

In 1975 John was awarded the MBE for service to the Solomon Islands and the people of the Solomons. In November he and Barbara travelled to England for the investiture by Queen Elizabeth at Buckingham Palace. Describing flying in the Solomon Islands, John said: "Every day was a gem for flying up there. Good scenery and you didn't have to fly known routes every day." Of all the places John had flown he thought the Solomon Islands was possibly his favourite, with Antarctic a close second.

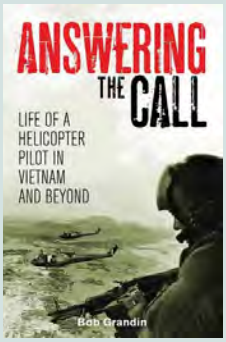
After Barbara and John moved back to Sydney for family educational commitments, John flew part-time with Aquatic Airways at Palm Beach until June 1985. His last flight in command was 16 June 1985 in a Cessna 150 at Warnervale, NSW having flown 27 different types of aircraft over 34 years.

After the career in aviation, he was employed in the building industry and in small business management, retiring finally aged 72. But retirement for John certainly didn't mean feet up and watching the sunset each evening. He and Barbara were active members of 77 Squadron Association and John was involved in various charities until fairly recently. In addition to his MBE, John was also awarded the Polar Medal and the Air Medal (US).

John Alex Seaton lived life to the full and those who knew him are all the richer for that. He will be missed by all who had the privilege of knowing him.

He is survived by his wife Barbara, daughters Peta, Nicola and Tania and grandchildren Unity, Samuel, Henry, Bradley and India.

2021 RAAF HERITAGE AWARDS



The RAAF Heritage Awards is a literature competition designed to enhance the records of the Air Force and foster interest in its history and heritage.

The 2021 round will seek entries that highlight areas of the Air Force's history that have not been thoroughly covered in the past. The focus will be on Cold War activities and Southeast Asia Treaty Organization involvement, United Nations commitments, and post-war transitions as a period of force regeneration and rebalance.

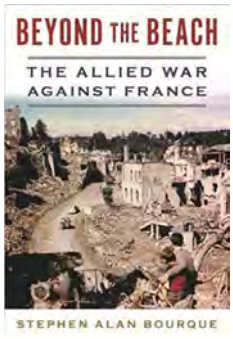
Air Force Historian Martin James says that since the awards' inception, the Air Force has published historical works of national significance, acknowledging veterans' service and achievements.

The winner of the last RAAF Heritage Awards, in 2018, was former Flight Lieutenant Bob Grandin with *Answering the Call: Life of a Helicopter Pilot in Vietnam*, published in 2019.

In 2021, the three prize categories include $25,000 for first place, $15,000 for second place and $10,000 for third.

Submissions are to be received no later than midnight 30 June 2021, with winning manuscripts published over the following two years. Further details, including full conditions of entry, can be obtained from airforce.history@defence.gov.au.

ABOVE RAAF Heritage Awards 2018 winning work, *Answering the Call: Life of a Helicopter Pilot in Vietnam*, published in 2019.



REVIEW BY Bob Treloar

BEYOND THE BEACH:
The Allied War Against France

By **STEPHEN ALAN BOURQUE**
Naval Institute Press, RRP $US34.95

BEYOND THE BEACH addresses the Allied bombing campaign against German forces in France during World War II. The author focuses on the two phases of the Allied bombing campaign: attacks primarily against airfields, ports and industry (strategic bombing campaign); and the bombing effort for the D-Day landings when rail yards, bridges and towns inland from the invasion beaches were targeted (tactical bombing campaign).

In the strategic bombing campaign, the author addresses the issue of casualties and questions why official histories are silent on this matter, noting a lack of extant documented history outside France regarding some 60,000-70,000 French men, women and children killed during the campaign to liberate their country.

The use of strategic bomber forces to support D-Day landings resulted in massive damage to French towns, killing many of their occupants.

Historians have virtually ignored the bombing of the invasion beaches and the surrounding environs in what was the greatest air campaign in history when 1130 aircraft attacked one beachhead battery and 12,600 aircraft attacked targets in France and Belgium. Appreciating the size of the bombing forces enables the reader to better understand the scope of damage inflicted on the French population.

Beyond the Beach is well-balanced but written with passion, and it challenges our contemporary view of the history of D-Day that ignores the bombing campaigns that contributed directly to the success of the landings and subsequent breakout of forces into France.

Dr Stephen Bourque is a professor emeritus at the United States Army Command and General Staff College.

REVIEW BY Bob Treloar

THE FORGOTTEN FEW:
77 RAAF Squadron in Korea

By **DOUG HURST**
Allen & Unwin, RRP $29.99

THE KOREAN WAR is often called the Forgotten War and the title, *The Forgotten Few,* is entirely appropriate. In June 1950, 77 Squadron was in Japan, about to go home. Instead, they went to Korea, flying Mustang fighters as part of a UN force helping South Korea fight the invading communists from the north. This book covers the three years 77 Squadron spent in the Korean War. It concentrates on operations and the effect that factors such as climate, logistics and training had on those operations.

After re-equipping with twin jet Meteor aircraft, five were quickly lost in early battles with MIGs flown by experienced Russian pilots deliberately targeting the Meteors for political reasons. The Meteors were assigned to ground attack, airfield defence and bomber escort squadron.

The MIGs subsequently encountered were flown by regular Chinese pilots and the squadron downed four of them without loss, to finish the war five-all against the MIG-15. However, overall No.77 Squadron lost more personnel in Korea than it did in the South West Pacific in WWII.

The Forgotten Few is well written and draws the reader into the battlefields of aerial conflict and air attack against advancing enemy ground forces, while detailing the misery of mud, slush and snowstorms endured by the Squadron.

Doug Hurst was a RAAF navigator for 33 years and retired as a Group Captain. He flew for 20 years, mostly in maritime squadrons and as an instructor. In retirement he has written numerous articles and seven books.

REVIEW BY Greg Weller

SPITFIRE LEADER:
Tragic Battle of Britain Hero

By **DENNIS NEWTON & RICHARD BUNGEY**
Amberley Publishing, RRP $49.95

ROBERT BUNGEY WAS A YOUNG South Australian who gained his wings at Point Cook in 1937 before going to Britain. He flew Fairy Battles in the Battle of France with 226 SQN (RAF) and was one of only four pilots from the squadron to survive the deadly German onslaught in 1940. Returning to England just in time for the Battle of Britain, he converted to Hurricanes flying with 145 SQN (RAF).

In June 1941 he was given command of 452 SQN, Australia's first spitfire squadron, and developed it into one of Fighter Command's most successful squadrons.

Having completed three operational tours in two years, Bungey returned to Australia in May 1942. Reunited with his British wife, he met his 14-month-old son for the first time. Less than four weeks later, his wife tragically died. Ten days after that, Bungey's body was found on an Adelaide beach with his son alive beside him. Grief stricken, the great air ace had gone for a walk, destined not to return.

Spitfire Leader, coauthored by Richard Bungey, the young son found on the beach beside his father, details Bungey's story. While it provides a fascinating look at the sacrifices of the men who flew in critical air battles, its enduring theme is stress in war. It is a tragic story that, unfortunately, we continue to hear. The stress of combat is not new, but there are improving avenues of support and understanding. A key element to better understanding is through stories such as *Spitfire Leader*, told from a uniquely air perspective. A compelling read.

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