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Contents

'I am a tragic. I think the guys I work with probably call me an aeroplane nerd.'

FW 190 PILOT CRIS MAYR p94

Singapore Airlines takes its first Boeing 787-10 p50

A grand design – Cessna's Grand Caravan EX p64

A vision of the future? How the Airbus A350, one of two contenders for Qantas's Project Sunrise requirement, might look in the Australian flag carrier's livery. ARTWORK BY MARK PHILIPP VEENENDAAL

Bridging the gap for women in aviation p38

NEXT ISSUE ON SALE MAY 31


Virgin
B

Locked On

Brunei Government Boeing 747-8 V8-BKH departs Sydney after visiting for the ASEAN summit in mid-March.

SETH JAWORSKI

Locked On

Focke-Wulf Fw 190 VH-WLF and Hawker Hurricane VH-JFW formate for the camera ahead of the Scone Warbirds Airshow in late March. MARK JESSOP


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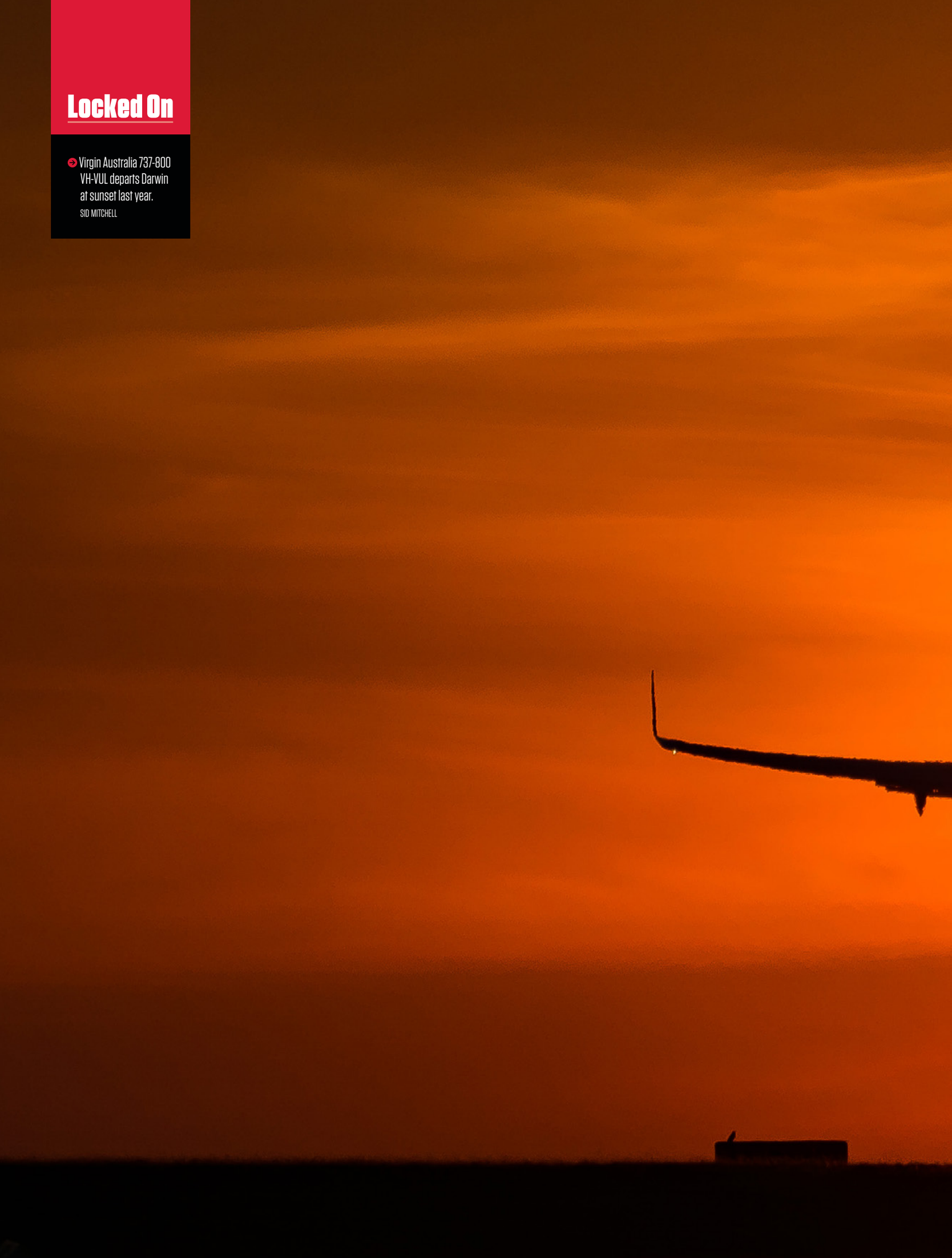
Locked On



Virgin Australia 737-800 VH-VUL departs Darwin at sunset last year.
SID MITCHELL

NOTAM
JORDAN CHONG

Bridging the gap

Attracting more women into aviation

On May 7, Merren McArthur will join a rare club when she begins her job as Tigerair Australia's new chief executive.

The appointment puts McArthur among only a handful of women to run an airline anywhere in the world.

Beyond that, it also offers hope and encouragement to the thousands of women around the world with a passion for aviation that there is no ceiling to their career in the sector.

"The more women we get into CEO roles the more things will change," McArthur told the *Australian Financial Review* on the day her appointment was announced.

Reading through our stories of women in aviation in this month's edition, one cannot help but be inspired by the female role models in the industry.

And as Solange Cunin's piece "Looking Up" notes, having strong positive role models and mentors is very important when trying to choose a career in aviation.

Those role models also need to be presented to as wide an audience as possible through initiatives such as the social media campaign from Aviation/Aerospace Australia to coincide with International Women's Day (see #givegirlswings).

"We are trying to make it a bit more approachable to young girls who might see things on social media and know that they can do any of these things, whether it be a pilot or an aircraft maintenance engineer or an aerospace engineer," Aviation/Aerospace Australia executive director Tamara Bell explained.

Inspiration is only half the battle though. There needs to be opportunities for women and as you can read elsewhere in the magazine, Australia's major airline groups Qantas and Virgin Australia, as well as aerospace giants such as Airbus and Boeing, are working hard to develop and expand the pathways for qualified aviators to a career in the industry.

Importantly, the senior leadership of those companies, from Qantas chief executive Alan Joyce down, have publicly committed to increasing the number of women in their ranks.

Why is this important? Well, all the industry experts agree aviation is growing, fuelled by the expanding middle classes in countries such as China and India, as well as new business models such as LCCs that have made air travel so much more affordable for everybody.

And the age profile of those in aviation is getting older. That means the engineers that build the aircraft, the technicians who maintain them, and the pilots who fly them are getting closer to retirement.

So where will the next generation of aviators come from? Continuing to recruit from only half the population is unlikely to cut it.

Across the industry currently, about five per cent of pilots are women, while the figure is lower for technical jobs such as aircraft maintenance engineers.

As John Walton reports in his story "Bridging the Gap", the task of attracting more women to typically male-dominated areas represented the greatest challenge facing Australia's aviation industry as it looks to meet the demand for future years.

McArthur's professional life began as a lawyer at a law firm in Melbourne and has included working as chief advisor for Rio Tinto Iron Ore in Perth and as deputy state solicitor for Western Australia.

And since joining Virgin Australia in 2008, McArthur has gone on to become the airline group's longest-serving member of its executive committee, holding roles such as general counsel, group executive for alliances, network planning and revenue management, and setting up and running its cargo business.

The incoming Tigerair Australia boss described her career to date as having the courage to grab those opportunities when they were presented to her, even if it might have seemed a "little bit scary and a little bit out of reach".

"I think women can be their own worst enemies in terms of their lack of confidence," McArthur told Richard Triggs' *The Arete* podcast prior to her Tigerair Australia appointment.

"So they are the ones in particular I would encourage to really push yourself outside of your comfort zone.

"There is so many ways and tricks that I have developed along my career about helping myself not feel nervous about challenging things. One of them is really just, now especially with Google, just getting in and doing all the background work.

"You can find out the answer to most things, or you know people who you are connected with around the organisation and who you feel safe with, to be able to ask the dumb questions so that when you are sitting in a meeting and you have to present on the topic you feel confident because you have already done the homework."

It took almost 70 years for the International Air Transport Association (IATA) to have its first female member on the board of governors when Sizakele Mzimela, then chief executive of South African Airways, was appointed in 2011. Let's hope headlines about women in aviation such as "Bridging the Gap" are consigned to history over the next seven decades.

'Inspiration is only half the battle though.'

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WA

AUSTRALIAN AVIATION

Debrief

News briefs from across aviation

The engine that will exclusively power Boeing's new 777X has completed its first test flight. GE Aviation's 747 flying testbed with the GE9XTM engine on the wing took off from Victorville in California at about 1040 on March 14. GE AVIATION

AIRLINER NEWS

Embraer has officially delivered its first E190-E2 to launch customer Norway-based Wideroe. The ceremony took place at Embraer's São José dos Campo headquarters in Brazil on April 4. The aircraft, PR-EFL, was then ferried to Norway and is scheduled to begin revenue service on April 24. Wideroe has configured the aircraft with 114 seats in a single-class layout. It is the first jet aircraft in the airline's 84-year history.

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The smallest member of **Boeing's 737 MAX** narrowbody airliner family, the 737 MAX 7, completed its first flight on March 16. The aircraft, N7201S, took off from Boeing's Renton facility at 1017 local time, landing at nearby Boeing Field three hours and five minutes later. Boeing test and evaluation captains Jim Webb and Keith Otsuka took the aircraft through a series of flight controls tests, as well as checks of its systems and handling qualities. "Everything we saw during today's flight shows that the MAX 7 is performing exactly as designed," said Boeing Commercial Airplanes' vice-president and general manager of the 737 MAX program, Keith Leverkuhn. Certification was planned to occur in 2019.

–

Portuguese charter and defence aviation services company **Hi Fly** has become the first airline to acquire an Airbus A380 in the secondhand market. The company said an A380 will join its fleet in mid-2018 and be ready to fly for airlines around the world on a wetlease basis. Hi Fly's A380 is a secondhand aircraft that first flew for Singapore Airlines and was returned to lessors in late 2017. The company plans to seat 471 passengers comprising 399 passengers in the main deck and 12 first class and 60 business class passengers on the upper deck. Hi Fly will be the first Portuguese and fourth European airline to operate the A380.

QANTAS GROUP NEWS

Airbus said at the Aircraft Interiors Expo in Hamburg on April 10 Qantas would be the launch customer for its Airbus A380 "Cabin Flex" solution which enables up to 11 premium economy seats or seven business class seats to be added to the upper deck of the aircraft thanks to a new cabin door area arrangement on the upper deck. Airbus said the A380 Cabin Flex made available the extra space for additional seats by allowing the upper-deck at Doors 3 to be deactivated. "The enhancement is available either for line-fit or retrofit. Qantas has chosen to be the launch operator of the A380 Cabin-Flex on its current A380 fleet from mid-2019," Airbus said in a statement.

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Jetstar group chief executive Gareth Evans told the Routes Asia 2018 conference in Brisbane on March 18 the low-cost carrier's Australian operation planned to operate the Boeing 787-8 alongside the forthcoming Airbus A321neoLR on some Australia-Bali routes. Jetstar has earmarked the A321neoLR for both Australian domestic flights and services to Bali from Melbourne (2,363nm) and Sydney (2,495mm).

That would free up Boeing 787-8s currently serving Bali to be redeployed to other destinations. However, Evans said the 787s would not disappear completely from the Bali route, ensuring that Jetstar would continue to offer a business class product to the popular Indonesian tourist destination. "What we are not doing is we are not replacing the 787s to Bali," Evans said. "They will still have 787s operating to Bali and we will still offer the configuration and the offering that we do today."

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Still on **Jetstar**, the LCC plans to commence nonstop flights between Brisbane and Uluru from August 3. The Qantas-owned low-cost carrier (LCC) will serve the new route three times a week, with flights scheduled for Mondays, Wednesdays and Fridays. Flight JQ667, to be operated by Airbus A320 equipment departs Brisbane at 0600, arriving at Uluru at 0910. The reciprocal JQ668 takes off from Uluru at 1000 for a 1325 landing back in Brisbane.

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Air services provider **dnata** has agreed to purchase Qantas's catering businesses for an undisclosed sum. The transaction, announced on April 11, involved Qantas selling its Q Catering (based in Brisbane, Melbourne, Perth and Sydney) and frozen food maker Snap Fresh to the Emirates Group-owned dnata. The deal required Australian Competition and Consumer Commission (ACCC) approval. The sale also included an agreement for dnata to supply catering for Qantas flights for an initial 10-year period, while the airline would continue to work with key suppliers in menu design and development such as Neil Perry's Rockpool.

VIRGIN AUSTRALIA GROUP NEWS

Virgin Australia's first Sydney-Hong Kong nonstop flight will take off on July 2. The airline's daily nonstop service will be operated by Airbus A330-200 widebodies featuring 20 business class seats with direct aisle access for every passenger and 255 seats in economy at eight abreast. It will compete against Cathay Pacific, which has four flights a day, and Qantas, which has two flights a day, on the route. Virgin Australia's Sydney flights have been scheduled as a morning departure from Sydney, arriving in Hong Kong in the early evening. After about two hours on the ground, the aircraft returns to Sydney as an overnight service. The start of Sydney-Hong Kong will also coincide with Virgin Australia's Melbourne-Hong Kong service dropping from daily to five times weekly.

The Boeing 737 MAX 7 completed its first flight on March 16. BOEING

Also, Virgin Australia has named veteran aviation executive **Merren McArthur** as the new chief executive of the airline group's low-cost carrier (LCC) unit Tigerair Australia. The announcement on March 21 said McArthur would begin her new role on May 7. McArthur has been at Virgin Australia since 2008, when she joined the company as its general counsel and later as group executive for alliances, network planning and revenue management. Her most recent role is as group executive for Virgin Australia Regional Airlines (VARA) and Virgin Australia Cargo. "Merren has done an outstanding job in transforming and strengthening both the VARA and Cargo businesses and I am confident that she will make an invaluable contribution in this new role," Virgin Australia chief executive John Borghetti said in a statement.

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In other news, Virgin Australia group executive for airlines **Rob Sharp** told the Routes Asia 2018 conference in Brisbane on March 19 the airline's order of 40 Boeing 737 MAX narrowbodies provided the flexibility to decide on which was the best aircraft for its domestic and

Embraer delivered its first E190-E2 to launch customer Widerøe on April 4. EMBRAER

China Airlines' Australian network has become an all-Airbus A350-900 operation. BRIAN WILKES

international network depending on market conditions. "There are a number of variants of the MAX. They have different route dynamics and as we look at future route options, we can look at the variants that make sense for our customer needs and our network," Sharp told delegates in response to a question. "We have set up internally our steering committees and all the effort that is needed to actually get ready for a new aircraft type. This new technology is actually very much suited for fuel efficiency. It's new product on board so that will be a great addition to the fleet."

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Finally, Virgin Australia plans to begin **a new Brisbane-Alice Springs service** from June 19. The twice-weekly offering will run on Tuesdays and Thursdays and be operated by Alliance Airlines with Fokker 100 and Fokker 70 jets on behalf of Virgin Australia. The flights have been scheduled as a morning departure from Brisbane, with VA1023 arriving at Alice Springs at 1305. After about 35 minutes on the ground, the reciprocal VA1026 takes off for Brisbane, touching down in the Queensland capital at 1700.

Virgin Australia has named Merren McArthur as the new chief executive of the airline group's low-cost carrier unit Tigerair Australia. VIRGIN AUSTRALIA

AIR NEW ZEALAND NEWS

Air New Zealand has moved quickly to announce plans to expand its schedule on the Tasman after its alliance with Virgin Australia ends in late October (see separate story). According to the Airline Route website, which publishes flight schedules loaded into global distribution systems, Air New Zealand will resume nonstop flights on two new routes – Brisbane-Queenstown and Brisbane-Wellington – as well as add extra frequencies on trunk routes such as Auckland-Sydney, Auckland-Melbourne and Auckland-Brisbane. There are also plans to boost its schedule from Christchurch to Brisbane and Melbourne and seasonal increases on Queenstown-Sydney and Auckland-Gold Coast.

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Still on Air New Zealand, the airline is calling for **tougher penalties** for the misuse of unmanned aerial vehicles, or drones, after one of its flights was involved in a near miss while approaching Auckland Airport for landing. Flight NZ92 from Tokyo Haneda, operated by Boeing 777-200ER ZK-OKF, was about five metres from a drone during its descent into Auckland on March 25. Air New Zealand chief operations and integrity standards officer Captain David Morgan said thankfully for all concerned an inspection of the aircraft showed no contact with the engine. "It's clear the time has now come for tougher deterrents for reckless drone use around airports to safeguard travellers, including imposing prison terms in the case of life-threatening incidents," Captain Morgan said.

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Also, Air New Zealand will join a select number of airlines in the **7,000nm club** from November 30 2018 when it commences nonstop flights between Auckland and Chicago O'Hare International Airport. The new route will be served three times weekly with Boeing 787-9s that feature Air New Zealand's premium-heavy configuration of 27 seats in business, 33 in premium economy and 215 in economy for a total of 275. At 7,112nm, Auckland-Chicago will be the airline's longest nonstop route measured by the Great Circle distance and its first of more than 7,000nm. Currently, there are 21 routes served by 12 airlines with a Great Circle distance of more than 7,000nm. Chicago will be Air New Zealand's fourth destination on the North American mainland alongside Houston, Los Angeles, San Francisco in the United States and Vancouver in Canada. The airline also flies to Honolulu, Hawaii, and Buenos Aires, Argentina in South America.

AIRLINE NEWS

Jetgo has commenced ticket sales for its nonstop Brisbane-Karratha flights scheduled to begin on June 25. The route will be operated twice a week with Embraer E190 regional jets configured with 98 seats in a two-class configuration. The initial schedule from June 25 to September 21 has Brisbane-Karratha flights operating

on Mondays and Thursdays, departing at 1430 and arriving at 1730. The aircraft will then overnight in Karratha before taking off at 0700 on Tuesdays and Fridays, arriving in Brisbane at 1330. From September 24 onwards, the schedule shifts to Brisbane departures on Monday and Wednesday and Karratha departures on Wednesday and Friday. Jetgo also planned to extend its Brisbane-Karratha flights to Singapore from late September. However, the airline said in early April "considerably more work is needed before these flights can commence".

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Fiji Airways chief executive Andre Viljoen said the rising cost of fuel will be one of the airline's major challenges for 2018 after posting a fourth straight year of record profit in calendar 2017. The airline group, which covers Fiji Airways, Fiji Link and other subsidiaries, reported profit before tax of FJ$95.8 million (A$61.3 million) for the 12 months to December 31 2017, up 13.4 per cent from the prior corresponding period. "Fuel prices will continue to be a challenge for all airlines and we will not get complacent with the fiscal discipline required to meet our financial targets," Viljoen said. It was the fourth year in a row the company posted a new record high full year profit before tax.

–

Cathay Pacific has posted its first back-to-back full year loss since the airline was established in 1946 as intense competition hit the bottom line, including on its Australian routes where demand was weak. The airline reported a net loss of HK$1.259 billion (A$207 million) for the 12 months to December 31 2017, a deterioration from a HK$575 million loss in the prior year, representing Cathay's biggest loss in nine years and only the fourth annual loss in its history. Cathay Pacific said the performance of its South-west Pacific network, which covers Australia and New Zealand, was below expectations with demand weak. "Increased capacity from Mainland China, Hong Kong and Australian carriers put pressure on yield and the number of transit passengers," the airline said.

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In other Cathay Pacific news, the airline is planning to add **a sixth weekly Adelaide-Hong Kong flight** from October and introduce a split schedule with early afternoon departures from Adelaide on Wednesdays, Fridays and Sundays and evening departures on Tuesdays, Thursdays and Saturdays. All flights are operated by Airbus A330-300s featuring 39 business class seats with direct aisle access for every passenger, 21 premium economy seats at seven abreast and 191 economy seats in a 2-4-2 layout for a total of 251 seats. Cathay Pacific said the new schedule would offer more convenient connections to popular locations in North Asia, China, North America and continental Europe, including Cathay Pacific's new Dublin route.

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China Airlines' Australian network has become an all-Airbus A350-900 operation following the upgauging of its Brisbane and Melbourne services to the next generation widebody in late March. Brisbane received its first China Airlines A350-900 service when CI53, operated by B-18901, touched down at about 1030 local time. A short time later, CI57, operated by A350-900 B-18909, landed at Tullamarine a little after 1200. China Airlines commenced A350-900 flights to Australia in December 2017, when it upgauged the Taipei-Sydney route. The airline has said previously the replacement of the A330-300s with the A350-900 on its Australian routes was part of efforts to win passengers in this country travelling to Europe via its Taipei hub.

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Embraer has lost another airline operator in Australia with **Cobham Aviation Services** confirming it has parted company with its E190 regional jet after three years of operations. The aircraft, VH-NJA, left Australia for Europe via Indonesia on February 24, and landed in the Polish capital Warsaw on February 27. Cobham Aviation Services said VH-NJA had been returned to its lessor. Cobham took the E190 in 2014 to service its contract with petroleum giant Chevron for its Gorgon project off north-west Western Australia. The contract with Chevron is now being serviced by RJ100s.

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Canberra Airport is offering a $600,000 incentive to Qantas and Virgin Australia to reduce flight cancellations on flights to and from Sydney. The airport said it would pay $100,000 a month over the next six months to the airline with a cancellation rate on Canberra-Sydney at or below the national average for that month. If both carriers come in below the national average, then the airline with the lowest number of cancelled flights will get the monthly incentive. "We are prepared to put our money where our mouth is to encourage airlines to stop the practice of cancelling flights and increase transparency about why flights are being cancelled," Canberra Airport managing director Stephen Byron said in a statement. "All we want is a fair go for our passengers who do not deserve a cancellation rate worse than what other travellers get around the country, just get us back to the national average."

–

Virgin Australia alliance partner **Etihad Airways** will end its Abu Dhabi-Perth nonstop flights on October 1. The route was operated daily with Boeing 787-9s until April 14, when it was downgauged to Airbus A330-200 equipment. The end of flights between Abu Dhabi and Perth leaves Etihad Airways with three Australian destinations in its route network – Brisbane (daily with 787-9s), Melbourne (twice daily with Boeing 777-300ERs and 787-9s) and

Up to three United States Air Force B-52H Stratofortress bombers were based at Darwin in late March and early April for exercises with RAAF F/A-18A Hornets, 4SQN PC-9A(F)s and Army and Air Force Joint Terminal Attack Controllers (JTACS) at ranges near RAAF Base Williamtown, NSW. SID MITCHELL

An Army CH-47F Chinook during first of class flight trials with HMAS *Choules*. DEFENCE

The next three RAAF F-35As have arrived at Luke Air Force Base, Arizona. DEFENCE

Sydney (double daily with Airbus A380s). Perth is the latest route to be cut or reduced as the Abu Dhabi-headquartered carrier undergoes a review of its operations in a bid to improve the financial performance of the company. Virgin Australia was to have started its own Abu Dhabi-Perth flights with A330-200s in 2017 but cancelled the service even before the inaugural flight took off due to what it said at the time were changes in market conditions that made the route unviable.

DEFENCE NEWS

An Army CH-47F Chinook heavy lift helicopter has been embarked aboard the Navy's landing ship HMAS *Choules* for the first time. The recently completed first of class flight trials aboard the *Choules* were held in the Coral Sea off the coast of Queensland. They were to define 'Ship Helicopter Operating Limits' so that the CH-47F can operate from the vessel in an operational environment. The flight trials were conducted by the Army's 5 Aviation Regiment and the Navy's Aircraft Maintenance and Flight Trials Unit (AMAFTU) and involved more than 206 launches and 66 flight hours, *Navy Daily* reported.

The **Royal Australian Air Force** has declared IOC (initial operational capability) for the Boeing P-8A Poseidon, meaning the maritime intelligence, surveillance and reconnaissance aircraft can now be tasked on operations. Defence Minister Senator Marise Payne announced the milestone at the RAAF's 2018 Air Power Conference in Canberra on March 20. "Together the P-8A Poseidon and the future MQ-4C Triton aircraft will provide Australia with one of the world's most advanced maritime patrol and surveillance capabilities," Minister Payne said. The P-8A Poseidon fleet, operated out of RAAF Base Edinburgh, are replacing the RAAF's ageing AP-3C Orion aircraft.

–

The RAAF has formally **accepted three more F-35As** from Lockheed Martin at the Integrated Training Centre at Luke AFB in Arizona. After rolling out and taking flight for the first time in December and January, F-35As A35-003, -004 and -005 were accepted into the ITC in early March. The new aircraft are the first JSF international partner aircraft to be delivered with the latest Block 3F operational flight program software load. The RAAF's first two F-35As have been at Luke AFB for three years and were recently inducted into the USAF's Ogden Logistics Center at Hill AFB in Utah to receive various structural, hardware and software upgrades to bring them up to the current standard.

INDUSTRY NEWS

Business aviation services company **Jet Aviation** announced on April 11 it had signed a binding agreement to buy aircraft sales and support company Hawker Pacific for US$250 million (A$322 million). Jet Aviation president Rob Smith said the acquisition of Hawker Pacific represented a significant step in expanding the company's presence in the Asia Pacific and Middle East. Meanwhile, Hawker Pacific chief executive Alan Smith said the company's acquisition by Jet Aviation was an excellent outcome for its investors, employees and customers. Jet Aviation is part of aerospace and defence giant General Dynamics, which is the parent company of Gulfstream.

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Air travel technology provider **SITA** is keen to expand the use of biometrics as part of efforts to help speed up and improve the passenger experience. SITA president for Asia Pacific Sumesh Patel said a trial on the use of biometrics at check-in and boarding with Air New Zealand flights at Brisbane Airport had shown passengers would spend less time at check-in and helped speed up boarding. Patel said further discussions with the Australian government, airports and airlines would lead to biometrics being used for other aspects of the passenger experience, such as for self-service bag drop and immigration clearance, as well as potentially duty free sales and entry into airport lounges. "These are other pieces of the trial that we are also working on with them and that will include the other touchpoints," Patel told media in Sydney in April.

–

Australia's Civil Aviation Safety Authority (**CASA**) is seeking feedback in response to an independent review of its new fatigue risk management rules. The review was announced in August 2017, when CASA deferred the introduction of Civil Aviation Order (CAO) 48.1 in response to feedback from the aviation community. The final report, released on March 22, said the independent review team "supports the need for CAO 48.1". "Scientific knowledge about fatigue and its effects on human reliability are strong enough to assert the existence of a significant risk exposure that needs to be properly managed," the report said.

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Boeing has marked the 10th anniversary of the establishment of Boeing Research & Technology Australia (BR&T-Australia). Established in 2008, BR&T-Australia has worked with government and university partners to lead and collaborate on major technology projects spanning advanced manufacturing, autonomous systems, defence, and virtual reality/augmented reality systems. "Our BR&T-Australia team strengthens our business by ensuring that the best of Australian innovation and technology enhances our world-leading products and services," said Boeing's chief technology officer Greg Hyslop.

–

New Deputy Prime Minister and **Minister for Infrastructure and Transport Michael McCormack** told *The Australian* newspaper on April 9 he is considering proposed changes to the Civil Aviation Act put forward by Dick Smith. The proposed changes involve changing the wording of the act to say that CASA is charged with ensuring the "highest level of safety in air navigation" in addition to having consideration for "an efficient and sustainable Australian aviation industry". Currently the wording of the act says CASA has to "regard safety as the most important consideration" in its role regulating the industry.

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Gulfstream's newest business jet the G500 made a stop in Melbourne in mid-April as part of a six-month around-the-world promotional tour. Powered by Pratt & Whitney Canada PW800 engines, certification and entry-into-service for the G500, which seats up to 19 people, has a range of 5,200nm and a long-range cruising speed of Mach 0.85, was expected to occur later in 2018. DAVE SODERSTROM

To celebrate the centenary of the Great Air Race in 1919, the Northern Territory government is backing **a new Great Air Race** to be held in 2019. The competition will be for electric-powered aircraft, with batteries to be charged using renewable energy sources or by hydrogen fuel cells, with the hydrogen produced by renewable energy. Competitors will have to complete the journey within 30 days.

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Boeing **HorizonX** has chosen Adelaide-based Myriota as its first non-US investment. Myriota makes small low-cost, low-power transmitters for two-way communications between ground-based micro-transmitters and low Earth orbit (LEO) nanosatellites to securely share data over narrow bandwidths. The technology has applications in logistics, defence, utilities, agricultural, environmental and maritime industries, where the Internet of Things (IoT) connectivity via traditional means is extremely challenging and expensive. "Part of the mission of Boeing HorizonX is to pursue and accelerate innovations coming out of startups around the world. By investing in Myriota, we are proud to support Australia's startup ecosystem and growing space industry," said Steve Nordlund, vice president of Boeing HorizonX. "Myriota's technology influences how we think about space-based communications and connectivity in remote locations." Boeing HorizonX, which was established in 2017 and is the vehicle by which Boeing makes investments in early-stage businesses, was part of the $15 million round alongside Australian venture capital firms Blue Sky and Main Sequence, Singapore-based Singtel Innov8 and Right Click Capital.

Good kit

Gear for Australian aviators

Good sunglasses are as critical for a pilot as all the other flight kit that gets squeezed into a flight bag. Operating at altitude means the environmental effects on the pilot are exaggerated, including exposure to UV light with UV increasing by approximately five per cent per 1,000ft.

To ensure these "critical instruments" are protected it's important when selecting a pair of sunglasses for use in the cockpit the pilot must ensure that function is the winner over the latest fashion trends.

Bottom Line: Buy sunglasses that block 99%+ of UVB and UVA light rays, if you want to keep your eyesight healthy.

What functionality is the average pilot looking for in a pair of sunglasses?

Should I fly with the same polarised lens I use on the water or non-polarised?

With polarised lens the pilot risks losing some or all visibility of the instruments, especially digital avionics, including iPads; having the reflections (glint) off other aircraft blocked; and scratches and abrasions on the windscreen are highlighted.

Non-polarised is the way to go. In some cases, polarised lenses can work, but we strongly advise against them.

Should I go for a coloured lens like my snow skiing goggles or keep them bland?

A coloured lens can mask lights, signals and other colour-coded information in the cockpit, on electronic flight bags or other inflight documentation. So stick with a grey lens

Should I use photochromatic so I have just the right amount of tint in good and bad weather?

A photochromatic lens often doesn't work in the cockpit due to the ambient light levels found when you're not in direct sunlight. With the constant scanning in the cockpit and back to the horizon, even with good direct sunlight, the lens will keep transitioning back and forth, which could be fatiguing for the eyes.

What about plastic or glass lens?

It's a balance here between weight and durability. A glass lens is more scratch resistant, however weight twice as much as a plastic lens. The lower cost plastic lens' provide a great lightweight experience, however tend to get damaged in the dynamic confines of the cockpit, not to mention the busy pilots life.

The more expensive polymer lens' proved the best compromise between weight and durability, however you do pay for the best of both worlds.

And glasses need to sit comfortably beneath the cushions of your headset without pinching and the inevitable headache.

Bayonet arms may edge out skull and cable arms as they are easier to remove from underneath a headset and as long as they fit comfortably, won't move during turbulence any more than skull temple arms would.

RAY BAN

RRP: $180.00 www.theiconic.com.au

In the 1930s aircraft could fly higher and faster than ever before and many US Army Air Force pilots were reporting that the glare from the sun was giving them headaches and altitude sickness. A new kind of glasses was introduced with green lenses that could cut out the glare without obscuring vision, and it was then that the Ray-Ban brand was born. We assume there is no need to explain the detail around the name? This new anti-glare eyewear went on sale to the public in 1937. The original glasses featured a plastic frame with the now classic Aviator shape. The sunglasses were remodeled with a metal frame the following year and rebranded as the Ray-Ban Aviator. During WW2 military uniforms became a fashion trend, the white standard issue t-shirt became a staple in every man's wardrobe as did the Ray-Ban become an essential eyewear fashion item. Today's Ray Bans incorporate a G-15 polycarbonate lens and also support the installation of prescription lens.

SERENGETI MEDIUM AVIATOR SUNGLASSES - 59MM

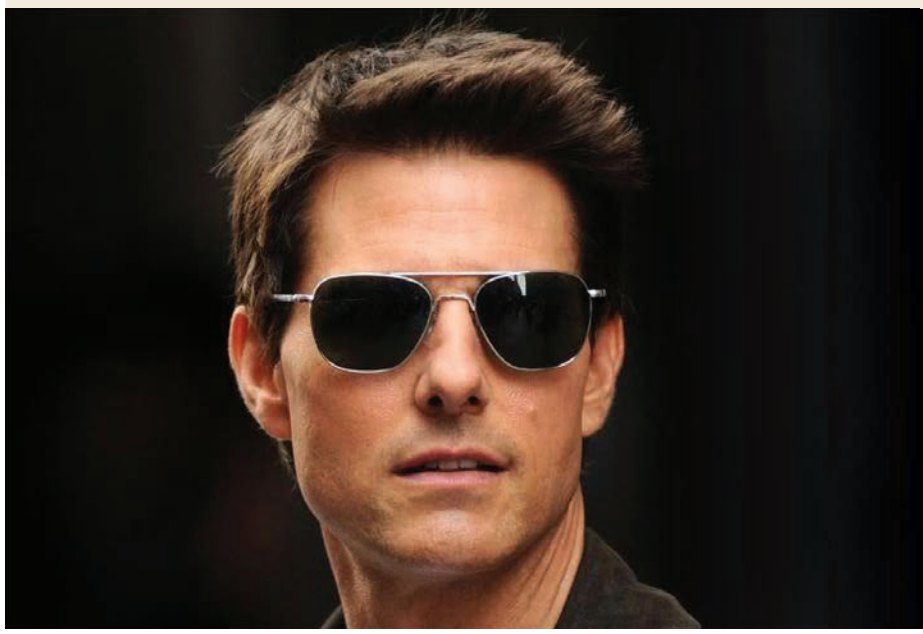
www.serengeti-eyewear.com/

Some call Serengeti "the best sunglasses in the world" and you definitely need to take a pair of these flying! While they are a pricey acquisition Serengetis are among the most scientifically advanced sunglasses in the world and provide outstanding filtering of the visual light spectrum while ticking all the UV boxes. The famous Drivers lens slash glare, enhance contrast and reduce eye fatigue. These advanced lens filter "blue" light to reduce blurring and minimise the effects of haze and glare and far exceed ANSI sunglass standards by blocking 100 per cent of UVB and 99 per cent of UVA rays. The bayonet is also equipped with a spring hinge, saving you from the "floppy arm" syndrome when trying to place a pair of glasses back on your head while keeping one hand on the yoke.

RANDOLPH SUNGLASSES

RRP: $220.00 www.visiondirect.com.au

Randolph Engineering (RE) was established in 1972 by Jan Waszkiewicz and Stanley Zaleski. Both were engineers, and it's no surprise "engineering" was incorporated into the title. Initially, Randolph Engineering served the eyewear industry by producing machines as well as optical tools, before transitioning into the supply of its own eyewear. One decade after the company entered the optical trade, RE was able to negotiate a supplier contract with the US Department of Defense and today it continues to provide 'Standard Issue' sunglasses to soldiers, aviators and even submariners. Uniquely, if you buy from the company direct you can mix and match the nine frames and three temple options to suit your personal needs.



AO – AMERICAN OPTICAL

aoeyewear.com

The original American Pilot sunglasses were immortalised by test pilot and astronaut Neil Armstrong who took a pair to the moon. They have been standard issue to the US military since 1982, not to mention a favourite of Tom Cruise. But don't let that put you off!

A RACER'S EDGE
MATT HALL

Wondering why

Maintaining the passion as a professional pilot

Devoid of financial pressures, what would you do with your life? PREDRAG VUCKOVIC/RED BULL CONTENT POOL

I have been fortunate enough to be flying professionally my entire adult life. I joined the RAAF as a teen, via the direct entry method, and flew for 18 years straight prior to my resignation to join the Red Bull Air Race.

Since then I have combined racing with displays, joyflights, charter work and spending time as a commercial helicopter pilot (but don't tell anyone that bit!).

Sounds like a dream to that teen who joined the RAAF all those years ago.

But believe me, and this will resonate with a lot of professional pilots, at times it does just become a job, and sometimes you end up asking yourself why you are doing it… it consumes a lot of time, money and energy, and sometimes can be very frustrating.

You have guilty feelings around this, because you know that your young self, plus all the people out there who do not fly for a job, would quite happily trade places with you. They would probably even do it if it meant selling their own mother.

A downturn in passion happened to me for a short period of time while I was in the RAAF, just prior to me getting my exchange posting to the USAF to fly F-15Es.

I was feeling like I needed a break and going to work every day to fly a Hornet was taking its toll on my body and mind. The exchange gave me a new lease on my RAAF career, re-invigorating me to give it my all, and learn from other people. Those same feelings of restlessness happened again as I was approaching the end of my career in the RAAF.

Luckily the opportunity to become a race pilot appeared and I was saved from having to make any tough decisions. But believe it or not, a lack of passion still happens every now and then, even in a job that requires me to travel to amazing countries and compete in one of the most unique motorsport series in the world.

Sometimes, after a bad race, or problems with equipment, team, or finance, you can get so frustrated you wonder why … why do I put myself through such physical, mental and financial pressure to do this? I find myself looking around at other people in other jobs, and from the outside it looks like they are sitting back and enjoying life, it looks almost relaxing compared to the pressure cooker of competing in a world championship series.

Sometimes I just wish that I could do that too. And all of the race pilots

suffer from this, and I expect a lot of other professional pilots suffer from it too.

I had to challenge myself in 2016 when my MXS race plane broke. Over the years it had been built up to be such a competitive aircraft. To have it become unusable as a race plane for at least a season, possibly forever, was very draining emotionally.

I must admit, the thought of starting all over again with a new aircraft type, and as it turned out, almost a new team, wore me down. I had some long discussions with my wife and my sports psychologist to determine my real desires. I was at a point where the surface desires of trying to do what you think everyone else thinks you should do, simply weren't keeping me motivated.

This time, I needed to really look within myself, and decide what direction my life would take. So, what I did was this…

…I did what every Australian who buys a lottery ticket does, I imagined I won the jackpot. The amount I had won was enough that I would not have to worry about finances ever again. The amount is not important to this story, it is the idea that with this winning, I would have enough to retire and do whatever I wanted with life.

This hypothetical scenario then posed the next question: What would I do with my life?

Of course, the first thing was that I would like to own a few planes. Among the fleet would be a family cruiser, a two-seat aerobatic plane to take people for rides in and a single-seat 'weapon' to do the craziest stuff imaginable. I would also need a warbird to fly.

On top of all that, I would want to travel and see the world, to catch up with my great mates on a regular basis. And while I was doing all that, I would like to go and race planes around pylons and see how fast I could go. Hmm…

As it turned out, I was living my dream life already. The unenjoyable parts were based around the financial pressure of what we do, the competition of trying to be the best and being frustrated about mistakes and team changes and all the items mentioned earlier. Once I removed those downers, it turned out my life was almost my perfect dream life.

Feeling unfulfilled is something that can probably creep up on anyone. When I sat back and analysed my life and thought about why I had struggled for motivation at certain points, it came down to the fact that at those moments I had been too busy – overworked – and I was trying too hard to make it all come together.

Forgetting to sit back and smell the roses was how I lost sight of how fortunate I was to be genuinely in a 'job' that is my greatest passion.

We all get trapped in this day and age trying to keep up with the pack. We experience it on social media especially, where we can see what other people are doing. As competitive animals, it's natural to then try to improve our performance to match what we see others doing.

But more often than not, to chase the pack you find yourself wanting to spend more money, improve performance and push harder for perfection. In the case of air racing, when the funds run low, and your competitor's coffers are healthier, it becomes very frustrating. When you aim for perfection and fall slightly outside of the mark, frustration again sets in. When we are trying to be perfect and we make a mistake we get frustrated.

All of a sudden, as you dive head first into all these tasks to become a better version of yourself, when you keep trying harder and harder, you can lose sight of what the initial goal was. The snowball builds until you burn out, until you're sick of what you do. It becomes a vicious cycle of trying harder and harder for little yield, and suddenly tasks seem impossible.

When I sit back and look on what I get to do and the opportunities I have, I know I am lucky. The real challenge is to appreciate the flying that I do.

So, the point of this column is to try to encourage all those people who sometimes wonder why they do it, can they do it, or should they do it, is to think back to the young you, who would have given their birthday away to go for just one flight.

Think of how that young person, without the pressures of competition or finance, would be wide-eyed if they saw what the older version of themselves can actually do in an aircraft now. Think back to why you learnt to fly in the first place and embrace it. Enjoy the now, enjoy being airborne, not trying to go faster to get where you want to go. Having the ability to fly is so special.

In the end for me, I love what I do. Regardless of the pressures I am under, the underlying privilege to represent my country in an international sport, racing planes, is second-to-none. And the flying is the best I have ever experienced. To think I contemplated 'was it worth it', just because of external pressures seems ridiculous. But it happened.

If you can relate to this, sit back and look out the window, whether you are at 10ft or 50,000ft. When you land, talk to a young enthusiast, it will help you regain your passion in a heartbeat!

'You can lose sight of what the initial goal was.'

There is plenty of hard work behind the glamour of air racing. SAMO VIDIC/RED BULL CONTENT POOL

PINSTRIPE
KIRSTY FERGUSON

Affirmative action

Why do we still need to showcase women in aviation?

I was even more excited than usual about this edition of *Australian Aviation* as it focuses on Women in Aviation. You may well ask, is that because I am a woman? Fair question, answer ... I suppose so.

If a person falls under the category of a "minority" then there will be some who feel the need to advocate for that minority, provide a voice or a perspective from that minority angle. My hand is up on that one.

Women are an undeniable minority in aviation, as they are in many career areas. Women comprised 25 per cent of board members of publicly-listed Australian companies in 2017, while in 2016 (the latest figure I could find) women made up just under a third of our parliamentarians. There are dozens of other examples but you get my point.

Gender inequality is a very real issue, and requires a champion. Enter the "Workplace Gender Equality Agency" as Australia's attempt to throw a spotlight on the issue.

Inequality will not fix itself just because we accept that it exists, or because we acknowledge that it is unfair.

Here's why.

All of us have preconceptions around gender roles, they are based on the reality that each of us has experienced in our lives to date and those preconceptions affect our perspective on what is or isn't real. Preconceptions are tough to dismantle.

Let me set the scene from where my perspective around women and inequality developed. My dad trained as a fighter pilot at the tail end of WW2. Having grown up during the Depression, he felt tertiary education was for his sons, after all, "they will have to support a family one day."

For her day I'd call my mum a feminist, an opera singer and teacher still unmarried at 30 (this was the early 1960s).

Scene set.

Jump forward to the 1980s when I set out to get my first job. My mum, bless her, decided to make me a "job interview dress". It had an unusual feature, a whopping great split* up the right side exposing a good deal of thigh. What was she thinking! Well I'll tell you, she was thinking, "this kid has no life experience and is up against thousands of other school leavers for a job, I need to get her noticed."

See how times have changed? Or have they?

Some of these ingrained mindsets cling on.

Only about 10 years ago, some of my potential clients would bypass me to ask for "the boss".

"Ahhhh, that's me," I'd say, to embarrassed looks all around.

More recently I was shocked by comments on social media about an all-female flightcrew, one went something like, "what if it's both of their time of the month – they might both flip out". This in 2017?

We have to be able to have a laugh, particularly at ourselves, but I'd like to see that critic handle a BBJ full of VIPs across hostile territory or a KC-30 tanker inflight refuelling over a combat zone, or handling a catastrophic engine failure on a commercial airliner – all events I have heard about from my fabulous female clients.

What we find shocking or ridiculous now with regard to gender stereotypes in the 1980s have simply been replaced by other gender issues, or masked by an attitude of political correctness.

The fight my friends is far from over.

I can hear some of you saying, "just select the best person for the job". Well, in a perfect world that would be the perfect solution. In this world, the real one, changing those ingrained preconceptions is a whole other matter.

I'll repeat, just because you think it, or just because it's right, does not mean it will happen.

Changes to legislation, to workplace agreements and to hiring criteria have to be in place to force the change, to make this evolved thinking the new norm. Enforceable decisions are often the precursor to change, and as much as we don't like to be told "we have to" setting quotas or inclusion standards will facilitate it.

Changing the status quo is not easy, it requires risk, risk from business, from government and from that unequal segment of the population to stand up and demand the change.

I am thrilled to say that thanks to the current equality movements, equality is at the forefront of our minds, be it marriage equality or #metoo or equalpayday.com.

Aviation, however, is lagging and the facts support that. In 2017 *The Guardian* reported that worldwide only three per cent of pilots were female, in the UK that figure has

Women are an undeniable minority in aviation. A/AA

"exploded" to six per cent (smiley face). Australia sits at five per cent, according to a 2017 news.com article.

Those percentages are on the move I am glad to say and into the public arena have come a few, let's call them maverick industry leaders, who have taken a stand. Virgin Australia has recently actively supported Virgin cabin crew extraordinaire Tayla Monkhouse in her new ambassadorship role for *Australian Aviation* and our legacy airline has stepped up, providing quotas for improving gender parity in pilot roles.

Alan Joyce has committed to a goal of at least 50 per cent women in Qantas's pilot cadet intake in a decade's time. His airline's Nancy Bird Walton initiative has as its goal encouraging girls to take up the right high school subjects to make this career possible.

"Next year Qantas will hire more than 300 pilots across the group, I want us to up the ante with our female pilot intake," says Joyce. Qantas looks set to commit to a 20 per cent intake of women in its 2018 cadet program, and double that number over the next decade.

Of course I'd like to see that as 50 per cent in 2019, that is equal, isn't it? But nonetheless, a rousing woohoo, go get 'em from this woman in aviation, albeit ... not a pilot.

For those who I have not managed to sway with regard to 'best person for the job' I would ask you to walk a mile in the shoes of a minority, be it gender, race or belief-based.

We all have undeniable bias, in order to understand our own innate bias we need to surround ourselves even more so with those who differ from us. Simply in order to recognise the hurdles our race, status or gender have erased, and accept that there are others who still have to jump them.

I'll finish by including a wonderful piece from a tenacious jet pilot, talking about her career and experiences.

IN HER OWN WORDS

The nature of the female airline pilot is her tenacity, she is a force of nature setting out to change the world as we know it – that women can do anything they set their minds to.

Early on I wanted to become an astronaut, the practical me decided becoming an airline pilot was more achievable. That's when the hurdles started; the careers councilor refused to help me obtain airline work experience, so I pestered Ansett Airlines until they said yes.

Qantas CEO Alan Joyce has committed to a 20 per cent intake of women in the airline's 2018 cadet program. QANTAS

I was sold! My eyes were set aloft.

My male contemporaries chimed in with "girls can't fly". My Year 12 careers advisor said I wouldn't get into an aviation university program. My grandfather (a former merchant navy captain) said; "stop this flying business, come home and work at Myer".

I replied "watch this space!"

When I began flying, female airline pilots were not visible, the successful outcome of the Deborah Lawrie case was only 15 years old, let alone there being someone to mentor me, it was a new path.

For those who missed this groundbreaking case, Deborah Lawrie was the first woman to become a pilot with a major Australian airline in 1979, but not before winning a landmark sex discrimination case, one where the airline cited as reasons for not hiring women a lack of strength, menstrual cycles and mixed gender cockpits being unsafe.

For me, as one of only a handful of women of colour flying jets in our country, I had no idea what barriers I was to face. From the outset I set out to gain as many qualifications as I could so that my results would speak for themselves, debunking the argument "you got the job because you're a girl."

Then you have to get on with it, slide into your big girls pants, shuffle back in the cockpit seat and say let's do this – do the small things well; disciplined, focused and squared away.

I've been fortunate to fly all over Australia, as a pilot I have become an explorer and a citizen of the world. The humanity of my aviation comrades across the globe is humbling but also the passengers and people I've met along the way – what a rich tapestry you have given me.

So come on girls, the pay packet is great, you can get some great shoes (cheeky grin), London is only 17 hours away, Paris across the drink all whilst getting to play with the coolest tech in town – a jet airliner. And did I mention staff travel?

A huge shout out to the male colleagues who believed in me, who pushed and supported me. To the women that went before me, I am greatly humbled by the trail you have forged, may I continue in your footsteps until it's no longer unusual for a woman to fly great big pieces of metal in the sky. And to the amazing airlines around the world, willing to show that they are proud of the women who fly their planes."

* PS, thought you should know, I sewed up the split.

'As one of only a handful of women of colour flying jets in our country, I had no idea what barriers I was to face.'

THE LONG

From Perth-London nonstop to Project Sunrise, Qantas is crossing its final frontiers

GESTHOP

WRITER: GERARD FRAWLEY

LONGEST HOP

When Qantas Flight 9 touched down in London at the end of its historic nonstop flight from Perth a little after 5am local time on Sunday March 25, the remarkable had been made to seem routine.

For the first time, Australia and the UK were linked by a direct nonstop air service. For the 229 passengers and crew on board Boeing 787-9 VH-ZND the experience was of a smooth, seamless service, but that belied the many years of planning and preparation Qantas had conducted.

"When we started the Kangaroo route in 1947, the flight took four days and seven stops. Every decade, as we got new aircraft we improved on that, we got faster, we got more comfortable, we got cheaper," Qantas Group chief executive Alan Joyce said onboard QF9 shortly before its landing into London.

"Today we're on this amazing historic flight, which is the fastest flight that has ever occurred between Australia and the UK."

The first incarnation of the Kangaroo Route that linked Sydney with London was operated by a Lockheed Constellation that carried 29 passengers and involved seven stops over four days of travel. A ticket cost £525 – or about $35,000 in today's money.

Today, the Perth-London Heathrow flight is scheduled to cover the 7,829nm journey in 17 hours and 20 minutes A return ticket is priced from as low as $1,300.

"It is a historic day for Western Australia, a historic day for aviation, a historic day for Qantas," Joyce told media inside Qantas's new international transit lounge at Perth Airport's Terminal 3 prior to QF9's departure.

"From today it will be the first nonstop link between Australia and Europe that has ever occurred in aviation. We're so excited."

The new nonstop link between Perth and London is now the longest regularly scheduled flight operated by the Boeing 787, and the world's second longest airline service (behind Qatar Airways' Auckland-Doha flights).

As such it is a flight that stretches the operational capabilities of the 787 to its limits, made possible by careful configuration of the aircraft and detailed flightplanning.

"We've got some very smart people in our organisation who have managed to find the sweet spot between weight, the passenger numbers, and the business class, premium economy and economy class configuration and the range with our engines," Captain Lisa Norman, Qantas 787 project pilot and one of the four Qantas pilots operating the flight, told *Australian Aviation* onboard QF9.

"Just because you have a 787 doesn't necessarily mean you can do [this mission], a lot of operators have put in much more denser passenger configs."

The result was one of the lowest seat counts yet specified for a Boeing 787-9, with 236 seats – in comparison, Qantas's low-cost carrier subsidiary Jetstar operates the smaller 787-8 seating 335 passengers. That means the 787-9 can operate Perth-London with a full, or near full passenger load with full fuel tanks.

"We've been doing flightplans [for QF9 and the return QF10] for about 18 months now," Captain Norman said of the planning behind the new ultra long-haul mission.

"We've got a really robust 'plan for tomorrow today' process, where we start looking at the flight 72 hours out, QMet (Qantas meteorology) starts giving us weather advice, so they'll say, for example, there is a high, medium or low risk of fog in London, and we start making some provisions just in case that event presents on the day of operation."

And operating the 787 on the Melbourne-Los Angeles route prior to commencing Perth-London was also "invaluable" in validating the aircraft's performance and refining flight planning assumptions.

'Just because you have a 787 doesn't mean you can do this mission.'

CAPT LISA NORMAN

"That enables us then to refine planning for this flight," Captain Norman said.

"We've seen the behaviour of all four [787] aircraft [delivered to date] now."

For the first two weeks of operations, Qantas was taking a conservative approach to the 787-9's payload by "blocking off" (ie not selling) up to 20 passenger seats to give the aircraft a comfortable margin to ensure it can reach London without a tech stop diversion (prevailing winds mean the London-Perth sector faces fewer operational restrictions).

On an ongoing basis, and as with Qantas's Dallas/Fort Worth-Sydney Airbus A380 flights (which can also take more than 17 hours if the headwinds are bad), Qantas will also actively manage loads to ensure the 787-9 has the payload range performance to operate the route nonstop.

The QF9 cabin crew poses for photos prior to departure.
VICTOR PODY

Captains Lisa Norman and Jeff Foote ahead of QF9's departure to London.
VICTOR PODY

VH-ZND, operating the inaugural QF9 from Perth, taxis to the gate at London Heathrow. QANTAS

Top/above: the crew of QF9 – First Officer Dave Summergreene, Captain Jeff Foote, Captain Lisa Norman and Second Officer Troy Lane – are all smiles after landing in London. QANTAS & GERARD FRAWLEY

Other factors too have played an important role in enabling the ultra long-haul flights – Boeing has delivered more than 600 787s now and so Qantas has been able to benefit from incremental performance improvements to the aircraft and to its GE Aviation GEnx engines.

Qantas has also commissioned lightweight cutlery, crockery and service carts, while flying over the Indian Ocean the aircraft can take advantage of 'user preferred routes', where the flightcrew can plan the most optimal flightpath taking into account winds without being constrained by traditional waypoints and airways. Also, over the Indian Ocean the aircraft can climb in increments of 1,000ft, rather than 2,000ft, making for a more efficient climb to altitude.

"It has been such a synergy of people's efforts to help us to get to this point," Captain Norman reflected.

"I think the significance is not lost on anyone. I don't know what other frontier you could do after this one now."

Certainly the Perth-London Heathrow route represents something of a beachhead for Qantas, with the success of the flight potentially spawning new nonstop services from Perth – Qantas's new western hub – to other points on the European continent, such as Paris.

While the economics of such an ultra long-haul flight are challenging, Alan Joyce said ahead of the inaugural Perth-London flight's departure that the response to the new route has been outstanding.

He said forward bookings showed 60 per cent of the traffic on the flight was origin and destination traffic between London to Perth, with 40 per cent connecting onwards in Perth to the rest of the Qantas network.

"That's important for the economics [of the route]," Joyce said.

Some 30 per cent of seats on the 787-9 are in business or premium economy, the highest percentage of any of aircraft type in the Qantas fleet, with 42 seats in business class in a 1-2-1 configuration offering direct aisle access for every passenger, 28 in premium economy laid out 2-3-2 across and 166 in economy in a 3-3-3 layout with 32in seat pitch.

Such a configuration reflects both the business-heavy nature of the routes the airline will operate the aircraft on, but it is also optimised to provide the payload range performance necessary for ultra long-haul routes like Perth-London.

And it would appear that premium mix is matching the demand for seats at the pointy end.

"It has more business class and premium economy seats than we've ever put on an aircraft and we are filling them," Joyce said.

"The forward bookings in those are over 90 per cent and are very strong, so the economics of this route is looking very strong from day one.

"In fact, we think we will make money from the first day, which I have not actually seen in a new international route for a long time. So the economics are starting out immensely strong."

Also strengthening Qantas's economics on the Kangaroo route is that the QF9/QF10 rotation begins and terminates in Melbourne (for all the hype over the nonstop Perth-London leg), and it has replaced the previous QF9/10 flights between

Qantas staff farewell the inaugural QF10 London-Perth departure. QANTAS

Melbourne and London via Dubai which were operated by Airbus A380s.

Qantas's A380s seat 484 passengers, compared to just 236 passengers in the 787-9, so some 248 seats per flight have been removed from the market each day.

Further, on the same weekend Melbourne-Perth-London flights launched, Qantas switched its hub for its QF1/QF2 Sydney-London flights from Dubai to Singapore, and placed the A380 on the Melbourne-Singapore route, with those flights timed to connect with QF1 and QF2 in Singapore.

That shift gives Qantas's Melbourne passengers two options for travelling to London, means the airline can continue to offer a first class product on the route, plus helps the economics of the Singapore-London legs of QF1/2 as well.

Switching hubs and introducing the 787-9 onto the Australia-London route is the culmination of Qantas's most complex aircraft entry into service program since the Airbus A380 joined the fleet in 2008, Phil Capps, head of customer product and service development, told *Australian Aviation* ahead of the inaugural QF9 departure from Perth.

"This has been the biggest change for us since the introduction of the Airbus A380 in the 2000s. Because it is about introducing and designing an entire [new] aircraft but also all the other parts that that aircraft interacts with. It's been a huge experience, we've had accelerated timeframes to deliver this," he said.

"But I think Qantas works very well when we have very clear strategies and know what to deliver."

The 787-9, Capps said, was delivering a new benchmark for customer satisfaction.

"We're extremely happy with the way customers are responding to the aircraft," Capps said.

"Particular elements from the cabin environment, the seating and the comfort [levels] but also the inflight entertainment are resonating very strongly with customers," he said.

"When we compare the experience of customers who are flying so far on Melbourne-Los Angeles – and soon to be Perth-London – there is a material increase, it is effectively a new benchmark of customer advocacy and satisfaction."

That bodes well for the forthcoming cabin upgrade of the airline's A380s, Capps said.

"We've recently announced the reconfiguration of the A380, there will be many elements of that which will be aligned with the Dreamliner so it means that we know that we've done things that are working well with customers and now we are going to continue to roll those out across the rest of the international fleet."

Early experience with the 787 has also validated Qantas's approach of collaborating with industry partners in designing and delivering its 787 passenger experience.

"I think what works for us is the collaboration of the best minds in the business. We like to use our own experience but then work with Neil Perry who knows food, beverage and service like no other, like Sofitel, who also knows service like no other, and with the [University of Sydney] Charles Perkins centre," he said.

The outdoor terrace area of Qantas's new Perth transit lounge. GERARD FRAWLEY

'We're extremely happy with our customers response to the aircraft.'

PHIL CAPPS

Qantas engaged experts from the University of Sydney's Charles Perkins Centre, industrial designer David Caon and its own consulting chef Neil Perry to introduce a number of cabin and lounge features designed to help cope with the effects of jetlag.

"Our job then is to continue to pull all those threads together and weave them into an experience," Capps said.

"The more you can collaborate with the best in the field, the better the experience will be. So that's really the biggest lesson we've learned."

Part of that experience is the new Qantas transit lounge at Perth Airport.

Capps said Qantas's experience in operating from Terminal 3 – it moved its Jetstar and QantasLink

services there when Virgin Australia vacated the space to relocate to its new terminal across the airfield adjacent to the international terminal in November 2015 – meant it had a good understanding of the spaces that were available in the terminal to build a new lounge in.

"With that in mind when we started working with the airport we understood that there was the potential for an unused space at this level that was adjacent to what could be an outdoor area. So as soon as we identified that we really worked very hard to lock it in.

"We wanted one of the first impressions to be one of natural light, fresh air and space. The ceiling design starts to rake up as you start to get towards the outdoor area, the fact that this is a completely glass wall is designed to give you an immediate relaxing and refreshing introduction to the lounge space."

With the Perth-London QF9/10 flights settling into regular operations, focus for Qantas now turns to Project Sunrise, its ambitious plan to introduce what Alan Joyce describes as a "super long-haul" aircraft into service from 2022 capable of flying nonstop from the east coast of Australia to London and New York.

The challenging nature of such super long-haul flights would limit the aircraft's ability to carry freight, but that could provide an opportunity for new thinking in passenger amenity.

'What are the out there ideas that could apply to this and really change air travel for the future?'

ALAN JOYCE

Among the ideas being considered for the new aircraft type, either the Boeing 777X or Airbus A350, include exercise areas and sleeping berths, Joyce told an Aviation Club of the UK lunch in London on March 27.

"We are also looking at do we need and should we have four classes? Is there a new class that's needed on the aircraft?" Joyce said of the cabin configuration of the Project Sunrise aircraft, which would be required to operate flights of more than 20 hours from Sydney and Melbourne to London (Sydney and Melbourne to New York would be about 18 hours).

"Could some of the freight areas that we may not be able to use be used as an exercise area? Could they be used for berths for people to sleep in? What are the out there ideas that could apply to this and really change air travel for the future. And nothing, nothing is off the table."

Joyce said Qantas is continuing to work with both Airbus and Boeing on defining aircraft payload range performance.

"It is also about getting an aircraft that not only can do Sydney to London, but at the same time the same aircraft is capable of being redirected to Sydney to Hong Kong or Sydney-Singapore.

"It can't be too heavy, it can't be specialised too much so that it's not usable elsewhere [on the network]. That's a big challenge."

That suggests Qantas is looking to acquire an aircraft under Project Sunrise that requires as little customisation and development as possible.

The inaugural QF9 nonstop flight Joyce had flown from Perth to London had a flight time of a little over 17 hours. The challenge for the much longer New York and London nonstop flights, Joyce said, was "to do it with a full passenger load, a full freight load and their bags".

"We have all this computing power now, all this technology, and it's working with both Airbus and Boeing to tweak the aircraft if necessary to get them to that range, and we're getting closer all the time," he said.

Qantas, Joyce said, is "a company that isn't resting on its laurels. It is a company that is saying we can do more in this space and we have a vision to stretch it even further".

"And we have we believe one last frontier in aviation. That last frontier is getting from the east coast of Australia to London. And I think that we have it in sight that by 2022 I believe we will have broken and pushed though that last frontier."

The 787-9 has thus been performing flawlessly in Qantas service. QANTAS

Trip report: QF9 and QF10

Jordan Chong

There was a mixture of excitement and trepidation as I boarded QF9 on Saturday March 24, knowing the next 17 or so hours would be spent in a pressurised tube above 30,000ft.

The excitement came from being a witness to history on board Qantas's inaugural flight from Perth to London, linking the continents of Australia and Europe with regularly scheduled passenger services for the first time.

However, the prospect of travelling some 8,000nm without a transit stop to stretch the legs, have a shower or enjoy some fresh air – as has been the case on every previous trip from Australia to Europe – left me feeling slightly daunted.

Nonetheless, I joined the 140-odd passengers in the economy cabin of Boeing 787-9 VH-ZND with the words of Qantas chief executive Alan Joyce ringing in my ears, that this was the best service his airline had ever put on board an aircraft.

The technologies embedded in the Dreamliner and its carbon composite fuselage and wings include having more fresh air pumped into the cabin, a lower cabin pressure altitude and a higher cabin humidity, alongside next generation lighting and temperature controls.

I was certainly hoping all of that would come into play as I settled into 41C in the first section of the economy cabin, with a water bottle, pillow and blanket already at my seat, and listened to the roar of the two General Electric GEnx engines during what was a long takeoff roll.

HEAVY PREMIUM MIX MEANS SMALLER ECONOMY CABIN

Qantas's economy cabin comprises a small section of five rows immediately behind premium economy, and a second section of 14 rows that stretches from Doors 3 to Doors 4.

A heavier premium mix on board – some 30 per cent of seats are either business or premium economy – helps avoid that cavernous, almost steerage, feeling sometimes experienced when travelling in the main cabin of aircraft with a low proportion of premium seats.

Previously, Qantas has spoken of the ideal flight profile for jetlag as having passengers awake for at least the first third of the flight before going to sleep. That way, they will wake up for breakfast before landing in London better rested and better able to get on with their day.

And it certainly appeared the cabin crew was keen to achieve this objective, notwithstanding the disruption of having camera crews and other media, as well as airline executives, moving through the aisles to capture all the colour and movement of the inaugural flight.

It also should be noted the cabin crew was delayed in beginning the dinner service due to the seatbelt sign staying on for about an hour after takeoff due to turbulence caused by the flight skirting the edge of Tropical Cyclone Marcus.

The cabin lighting, which has been designed in partnership with the University of Sydney's Charles Perkins Centre and experts at Boeing, also played a role. The cabin lights stayed on well after the dinner service had concluded, gradually turning dark over the course of what seemed an hour. The cabin temperature also seemed cooler as the lights went down.

After choosing the chicken with red rice and vegetables for dinner, served alongside a garlic butter-infused bread roll and panna cotta, it was time to attempt sleep.

It would be an exaggeration to say sleep came easily. However, I managed to get about six hours of rest over the course of the 17-hour journey.

During the night, the cabin crew walked through the cabin at regular intervals offering food and water, including a warmed mid-flight sandwich.

In between times, passengers headed to the rear galley's self-service station for drinks and snacks such as whole fruit, carrot sticks and hummus, and cheese and crackers. For those with a sweet tooth, Tim Tams, chocolate chip cookies and muesli bars were also on offer.

Fresh fruit and vegetables proved a refreshing change to the usual assortment of pre-packaged food items, while a hot chocolate with marshmallows, poured out of a purple jug featuring Cadbury and Qantas branding, proved a comforting, and popular, warm pre-bedtime drink.

It is the verdict of passengers that ultimately determine whether a route is successful and on that front the scorecard for the 787-9, in economy at least, is mixed.

FIRST, THE POSITIVES

Rob Williamson is a very frequent flyer who normally travels in business class on his work trips to Asia or Europe. While the Perth-based businessman was keen to be up front for this inaugural flight, business and premium economy were completely booked out, meaning he had to settle for 41A.

He said he came away from the experience pleasantly surprised.

"It was above my expectations," Williamson told *Australian Aviation* moments after the flight touched down.

"My personal feeling and well-being is better after this flight than after a 12-hour flight from Sydney to Beijing on a Qantas Airbus A330.

"I think the configuration of these economy class seats is very smart and the food I have eaten has been very good."

And while dry eyes at the end of a long-haul or ultra long-haul flight have not been totally eliminated, it can be said my eyes felt less dry when walking off the aircraft at a chilly London Heathrow a little after 0500 local time. Further, while undoubtedly tired after a long trip, I felt able to face the day ahead rather than immediately retreat to the nearest hotel room for a nap.

Also, Qantas should be credited for providing a decent-sized pillow for its economy passengers, instead of going for these tiny things that don't offer anywhere near the needed support for those without the luxury of a lie-flat surface in business or extended recline in premium economy.

ON THE OTHER HAND . . .

In the minus column, Qantas's 787-9s feature nine-abreast seating in economy. To put this in perspective, only Japan Airlines has configured its 787s in anything but a 3-3-3 configuration in the main cabin.

Nonetheless, 3-3-3 means seats are less than 18in wide (exact figures vary depending on how it is measured) and aisles feel narrow. There were a few accidental knee knocks and inadvertent shoulder bumps throughout the night as passengers made their way to the restrooms or self-service snack bar. Even some cabin crew remarked about the narrowness of the aisles during meal service.

JT Genter, points and miles writer for travel website The Points Guy, was further back in the economy cabin in seat 56D, the fourth last row, on the inaugural flight.

He said the time passed quickly as he busied himself with the inflight entertainment offering, the meals and the general excitement that an inaugural service often brings, including a short time spent in business class as part of a seat swap with another journalist on board.

"I actually didn't sleep the entire time but it still flew by," Genter told *Australian Aviation* in the arrivals hall of Heathrow's Terminal 3. "There was tons of entertainment."

While praising Qantas's meal service concept – in contrast to the traditional airline meal tray, the airline offers passengers in economy a larger main course, bread roll and packaged dessert while doing away with an appetiser – Genter said the seat itself was "as comfortable as possible while still being nine wide".

"Those nine wide seats are tough," Genter said. "At least they gave us an extra inch of pitch at 32in.

"The seat was pretty well designed with the unique storage areas and mood lighting and all that sort of stuff."

Getner said having only 166 economy seats – it is one of the smaller economy cabins among all 787-9 operators – meant the galleys were not as crowded with passengers when compared with some flights operated by larger aircraft such as the Airbus A380.

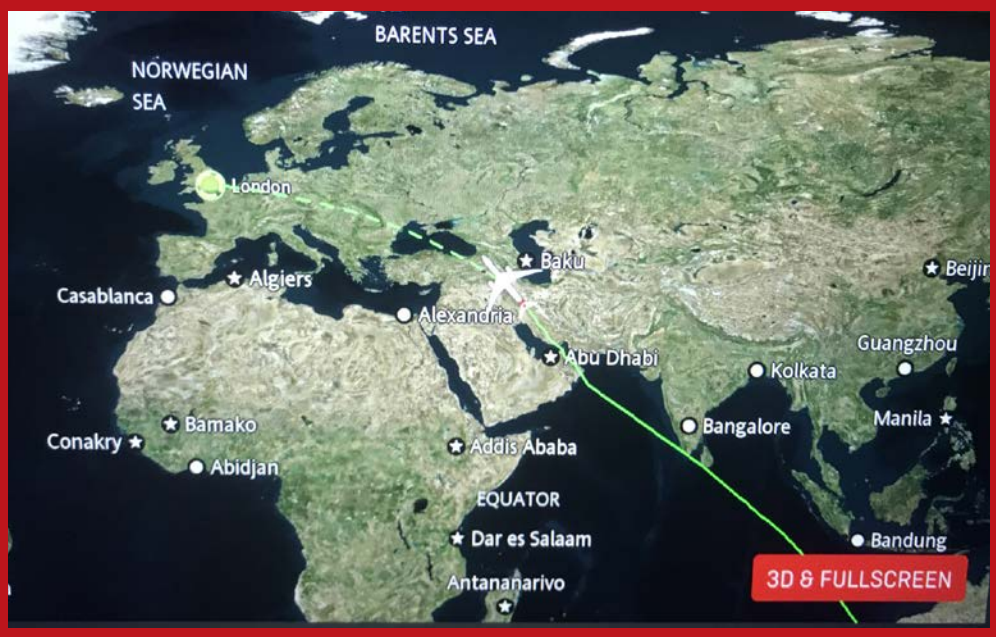
"Even with an inaugural flight like this one where a ton of people are excited and standing up and talking, the galleys didn't get that crazy," Gender said.

"The flight attendants might disagree but I think for a normal flight that might really play well."

A further note regarding the economy seat. Perhaps the adjustable headrest, now pretty much de-rigueur on most modern airliners for the support it gives the head and neck, needs to be tweaked as it was my experience that the headrest struggled to stay in place, regularly sliding back down the seat after being adjusted.

And as Genter mentioned, Qantas's inflight entertainment system, which does away with a handset in favour of a touchscreen, has something to cater for just about everybody's taste including a heavy selection of box sets, with pre-flight fears of having no other option but to stare at the moving map to pass the time proving unfounded.

The cabin stayed dark until about 90 minutes prior to landing, when, again, the lighting gradually transitioned to "dawn".



QF10 A SIMILAR EXPERIENCE

On Monday, April 2, I took the reciprocal QF10 from London Heathrow to Perth. Having come through my QF9 experience unscathed, there was less trepidation about what lay ahead. Less excitement too, given the party balloons and fanfare present for the inaugural flight were nowhere to be seen.

It was a, relatively, shorter journey on the eastbound leg, clocking in at a little over 15 hours.

Unlike Perth-London, QF10 with its scheduled 1315 departure time has three distinct phases of the flight – daylight, followed by darkness and then daylight again before landing in Perth at about 1230 the following day.

The cabin service, in economy, follows a similar pattern.

Drinks are served about an hour after pushback from the gate, before being cleared. The carts then roll up and down the aisles for the main meal service. Again, there are three mains to choose from, two hot items and a salad option, alongside dessert and a warmed bread roll.

Once cleared, it is now about four hours since pushback and blue skies have given way to a deep orange as the sun sets. The cabin crew come around for the final time in this meal service offering hot drinks as the inflight lighting slowly dims to eventual darkness.

The mid-flight snack is a tomato and cheese calzone, while there are again an assortment of sweet and savoury items in the self-service bar. Again, I manage about six hours sleep.

The cabin lights make the gradual transition from darkness to sunrise about two hours prior to landing, some hours after dawn broke somewhere over the Indian Ocean.

After landing, passengers continuing on QF10 to Melbourne head to the international transit zone without needing to clear security or passport control (which occurs in Melbourne).

Meanwhile, those on connecting flights to other domestic points head to the newly constructed border processing facilities at Qantas's Perth Terminal 3/4 precinct.

The queues move quickly, notwithstanding the passenger scrum for landing cards from Australian Border Force as they were not loaded on the flight.

Once landslide, I dropped off my checked bag, which had been tagged through to Sydney at London Heathrow, at a self-service kiosk before making my way to the other end of the terminal to clear security and head up to the boarding gates.

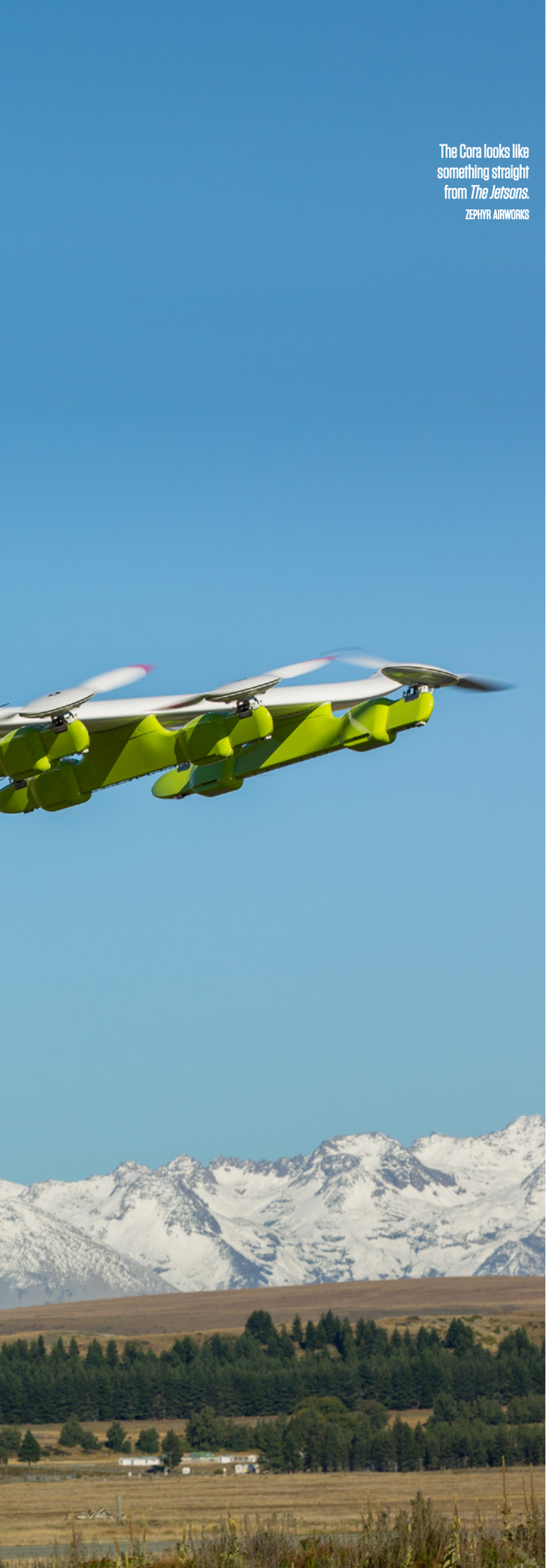
My flight takes off for Sydney on time and as a domestic passenger I am quickly out of the terminal at Mascot and on my way home.

NOTE: All passengers referred to in this story flew on paid revenue tickets.

KIA ORA CORA

A US startup has chosen New Zealand's Canterbury Plains to flight test its self-flying electric air taxi

WRITER: DENISE MCNABB



The Cora looks like something straight from *The Jetsons*.
ZEPHYR AIRWORKS

Somewhere on the Canterbury Plains against a backdrop of the snow-covered Southern Alps, local farmers got their first glimpses of the future of air taxi travel.

Periodically, a strange-looking whisper-quiet vehicle would fly from a private airfield over their paddocks, looking for all the world like it had popped out of the 1960s animated sitcom, *The Jetsons*.

In this lightly populated rural pocket of New Zealand, inland from Christchurch, the need to test the craft away from prying eyes while in its embryonic stages paid off for Zephyr Airworks.

Californian start-up tech company Kitty Hawk Corporation registered Zephyr Airworks as its New Zealand arm in December 2016 so it could secretly flight-test this self-flying electric air taxi after extensive research and development at its US Mountain View headquarters over an eight-year period. The first air taxi, named Cora, arrived from the United States last October.

By March tech media had a whiff of something happening Down Under. It was time to spill the beans.

The egg-shaped, two-seater Cora prototype, capped by a glass canopy, lifts vertically like a helicopter on the thrust of 12 independently operated lift fans (one on each side of six struts spaced evenly under each of its 11 metre wings). Once airborne it switches to aeroplane mode using a single push propeller at its rear.

Battery-powered, Cora has self-piloting software and in its present incarnation, can fly around 100 kilometres on a full charge at a speed of 95kt (180km/h) at a height of between 500 and 3,000ft.

Its three independent flight computers each calculate its location. If one of them has an issue the other two kick in to navigate reliably. Cora also has a parachute if it needs to land without fans.

Both the New Zealand Civil Aviation Authority (CAA) and the US Federal Aviation Authority (FAA) have given Cora an experimental airworthiness certificate for unmanned research and development testing at a private aerodrome, but its focus now is on further ground-breaking certification from the NZ CAA, an ambitious task as there is no precedent for such a vehicle anywhere.

If Kitty Hawk's plans remain on track these small flying cars could be buzzing over New Zealand between three and six years from now offering an Uber-style air taxi. New Zealand has been officially designated by Kitty Hawk as the global launch pad with the government's endorsement.

After New Zealand Cora will take on the world, pioneering a path of aviation change as it goes. But it is not the only company moving in the direction of air taxis. There are an estimated 30-50 projects in tow around the world.

For now, Zephyr Airworks chief executive Fred Reid will not put a definitive timeframe around a date Cora will make public flights.

Not only will there be many modifications and refinements and hundreds of hours of testing for Cora between now and its public debut, but avionic certifications and regulations need to be turned on their ear to accommodate this new flying mode, including the management of aerial highways – or flyways – to ensure safe and orderly air travel.

"We have a lot of work to do and we are working constructively with regulatory authorities. We are looking forward to being able to share our product with the New Zealand public when the time is right," Reid told media after the project went public on March 12.

"It's about people and mobility; it's about the time you could save soaring over traffic – the friends you could visit. It's about giving everyone a fast and easy way to get around the planet that doesn't come at the expense of the planet."

Reid said Cora vehicles would not be sold individually, but as a service with a fleet, similar to an airline or a rideshare. An app was also being developed for people to hail the Cora air taxi.

Kitty Hawk's website does reveal, however, that it is developing a flying machine for individuals under the name of 'Flyer', with interested parties being asked to seek more information.

Cora players

Although he has never officially confirmed he is the backer, Larry Page, co-founder and chief executive of Google parent, Alphabet has been widely reported as funding the project in a private capacity.

And while no figures have officially been released about the cost of development, US$100 million has been touted by a tech expert as a realistic expectation for getting Cora – literally – off the ground.

Kitty Hawk's chief executive entrepreneur and scientist, Sebastian

Cora features 12 independently operated lift fans. ZEPHYR AIRWORKS

Thrun founded X (previously Google X) where he drove the development of the self-driving car and Google Glass. He is also president of Udacity, a movement aimed at democratising education.

Fred Reid, meanwhile, an aviation stalwart with 30 years experience in the industry, has worked as chief executive of Virgin America, president of Delta Air Lines and president of Lufthansa Airlines where he was a key player in the creation of the Star Alliance.

Why New Zealand?

Kitty Hawk says on its website that to take the next step to bring Cora out of R&D to the commercial market it needed to find a country as "bold and dynamic as America had been in the early 20th century when the Wright Brothers took flight and the country was a hotbed of invention and discovery".

It also needed to have a world-class reputation in certification and regulation and a government and society with an eye to the horizon. After two years of pitching privately it chose New Zealand.

The company said it realised quickly that New Zealand had everything it needed, from design to New Zealand certification plus sound intellectual property legislation and receptivity to new ideas.

Kitty Hawk also references Richard Pearse, the New Zealand farmer and inventor who pioneered flight in New Zealand – ostensibly preceding the Wright brothers.

"New Zealand is recognised for its safety-focused regulatory environment and a strong history of excellence in airspace management," Reid said.

"These qualities are vital in giving people confidence that we are serious about making Cora the best air taxi on the market."

It was not until the Kitty Hawk team arrived in New Zealand that it found 80 per cent of the country was powered by renewable energy and was looking to harness benefits of the electric mobility revolution.

Reid said when the Californian team pitched its plan it had no idea what to expect.

"They could have laughed us out of the room. We were pitching something that sounded like science fiction," he said.

Under a non-disclosure agreement it talked with the New Zealand government and other agencies and local bodies for 18 months about a supportive partnership for the project.

New Zealand Prime Minister Jacinda Ardern told The New York Times the decision to work with Kitty Hawk was "about sending the message to the world that our doors are open for people with great ideas who want to turn them into reality."

"We've got an ambitious target in New Zealand of being net carbon zero by 2050 and exciting projects like this are part of how we make that happen," she said.

Reid has been setting up graduate programs at New Zealand universities to ensure Zephyr Airworks can find graduates with IT, engineering and manufacturing skills to work on Cora.

The company presently has jobs listed in New Zealand for pilots, flight test engineers and aircraft technicians. It employs a wide range of people from those with skills in avionics to composites, flight controls, and car manufacturing and battery technology.

Dr Peter Crabtree, general manager for science, innovation and international projects at New Zealand's Ministry of Business, Innovation and Employment, said the country knew it couldn't keep using the "same old approaches" to meet future challenges.

"We saw Cora's potential as a sustainable, efficient and transformative technology that can enrich people's lives, not only in New Zealand, but ultimately the whole world."

'We were pitching something that sounded like science fiction.'

FRED REID

CAA breaks boundaries

The NZ CAA's deputy director of aviation, Steve Moore said the authority was working to define a bespoke set of certification requirements using a civil aviation rule in effect since 2015 that provided a legal framework for the operation of unmanned aerial vehicles.

Using a flexible approach to the application of the risk-based rule CAR Part 102 (that defines this set of certification requirements) is understood by CAA to be unique within the global aviation environment.

"The nature of Zephyr Airworks' remotely-piloted aircraft system (RPAS) design and its operational goals means that the standard set of requirements applicable to aeroplanes or helicopters cannot be applied in the normal manner," said Moore.

"A bespoke approach needs to be taken to ensure that the certification requirements adequately capture the associated aviation risks and are also tailored to reflect the specific nature of their design."

The CAA said it was also aware of the need to ensure that its broader suite of regulations remained contemporary as the use of RPASs proliferated through the country's aviation system.

There were significant regulatory challenges that needed to be worked through around how a service would share the airspace with other aircraft and how the vehicle would work when out of sight from operators on the ground, for instance.

Graeme Sumner, chief executive of air traffic management provider Airways New Zealand, said the country's regulatory environment and relatively uncongested airspace made it an attractive option for new operators.

Airways has begun piloting future technologies to support the arrival of autonomous flying vehicles such as Cora in New Zealand airspace.

It said in a statement that development of a nationwide unmanned aerial vehicle (UAV) traffic management system would enable drone activity across New Zealand airspace through safe integration into the national air traffic network.

"We are looking for ways to safely support more complex operations and facilitate new entrants, including the Zephyr Airworks' autonomous aircraft, into our skies."

Airways has been putting an AirMap drone traffic management platform in Canterbury and Queenstown through trials that allow drone pilots to plan flights, seek authorisations and get information about the areas they're operating in.

The next phase is tracking tools that enable accurate monitoring of UAVs once they are beyond the pilot's line of site and detect and avoidance capabilities to keep them safely separated from other aircraft.

Airways will also test New Zealand's existing telecommunications network for its ability to track the likes of Cora and UAVs in uncontrolled airspace to "enable better telemetry for drone pilots".

"Our first priority is ensuring the safety of our skies and we're thrilled to be at the forefront of this ground-breaking trial with Zephyr Airworks," Sumner said.

Over the past four years Airworks had also developed an advanced launch services program, enabling more than 120 stratospheric balloon launches for NASA and Google, and has facilitated RocketLab's ambitious rocket launch program, he said.

Christchurch role

Joanna Norris, chief executive of ChristchurchNZ, a body representing the interests of tourism, economic development, growth, international eduction and events in the city, said Zephyr Airworks came to Christchurch because of the ease of doing business there, the country's safety-focused regulatory environment, a culture of ingenuity and vision for clean technologies and future transport alternatives.

'We're thrilled to be at the forefront of this ground-breaking trial.'

GRAEME SUMNER

She said Christchurch was at the forefront of future transportation in New Zealand. In addition to the Zephyr self-piloted air taxi their other projects underway included autonomous vehicle production manufacture in Christchurch, research trials by Ohmio Technologies with an electric Hop shuttle, described as the world's first self-driving and scalable public transport solution – supported by Christchurch International Airport, and YooGo, the country's first fully battery-powered electric car sharing service, which launched in February 2018 with a pool of 100 electric vehicles.

"Christchurch is committed to becoming carbon neutral and we are embracing future technologies in the areas of future transport, future foods, Antarctica and space technology, technical adventure clothing, social enterprise – we are open for business and making strong strides in these areas," Norris said.

A race to the future

For Kitty Hawk the journey to market could turn out to be a race with many competitors vying for their share of the same market, including the major aircraft manufacturers Boeing and Airbus. Uber is also working towards an air taxi service in Los Angeles, Dallas and Dubai and German drone company Volocopter is among many that is testing unmanned air taxis in Dubai.

Soon it won't just be the skies over Canterbury that are home to flying taxis.

Cora requires a bespoke approach to certification standards. ZEPHYR AIRWORKS

WOMEN IN AVIATION

BRIDGING

THE GAP

Australia's airlines and aviation industry seek to attract more women – mostly

WRITER: JOHN WALTON

Commercial aviation is staring down the end of a demographics barrel. It's rare that Boeing and Airbus or Qantas and Virgin Australia agree on much, but the two global airframers agree that more than a million pilots and maintenance technicians will need to be trained in the next twenty years, and Australia's largest airline groups are spending time, senior level focus and money on ensuring they have the resources to meet soaring demand.

The problem is, the industry is currently missing out on fifty percent of the global talent pool: women. Fewer than five percent of pilots are women — Qantas says three per cent, worldwide — and the proportion of maintenance engineers is smaller still. Commercial aviation, and particularly the technical world of the flightdeck and maintenance hangar, is disproportionally dominated by men, although airlines, airframers, suppliers and the rest of the industry are, largely, looking to attract more women into the business.

"Between now and 2036, the aviation industry will need to supply more than 2 million new commercial airline pilots, maintenance technicians, and cabin crew," Boeing's 2017 Pilot and Technician Outlook forecast stated, noting that of those numbers 637,000 will be commercial airline pilots and 648,000 will be maintenance technicians.

"Over the next 20 years," Boeing noted, "the Asia Pacific region will lead the worldwide growth in demand for pilots, with a requirement for 253,000 new pilots. North America will require 117,000, Europe 106,000, the Middle East 63,000, Latin America 52,000, Africa 24,000 and CIS/Russia 22,000."

With more mobility than ever for technical and flightdeck expertise, ensuring more women in aviation isn't just the decent thing to do. It's a firm business case that companies with a grip on their future are taking very seriously. Moreover, diverse workforces that reflect the world around them are, simply, better at achieving the objectives their companies set out, and creating them is hard: it's not just a letter-of-the-law, box-ticking exercise.

As an English-speaking country in the Asia Pacific region, with English the language of international aviation, Australia and Australians have a home-ground advantage. But that also means that Australian pilots, engineers and other technical experts are in demand internationally.

The Qantas Group has committed to a 20 per cent intake for its 2018 cadet pilot program. QANTAS

The Qantas Group Pilot Academy shows how seriously Australia's largest airline is taking the potential shortage. Late last year, chief executive Alan Joyce said at a Qantas-hosted Male Champions of Change Leaders' Forum in Sydney, "next year, when we need to hire more than 300 pilots across the Group, I want us to up the ante with our female pilot intake."

"Qantas Group commits to a 20 per cent intake of women in our 2018 cadet program and we will double that number over the next decade to reach gender parity, at intake, through our Nancy Bird Walton Initiative. This initiative will support girls and women on a merit-based path to a career as a Qantas Group pilot. We'll target STEM [science, technology, engineering and mathematics] in schools, flying schools and cadet programs to achieve our aspiration. It is going to take a concerted effort but it's time for a moonshot vision for gender equality."

'I want us to up the ante with our female pilot intake.'

ALAN JOYCE

Chris Smith, general manager of operations for Boeing Defence Australia, is equally clear that action is needed.

"Boeing Australia recognises strong leadership is required to increase the number of women within the Australian aerospace industry. Boeing Australia has appointed dedicated resources to review and implement diversity and inclusion practices nationwide, resulting in a Diversity Action Plan endorsed and supported by the Boeing Australia Holdings board of directors."

"Aligned with Boeing's global Diversity & Inclusion strategy, the Boeing Australia goal is to increase the number of women in leadership and technical roles and across the business overall," Smith tells *Australian Aviation*.

This strategic view is critical for any airline, airframer or other company working in commercial aviation: businesses are stronger, more customer-focused, more productive and better places to work when they reflect the society they operate in, the staff they employ, and the markets they serve.

Virgin Australia sets and achieves goals, seeks to do more

"Attracting women to what is typically male-dominated areas, and showcasing that there is excellent career opportunities and progression," is the greatest challenge facing Australia's aviation industry as it seeks to meet the demand for the future years, Lucinda Gemmell, Virgin Australia's group executive for people, tells *Australian Aviation*.

Gemmell's colleague, Virgin Australia head of maintenance Cleo Alexander, concurs.

"The greatest challenge in engineering is promoting the role and convincing women that it's a rewarding career, and making more women aware of the role. Engineering, when it comes to aviation, is shift-work, which can be challenging especially when trying to balance work and family. However, Virgin Australia promotes a flexible workplace to make it work for everyone."

"We recognise that, typically," Gemmell says, "the technical areas of aviation are male-dominated, but we are working hard to challenge that and improve gender imbalances in these areas. We have a number of initiatives in place across our organisation to attract and retain the right talent, irrespective of their gender."

Those include a pilot cadetship program, which creates a direct pathway into the industry, and also lines up a job with Virgin Australia after successfully completing the course.

The airline works with local initiatives, like the Aerospace Gateway to Industry Schools program, which boosts the growth and development

of a capable workforce base for Australia's aviation industry. Students regularly tour the Brisbane operations control centre and Virgin Australia's maintenance hangar to encourage them to join the industry.

"The Network Operations team supports the crewing and running of the airline on the lead up to, and day of operations," Gemmell says.

"Over the past three years the team has significantly increased its female representation. Now, it's not uncommon to see a near all-female team running Operations Control and Crew Control. The female representation increase in this area was driven through recruitment and significant female participation in the foundations leadership course through our partnership with University of Queensland Business School, Executive Education."

More widely, Virgin Australia is a participant in industry groups like Women in Aviation/Aerospace Australia, discussing gender diversity and seeking to increase women's participation in aerospace and aviation in Australia, as well as providing a network for women to network within the industry, attract future generations into aviation and aerospace, and to promote excellence within their careers.

"We continue to explore further opportunities through partnerships and memberships of this nature to support a long-term strategy to encourage people to consider a career as a pilot," Gemmell says.

"As with all of our attraction strategies, this will be underpinned with a desire to have representation from diverse groups."

Across the Virgin Australia Group, the airline has set itself several objectives, including to maintain the proportion of women in what it calls CEO-1 and CEO-2 grades (direct reports to the Group CEO, and their direct reports, including Tigerair Australia) above 36 percent. The Group's chairman is a woman, Elizabeth Bryan, as is newly-appointed chief executive officer for Tigerair Australia Merren McArthur, and currently 50 per cent of the executive team reporting to the CEO are women. It is also carrying out an ongoing review of gender pay gaps.

"We are focused on developing female leaders of the future and to assist with this we have dedicated talent processes to identify, develop and plan for movements of high potential women into senior management," Gemmell says.

Tigerair's Deborah Lawrie with Virgin Australia pilot Amelia McKay. Lawrie won a landmark sex discrimination case against Ansett Airlines to become the first woman pilot employed by a major Australian airline.
VIRGIN AUSTRALIA

"We have run a number of targeted development programs for women, including the Chief Executive Women program we run, where we sponsor a small group of women each year in a mentoring course. The inaugural course ran last year, which was a great success, and we look forward to continuing this program again this year."

Virgin Australia is also working on the "pipeline issues" of getting more women into technical education and supporting them during and after their studies.

"Last year, Virgin Australia and Campus Travel opened up applications for Travel Grant: Recognising women in STEM. We received over 1,000 applications for the $6,000 grant. In December 2017, the successful recipient was a Queensland University of Technology PhD student working in STEM who says she will use the money to further her research and work with a leader in her field in London," Gemmell says.

Qantas is one of the few aviation companies willing to speak about its gender balance statistics. QANTAS

Boeing highlights STEM education and the pipeline

Boeing Australia, too, is keen to increase the number of talented women in its business.

"Boeing Australia is a key sponsor and keen supporter of external organisations nurturing young women in aerospace such as the Power of Engineering group and Women in Aerospace/Aviation Australia. The company has taken a deliberate approach to foster relationships with our Australian university partners and schools with a focus on STEM," Chris Smith, general manager of operations for Boeing Defence Australia, tells *Australian Aviation*.

"This has included dedicated scholarships for young female and male engineers and technical students, and student internship programs to provide real-world experience in aerospace jobs and grow the talent pipeline," Smith says.

"In recent years at Boeing Defence Australia, a targeted approach has resulted in a balanced intake of talented females and males through its graduate and intern programs. Boeing Australia also sees mentoring relationships between senior leaders and future female leaders as critical to retaining top female talent."

The end goal: raising the number of women in technical roles, leadership positions, and throughout the company.

"Elements of the strategy include proposed unconscious bias training for leaders, a recruitment review of hiring and retention practices to ensure a talent pool of qualified women and men, the introduction of a Boeing Women in Leadership program, nationwide International Women's Day events, and establishment of a gender working group to address specific tactics in the areas of leadership, culture and talent," Smith says.

But Rex says initiatives are "an insult"

Regional airlines are a key part of the commercial aviation ecosystem, and face particular challenges in training and retention of pilots, engineers and key technical staff.

But responding to questions from *Australian Aviation* about making aviation a more attractive career for women, gender imbalance, and pipeline problems a Rex spokesperson would say only: "Each position in the Rex group is filled on the basis of merit. To have special affirmative initiatives to promote the number of women in the workforce is reverse discrimination and an insult to women."

Regional Express has no women on its board of directors nor on its senior management team.

'A targeted approach has resulted in a balanced intake of talented females and males.'

CHRIS SMITH

Qantas is on an upward climb, seeks to increase trajectory

Qantas is one of the few aviation companies willing to speak about its gender balance statistics. With a global women pilot proportion of just three per cent, even Qantas's existing work has only achieved a rise of 15 per cent in its domestic and international pilot pipeline, where women now make up 18 per cent.

The current state of Qantas: "overall, across all of our airlines, including Jetstar and QantasLink, we are at just over five per cent female pilots – around 190 women compared to more than 3,300 men," Alan Joyce said in November, shortly before the departure of erstwhile Jetstar CEO Jayne Hrdlicka from the aviation industry.

"We can't dismiss this gap by saying that family commitments make a career as a pilot unsuitable for a woman. Not when we know that our cabin crew have similar rosters and 68 per cent of our flight attendants are women. The increases are certainly a move in the right direction and proof of the power of knowing your numbers and challenging your teams to do more," Joyce admits.

"But until we identify and accept the points of weakness in our systems and processes, female pilots will remain in the minority. We have to look deeper into the issue and really understand the barriers and entrenched bias in

a system so we can forge a better way forward. We need to ask why it exists and, importantly, be prepared to hear, accept, and act on the answer."

Regarding the question of gender equality, Joyce says, "At Qantas we have asked the question and have made some gains. We've done it by identifying and removing the barriers to participation and making our workplace more inclusive – a place where women can and do thrive. We have relentlessly pursued new thinking and revisited the concept of unconscious bias."

Notably, Joyce highlights that "the change we've made to our recruitment policy and the governance around it is also having a significant impact. Every month we measure our application rates, our shortlists and the gender balance on interview panels. Again, it's about knowing the numbers. And we take heart from our wins – one third of the Qantas board are now women; four out of nine of my leadership team are women; 43 per cent of our overall workforce are women; and 50% of our graduates are women. We are also proud of the fact that we reached – ahead of time – our target for women to make up 35 per cent of our senior management team."

"We also achieved gender pay parity at senior management level and, for the first year, our external recruits into senior roles have been more than 50 per cent women," Joyce says. "What was particularly pleasing with that achievement were the gains in technology roles. In our most recent wave of recruitment in IT, we saw over 62 per cent of offers made to women."

"We are doing things differently to attract and offer women roles and we are doing better. But, I'll put my hand up and say, for all the gains I've just listed, they could have – and should have – been better," Joyce admits. "We did not apply enough rigour to processes for promotion into senior roles and, as a result, we missed a golden opportunity to surpass the target we had set ourselves. We also know, through interviews and surveys, that we need to be relentless about offering flexibility. We should not be losing talent and knowledge because of inflexibility."

"We're prepared to set goals and expectations right across our organisation. We'll continue to challenge our employees' ideas of gendered roles and leadership and keep breaking through the embedded barriers in our systems," Joyce says. "There is no question that we are doing better, but we need to work together to get this change happening faster."

International best practice

Enginemaker Pratt & Whitney, says the company's senior director for talent Tara St Pierre, is working aggressively to improve gender representation. "Our goal is to have gender parity (50 per cent) in leadership roles across the company by 2030."

Some of North America-based Pratt & Whitney's work involves new systems. "We are deploying technology that provides feedback on the content of the job description and suggests wording that attracts more talented and diverse applicants. Data shows that a strongly written, gender neutral job posting will increase the number of women who apply by 23 per cent on average," St Pierre explains.

But personal involvement is important too. "We pair senior executives with high potential protégés to ensure career advancement by advocating on the protégé's behalf, understanding their career goals, providing feedback and publicly supporting them," St Pierre says.

"We have been successful promoting women into senior roles, and now our focus is on filling the pipeline and accelerating growth through innovative leadership development programs, coaching, efficacy training and sponsorship," St Pierre says.

"Our Employee Scholar Program provides unmatched opportunity for education. UTC has invested more than $1.2 billion to further our employees' formal education. Since 1996, more than 38,500 degrees have been earned by employees in more than 60 countries, and more than 6,000 employees are currently enrolled."

In addition, St Pierre says "our employees volunteer to bring STEM awareness and education to students in schools and activities worldwide, such as FIRST Robotics. We also support global organisations and initiatives that support STEM, including Women in Aviation International's Girls in Aviation Day and Junior Achievement Career Days."

Pratt & Whitney has also designed a work re-entry program, searching for candidates returning to the workforce after a break of more than two years, a multi-skilled talent pool that includes many women who have chosen to take a break to work within the home. The company also offers "UTFleX", a flexible working program.

"We actively highlight our extraordinary women in leadership to applaud their success and inspire others. We run campaigns for celebratory opportunities like Women's month and spotlight accomplishments regularly, like the recent appointment of Pratt & Whitney's Jonna Gerken to president of the Society of Women Engineers," St Pierre explains.

"Pratt & Whitney's Women's Council recently published the book, *Powering the Eagle…Over 90 Years and Counting: Pratt & Whitney's Inspirational Women*, to celebrate some of our extraordinary employees," St Pierre says. "We've also launched a Brand Ambassador program, with executive leaders, like Mary Anne Cannon, vice president of Commercial Programs, promoting opportunities and initiatives across the company."

Understanding the context and addressing the needs of women who have intersectional identities — such as women from minority backgrounds, women who identify as LGBTQIA+, military and ex-military women, women with disabilities, and so on — is crucial to building a diverse workforce. Pratt & Whitney's employee resource group networks work together to focus on these groups, helping the company to best meet their needs and benefit the company.

As an example, St Pierre says, "we work with recruiters and partner universities to find people with disabilities, an under-leveraged talent pool. Our employee resource group also runs a Faces of Ability campaign featuring employees who identify with disabilities or care for those who do." In addition, "we partner with veteran and military organisations to source candidates and provide external mentorships, help with resumes, etc."

"Our greatest challenge is attraction and retention. The market is competitive," St Pierre concludes.

"We aren't the only company focused on hiring diverse candidates. But, we believe in our offerings and continuously work towards ensuring we are an employer of choice, and we're actively building a culture of empowerment and inclusion."

WOMEN IN AVIATION

LOOKIN

NG UP

WRITER: SOLANGE CUNIN

Working within aerospace is usually thanks to a lifelong passion and interest. Let's face it, aerospace is an awesome (in the literal sense) and inspiring industry to be involved in. Because of this, it has always attracted highly talented and enthusiastic people. But discussions around International Women's Day have highlighted whether the aerospace industry is attracting diverse talent.

The conversation around workplace diversity has evolved to the point where it is a consumer expectation that organisations have, or are working towards, an inclusive and diverse workforce.

But despite current efforts, the aerospace industry isn't hitting the mark.

Just 20 per cent of employees in the aviation industry are women, according to a 2016 report by Australian Industry Standards. This falls short of the 46 per cent seen across most other industries in Australia. Alarmingly, this figure drops to a mere 10 per cent when looking at specialised roles within the industry, largely because of the disproportionate amount of women working in flight attendant roles.

Women only make up five-nine per cent of pilots. This startling figure becomes alarming when considering that Boeing forecasts the need of an additional 637,000 commercial pilots in the next two decades. But where will all these pilots come from if less than 10 per cent of them will be female?

It's not all doom and gloom, with the recent graduation of Australia's first female fighter pilots. Aerospace businesses are joining the diversity conversation as well. Organisations like Lockheed Martin, the Australian Army and the RAAF are all partnering to support leading industry body Aviation Aerospace/Australia's Women in Aviation/Aerospace initiative, while Qantas is continually pushing the boundaries in progressive leadership and strategy.

The wheels are turning, and industry is moving towards diversity.

For young women studying and entering into the industry now, their journey will undoubtedly be easier than that of women before them. But there are still hurdles and barriers that are preventing aerospace to perform as well as other industries.

One factor to consider is the time it takes to overcome stigmas and stereotypes. For decades (or longer)

aerospace has been considered a man's job and a boys' club. Clearly the practical aspects of travel played a role in prohibiting women from participating, but now that the days of women needing to stay near the family home to take care of children are over, there is a proactive effort to counteract these long-established norms and stereotypes. This effort has to be sustained over time. It took time to recover from these old social norms and update them to current standards.

A barrier that women entering the industry face is unconscious bias – including from women. While work can be done to remove the masculine phrasing of job descriptions, and heritage processes and systems that were designed by and for men, unconscious bias is tough to combat directly.

Unconscious bias starts with girls themselves, how they evaluate their own successes and capabilities at university and before. How they position themselves against their peers. It affects what roles girls even apply for and how they articulate their value proposition. All of this happens before they reach industry where they will then battle the biases of others as well.

Of course these biases are formed before higher education, starting with influencers at school, at home and in the media. Role models at this stage may not be informed of changing career trends or opportunities, or they might just not be speaking about it at the right times.

The positive is that there is an abundance of opportunities for girls to learn STEM at school, with more programs and focus than ever being applied to encourage girls into STEM.

The shortcoming of these efforts may simply be in joining the dots of what careers that leads to and what their ambitions could be.

Role models lead to greater ambitions

Having strong, positive role models and mentors is paramount when trying to encourage more women to choose a career in any industry. While there are plenty of examples that disprove the saying "you can't be what you can't see", having examples of people to point to and learn from, does make achieving that career seem much more realistic.

In 2013, a study by The Glass Hammer and Accenture found that: "The vast majority (83.3 per cent) of women in tech who said they wanted a C-Suite job also said they had a role model."

There are some tremendous women working in the aerospace industry who would make incredible role models for anyone wanting to enter the industry. While it isn't possible to make an exhaustive list of accomplished and ambitious women within the aerospace field, the following women are quite inspirational and worth learning about for any young girl with an aerospace dream:

- Claudine Ogilvie, CIO at Jetstar Airways;
- Andrea Boyd, ISS flight operations engineer at European Astronaut Centre;
- Kathleen Boseley, head of independent designs at Airbus Group;
- Angela Wiggins, chief counsel at BAE Systems
- Squadron Leader Marija Jovanovich, RAAF test pilot;
- Flavia Tata Nardini, CEO and co-founder at Fleet Space Technologies.

Role models and mentors help girls in realising what is achievable. A/AA

'It took time to recover from these old social norms.'

What is being done to help?

There are a number of groups advocating for more women to join the aviation and aerospace industries. In March, a social media campaign launched on International Women's Day by Aviation/Aerospace Australia called #givegirlswings. Campaigns like this aim to fight stereotypes and provide awareness on what types of careers are available in the aerospace industry.

Campaigns like #givegirlswings, similar to the #ILookLikeAnEngineer campaign in 2015, aim to harness social media, not only fighting stereotypes more broadly, but reaching a younger audience of women who might be considering their career options.

Industry bodies like Aviation/Aerospace Australia and Engineers Australia advocate for higher rates of female participation, encouraging women to progress and succeed within the industry as well as grass roots educational initiatives around ensuring young girls have the STEM

skills they will need to join the aerospace industry.

To encourage women who are at the stage of entering university to continue their studies, there are many incentives. Most major universities around the country offer scholarship programs for women entering studies within STEM fields which may turn the dial for those who are choosing between two or more different areas to study. Once at university, the student-run branches of groups like AIAA and AYAA offer a range of support, networks and seminars to support all aerospace students.

At a younger level, the effort to encourage school-aged girls into aerospace is fragmented. The need for young Australians to pick up STEM skills more broadly dwarfs the efforts of any particular industry. Programs like Tech Girl Superheros and Go Girl, Go for IT, have good reach across the country for encouraging young girls to focus on general technology skills.

But there is very little in the way of aerospace-focused programs for girls.

'The effort to encourage school-aged girls into aerospace is fragmented.'

There are school programs aimed at encouraging students in general to take on the aerospace industry, including programs like Cuberider's space program on the ISS, Zero Robotics competitions and the iSTEM program. There are also a number of larger aerospace organisations which sponsor and support local schools in one-off projects or mentorship.

If the aerospace industry wants to attract more people than those who have loved the industry since childhood, then a more collaborative and organised approach to high school outreach is needed.

What if this is all for nothing?

In February 2018, a study was published by researchers at Leeds University called 'The Gender-Equality Paradox in Science, Technology, Engineering, and Mathematics Education'.

This study found, much to everyone's surprise, that in countries which had the highest rates of gender equality, there are some of the smallest number of female graduates in STEM degrees. Countries that are ranked top in the world for gender equality, like Norway and Finland, have some of the worst rates of gender parity in STEM courses, while the opposite was found true for countries ranked at the bottom of gender equality like Algeria and UAE, which have mostly women graduating from STEM degrees.

While this research is new, it does cast a new light on current STEM education efforts. The researchers provided some suggestions as to what might cause this paradox to occur. It may be to do with the stability and assuredness within these countries which enables women to choose what they would enjoy doing, as opposed to what they 'should' do, or choose a career for economic reasons. It may also have to do with heritage stereotypes of the West which mightn't have existed in the same way as in countries like Iran.

While the referees are still out deliberating what this new data and insight means, we should remain calm and continue with our efforts.

An image from Aviation/Aerospace Australia's #givegirlswings social media campaign launched on International Women's Day. A/AA

WOMEN IN AVIATION

SUCCESSFUL CHANGE

WRITER: BAZ BARDOE

In aerospace it is a given that we must be innovative. In just a century we have gone from the Bristol Boxkite which could do little more than rise a few hundred metres from the ground and slowly turn, to the introduction of the F-35 Joint Strike Fighter, which may as well be from another planet in terms of the difference in technology. What lies ahead will need to be every bit as stunning. We have some big challenges. We need sustainable fuels. New materials beckon. Carrying capacities and many other elements urge us to innovate.

In the aerospace industry there is a pride in how innovative approaches have positively impacted upon the human experience, flowing on to everyday aspects of life. Next time you go on holiday overseas think about how safe, convenient and comfortable it is to travel at hundreds of kilometres an hour. But with what lies ahead the industry will never be all it can be unless we draw upon as wide a talent pool as possible.

At the most recent Women in Aviation and Aerospace summit in Melbourne there was a record attendance by men. There has been great progress in the industry and increasingly a shift in consciousness away from seeing the participation of women as a special case, to a realisation that what makes the industry friendly to women, makes it better for everyone. This was a point underscored by Kristen Raby, operations manager of Nova Systems. Raby is a former Canadian Air Force test flight engineer with some impressive 'firsts' to her name. She is also a humble person who stresses the need to lead by example and engage with your workforce in a genuine fashion – sound advice for anyone. At Nova Systems a lot of work has been done to create an award winning workplace, with high retention rates. People want to work there, and a big part of this has been making it gender inclusive.

"When looking to tackle this important issue, Nova Systems initially focused on Women in Nova, but over time we broadened the discussion around Diversity and Inclusion to include all of our employees," says Raby.

"We realised that rather than saying 'good for women' it was more

The RAAF graduated its first two female fighter pilots late last year. DEFENCE

about creating an environment that was 'good for everyone'. Promoting policies and practices that embrace the behaviours we want across our entire team creates a stronger culture within a more inclusive company. Nova Systems consistently features in the top 25 Best Places to Work in Australia, coming #11 in 2016 and 2017 for organisations with over 100 employees."

And it is not only a great place to work, it is growing fast which further underscores Raby's point that everyone wins.

The role of men in developing a more inclusive approach is vital, and through forums like the summit men are being involved in a process where everybody wins.

"I wasn't expecting many men to attend the summit," said Flight Lieutenant Rashmin Gunaratne from the Defence Aviation Safety Authority.

"I was also expecting (and was prepared to receive) a one-sided discussion against men. On both accounts I was pleased to say that I was wrong. It was quite interesting to hear what some of the leading companies and organisations have been implementing. There were a number of good ideas which I believe a lot of the participants were able to take back to their organisations. I also believe it's important for more men to attend these summits as successful change requires all parties involved to commit to that change."

RAAF engineer SQNLDR Samantha Hearne. DEFENCE

The Air Force has made a strong commitment to being an industry leader in terms of supporting gender diversity and the results are becoming increasingly apparent. A notable first occurred recently when the first women successfully completed fast jet conversion.

"The Royal Australian Air Force is committed to developing diverse and inclusive teams that contribute to Air Force capability," a Defence spokesperson stated.

"Air Force values the contributions of its people and recognisses its members' combined knowledge, skills and experiences are an ongoing essential element of its success. Air Force's current and past female aircrew have done an outstanding job. All job roles in Air Force are open to women, including fast jets."

This hasn't happened by accident. The organisation established Project WINTER (Women In Non-Traditional Employment Roles), which aims to increase female participation in roles where women comprise less than 15 per cent of an employment group. Air Combat Group (ACG) – the formation within Air Force that has ownership of the fast jet capability – is also "…reflective of the changes in Australian society that have seen females expand into jobs previously dominated by males," the spokesperson added.

"ACG has multiple initiatives to increase the number of female fast jet aircrew following establishment of a dedicated team in 2009 to examine opportunities to attract and retain women. A key goal of recruitment is to increase awareness of fast jet aircrew as a career option for women. Air Force is achieving this through targeted advertising campaigns and specific activities, such as Experiential Flight and Aviation Camps for Women and a travelling Super Hornet simulator."

Much like Nova Systems there have been some notable flow-on benefits such as a more individualised approach to training.

"ACG has altered the way it conducts its fast jet pilot training. The previous train and test culture has changed to adult learning principles with each individual trainee, male or female, understanding their strengths and limitations and then working to overcome those limitations to reach their full potential as fast jet aircrew. After training, females are provided with the same career progression opportunities as their male colleagues, including operating aircraft such as the F/A-18A classic Hornet, F/A-18F Super Hornet, EA-18G Growler electronic attack aircraft and the F-35A."

And importantly Air Force is also building a work culture that balances a career with raising a family further underscoring the point that the things that make a workplace more friendly to women tends to make it good for everyone.

Squadron Leader Samantha Hearne is an aviation engineer at the Defence Aviation Safety Authority who has the vital job of making sure propulsion systems "have been designed to the stated specifications" and that they "are operating safely". Much like Kristen Raby she has some sage advice that would benefit anyone.

"Don't rely on stereotypes or propaganda," she says. "Investigate the career options you are thinking about. Talk to people who actually do the job, speak to different organisations in different fields. There are a wide variety of career paths out there, no two will be the same, so do your research so you can find an area that you are truly passionate about."

As an innovative industry Aerospace has become used to being recognised for technological benefits that flow on to many other areas of society. As a progressive industry some good work is being done in creating new models of workplaces that are more inclusive. We are seeing that the sorts of things that make the industry better for women make it better for everyone.

Concepts such as flexible working arrangements build a better work/life balance for everyone. Different ways of thinking are allowing us to approach and solve complex problems more effectively. Innovation comes from being challenged in our thinking. We must be open to this and draw upon the widest range of talent and intellect in order to remain innovative and competitive.

And creating an open and friendly workplace that feels welcoming to everyone makes for a more pleasant place to work. The Aerospace industry can provide an example that everyone benefits from and the summit provided a focal point for reinforcing this message.

IT TAKES

Singapore Airlines takes its first Boeing 787-10

A VILLAGE

WRITER: JORDAN CHONG

9V-SCA is welcomed to Singapore. SIA

Singapore Airlines (SIA) Boeing 787-10 9V-SCA's arrival at Changi Airport after its epic ferry flight from Charleston, via Osaka Kansai, was indeed a cause for celebration.

Not only did it mark the first delivery of a 787-10 to an airline customer anywhere in the world, it also made SIA the first airline group to have all three Dreamliner variants in its fleet, with the 787-10 in Singapore Airlines colours joining the bright yellow -8s and -9s already flying with its low-cost carrier unit Scoot.

Add to that the launch of some new cabin products, such as flat beds for business class, and it is easy to see why the official arrival event drew a sizeable crowd of special guests, airline executives, suppliers and a host of local media alongside their international counterparts brought to Singapore courtesy of SIA, including *Australian Aviation*.

The festivities represented the beginning of a new era at SIA. The 787-10, with its improved seats and cabin amenities compared with older aircraft it is replacing, will allow the airline to resume capacity growth and take up the fight to its competitors on regional and medium-haul routes.

'The 787-10 will allow the airline to resume capacity growth.'

The morning of March 28 2018 also represented the culmination of more than a year's work across the whole company, from the engineering teams preparing to maintain and service a new fleet type, to the pilots and cabin crew responsible for operating the aircraft.

Add to that SIA's product development team's work with Stelia Aerospace to heavily customise the new business class seat, which offers direct aisle access and lie-flat beds for passengers on an aircraft SIA plans to serve destinations no more than eight hours away from its Singapore hub.

Australian Aviation spoke to a couple of key players at the official arrival event about this collective effort to bring the 787-10 to Singapore.

SIA HAD 19 PILOTS QUALIFIED PRIOR TO ARRIVAL INTO SINGAPORE

Singapore Airlines pilot-in-charge for the 787 Captain Ian Cheng operated the Osaka Kansai to Singapore leg of the delivery flight.

Having previously flown the 777, Captain Cheng is among the first 19 of SIA's qualified instructors and line captains to fly the 787-10.

The first training sessions for the 787-10 began in February, with the "differences course" as it is known lasting about three weeks, interspaced with rest days and ground training.

There was simulator training in Singapore, as well as some aircraft flying on the 787-10 at Boeing's North Charleston, South Carolina facility.

"The similarities of the 777 and the 787 is very close, probably about 80-90 per cent similar," Captain Cheng explained to *Australian Aviation* on the flightdeck of 9V-SCA shortly after landing in Singapore.

"It's almost as similar to the 777 as it can be. I think from the pilot's point of view, the 787 feel is a bit more responsive."

SIA officially took delivery of its first 787-10 on March 15. However, the aircraft did not leave Charleston on its delivery flight to Singapore until March 26 with a host of special travellers including chief executive Goh Choon Phong and Boeing Commercial Airplanes senior vice-president for Asia Pacific and India sales Dinesh Keskar, on board.

In between, Captain Cheng and his colleagues did some crew flying with the aircraft, including numerous 20-minute flights between Charleston and Myrtle Beach, which are only 73nm apart.

"It is just to get ourselves qualified," Captain Cheng said.

Since that first delivery, SIA has

taken a second 787-10 and begun commercial flights to Bangkok and Kuala Lumpur. And there are three more 787-10s planned for delivery in May.

These flights will also help get more pilots, currently being drawn from SIA's 777 pilot pool, qualified to operate the 787-10.

And as a qualified instructor, Captain Cheng will be responsible for helping build up the number of qualified 787-10 pilots.

"There will be an instructor and then there will be a trainee," Captain Cheng said.

"If I am training a captain, the captain sits here in the left seat and I am qualified to sit in both the right and left seat so I sit in the right seat.

"If I am training a first officer, he or she is only qualified on the right-hand seat so I will operate from the left-hand seat.

"By the end of May we would have qualified approximately 80 pilots."

ENGINEERING BENEFITS FROM SCOOT'S EXPERIENCE WITH 787

Singapore Airlines senior vice president for engineering Lau Hwa Peng said having Scoot operate the smaller 787-8 and 787-9 since 2015 has been of great assistance in preparing for the arrival of the 787-10.

"Typically, if it is a brand new aircraft we would have to start at least two years ahead of the entry into service," Lau told *Australian Aviation* in an interview.

"For the 787-10, we have the privilege of already supporting Scoot on their 787-8 and 787-9. They started their 787 operations in 2014 so we already have three years of experience handling the 787.

"Because we already had the Scoot experience, it started about 12 months before EIS."

Nonetheless, there is a lot of preparation involved, including dealing with suppliers and the original equipment manufactures (OEM) to make sure spares were available, manuals were ready, and people were trained.

While the bulk of the systems on the Dreamliner family of aircraft are the same, Lau noted the two key differences from a maintenance perspective were the -10's landing gear, which features a semi-cantilever bogey to help move the centre of gravity slightly in order to achieve better rotation, and the air conditioning system owing to the larger fuselage.

787-10s on the Charleston flightline. BOEING

Replacing Airbus A330-300s and Boeing 777-200/200ER/300s with the 787-10 has also meant some changes to how SIA's Engineering unit manages its staff, given the different maintenance profiles of these modern aircraft.

For example, an A330 required a heavy maintenance check, which involves stripping the aircraft and engines down to their bare bones to inspect for corrosion and damage that cannot be seen in normal operations, every six years.

The 787 requires a heavy maintenance, or D check, every 12 years.

It is a similar story for the more regular A check, which is required every three to four months – a 777 needed to be in the hangar for three days, while the 787 could have its A check completed out on the flightline in 12-18 hours.

"As a result of these modern airplanes, the heavy maintenance checks are spaced out a lot more so the Engineering Company would have to look at what other opportunities they can do in between to make sure they keep their workforce gainfully engaged," Lau said.

"Skilled engineers and technicians are hard to come by. So they will be trained on the new airplane in order to be able to work on the newer generation aircraft.

"This airplane, from a maintenance point of view, represents a step change from older generation airplanes. Boeing has lived up to its marketing pitch about the 787 being about 16 per cent lower maintenance cost than the 777."

Meanwhile, SIA's Training Centre has added a 787-10 door and other assorted cabin furnishings to ensure its world famous cabin crew are qualified to work on the 787-10. A 787-10 course for cabin crew already qualified to work on other aircraft takes about three days.

A ribbon cutting to signify formal acceptance of the first customer 787-10. BOEING

LONG-HAUL COMFORT ON EVEN THE SHORTEST OF FLIGHTS

SIA's 787-10s have 36 business class seats and 301 economy class seats for a total of 337. The airline expected to have eight of the type in service by March 31 2019.

While earmarked for regional and medium-haul routes that range from the short hop to Kuala Lumpur to six- and seven-hour overnight flights to North Asia, SIA's 787-10s will feature a new-design business class seat in a staggered 1-2-1 configuration offering direct aisle access for every passenger and which converts to a 76in lie-flat bed.

This represents a significant upgrade from the angled lie-flat business class seats in a 2-2-2 layout without direct aisle access on the A330-300 and 777-200.

The economy seats are nine-abreast

and have 32in pitch, as well as the newest generation seatback inflight entertainment system in the SIA fleet.

The new business class seats were officially unveiled to the world shortly after the aircraft landed at Changi Airport and represented part of a US$350 million investment in new 787-10 cabin products.

In addition to the improvement in cabin amenities, the switch to the 787-10 also represented a capacity increase of 18 per cent compared with the 285-seat A330-300s it is replacing.

Further, the 787-10 has 27 per cent more seats than SIA's 266-seat 777-200s.

Singapore Airlines chief executive Goh Choon Phong said the 787-10 was a very important addition to the fleet.

"I have very good confidence that it will set a new level of comfort for people travelling on medium-haul because the product we are having on the 787-10 is something that is even better than what others are deploying on long-haul," Goh told reporters in Singapore shortly after stepping off the 9V-SCA delivery flight.

"When we introduced the A350 we said it was a game changer because of the economics it can bring and the products that we can have on the plane. The 787-10, similarly, is going to be a game changer but this time around it is going to be for our medium-haul and regional routes.

"So I am sure that it is something all our customers will love to travel on."

Aviation thinktank CAPA – Centre for Aviation chief analyst Brendan Sobie said the extra seats on board the 787-10 would allow SIA to increase capacity and reduce unit costs on some of its densest routes, particularly at slot-constrained airports in Asia.

Sobie noted SIA had not been able to add capacity in a number of regional markets for several years, meaning the 787-10s represented the ability to catch up with demand, rather than getting ahead of an expected increase in demand.

"SIA is confident that the increase in capacity is manageable, given the increase in demand for air travel to and from major Asian cities," Sobie said in a research note published on April 3.

"At several major airports in Asia more frequencies are not an option due to slot constraints, so the only growth option is upgauging.

"The 787-10 has much lower unit costs than the A330 or older 777

Singapore Airlines expects to have 80 pilots qualified on the 787-10 by the end of May.

variants, giving SIA better capability to compete for price sensitive economy passengers in an extremely competitive market."

PERTH TO WELCOME AUSTRALIA'S FIRST 787-10 FLIGHTS

SIA began commercial service with the 787-10 on Tuesday April 3, when 9V-SCA flew the SQ970/973 Singapore-Bangkok-Singapore rotation, followed by a trip to Kuala Lumpur and back.

After a month or so of short-haul flights for crew familiarisation and to allow pilots to build up hours on the type, its first scheduled medium-haul route for which SIA purchased the aircraft will be Singapore-Osaka, starting on May 3.

Perth is the second announced scheduled destination for SIA's 787-10s, starting with a special launch flight landing on the afternoon of Monday May 7.

Then from May 8, the SQ215/216 rotation will switch from A330-300 equipment to the 787-10. The flights are scheduled as an evening departure from Singapore, touching down in Perth just before midnight. After about an hour on the ground, the reciprocal SQ216 takes off a little after 0100 for an early morning arrival back in Singapore.

Currently, SIA flies four times daily between Perth and Singapore with a mixture of Boeing 777-200/200ER

SIA's 787-10 introduces new business class seats. SIA

and A330-300s. The change of gauge on one of those four flights' aircraft represented a capacity increase of about five per cent.

SIA has 49 787-10s on order with Boeing. And alongside Scoot's 787-8s and 787-9s, the airline group is the first in the world to have all three Dreamliner variants in its operations.

However, it is unclear if all 49 787-10s will be delivered in SIA colours as the airline is also planning to take regionally configured A350-900s from later in 2018, albeit with fewer seats and a likely different proportion of business class and economy compared with the Dreamliner.

There is the possibility some of the 787-10s on order could be converted to the smaller 787-8 or 787-9 for further expansion at Scoot, or placed at the Scoot/Nok Air Thailand joint-venture NokScoot.

CAPA's Sobie estimated the 49 787-10 orders were likely too much for SIA's own needs.

Nonetheless, the aircraft represented a "fresh era of growth after a decade of flat capacity".

"However, SIA will need to manage the 787 fleet carefully, from a group perspective," Sobie said.

"Some network adjustments may be required to avoid too much overlap between Singapore Airlines and Scoot.

"How many of SIA's future 787 orders to allocate to Scoot and NokScoot will also need to be examined carefully.

"Ultimately all three airlines should be able to benefit from the 787's game-changing economics, and having all three variants in the group's arsenal provides optimum flexibility."

Goh said the 787 order book, as well as the profile of the rest of the fleet, was able to react to changing market conditions.

"This aircraft is for growth of course, but at the same time it is also for renewal," Goh said of the 787-10.

"So there is flexibility for us to determine how much growth and how much renewal. In that sense, we have a nimble and flexible way to manage capacity in response to the market demand."

The SIA chief executive noted the airline had not grown capacity to any great extent over the past six years due to the introduction of premium economy on its A380 and 777-300ER fleet, leading to a reduction in seats on a number of routes.

But the recent deliveries of the A350-900 and now the start of 787-10 aircraft joining the fleet meant SIA was entering a "new phase of growth".

Following Osaka Kansai and Perth, SIA's third route for the 787-10 will be Singapore-Tokyo Narita starting in mid-May.

787-10 MARKS END OF DREAMLINER DEVELOPMENT

The first delivery of the 787-10 to Singapore Airlines represented the final chapter of the aircraft type's development, with all three variants now in production and being delivered to airline customers.

Currently, a combined 12 787s roll out of Boeing's final assembly lines in Everett and South Carolina each month. The production rate will increase to 14 per month by the end of calendar 2018.

All 787-10s are being built at Boeing's North Charleston, South Carolina final assembly line.

The largest variant of Boeing's 787 program is capable of flying 6,430nm when configured with 330 passengers in a two-class layout, according to Boeing figures.

'SIA will need to manage the 787 fleet carefully, from a group perspective.'

BRENDEN SOBIE

At 68.2m, the 787-10 is a 5.5m stretch on the 787-9 that began flying in August 2014. The first 787 variant, the -8, made its commercial debut in October 2011 with launch customer All Nippon Airways (ANA).

The 787-10 received its amended type certificate from the US Federal Aviation Administration (FAA) in late January, following a flight test program that kicked off in March 2017 and accumulated 900 test hours.

Apart from SIA, airlines that fly to Australia and have ordered the 787-10 include ANA, British Airways, Emirates, Etihad, EVA and United.

Boeing's Keskar said he had no doubt the 787-10 would be a passenger favourite.

"I can attest that Singapore Airlines passengers are going to love flying on it short-haul, long-haul, medium-haul, anything they want to do with this airplane," Keskar said shortly after stepping off the delivery flight.

"The seats are outstanding even in economy class and the business class is one of the best I have ever seen."

Keskar said the three models in the 787 family offered airlines the option of deploying a "different size of airplane depending on the route".

"You can start a route with the 787-8, as it builds and gets like a high load factor then you take that airplane out and move it to some other route building and put a 787-9 in there and you do the same thing with the -10," Keskar said.

"That's why having this flexibility of -8, -9 and -10 is very important to the airlines.

"The beauty of it is, just like our 737 series, the engines, cockpit, systems, everything is identical and by doing so now the pilots are the same, engineers are the same, the mechanics are the same."

All 787-10s are assembled at Boeing's Charleston, South Carolina plant. BOEING

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MARIJA JOVANOVICH
ROYAL AUSTRALIAN AIR FORCE
AUSTRALIA

ATTITUDE FLYING

SQNLDR Maz Jovanovich and the "best job in the world"

WRITER: ANDREW MCLAUGHLIN

Every now and then, an aircraft design comes along that outlasts the working careers of not only its first generation of aircrews and maintainers, but those of their children and even their grandchildren.

One such long-lived aviation success story is the Lockheed P-3 Orion. Developed from the Electra airliner, more than 750 P-3s in multiple variants were built, and it has been the foremost maritime surveillance aircraft used by the US and allied air forces and navies since the early 1960s.

Among its operators and the wider aviation community the P-3 is known as a rugged, reliable workhorse. But Squadron Leader Marija Jovanovich, the executive officer (XO) of the RAAF's 10 Squadron, refers to the P-3 somewhat more passionately and descriptively.

"It's 135,000 pounds of romping, stomping, anti-submarine warfare machine!"

'Maz' has flown and had a love affair with the RAAF's AP-3C Orion since 2007. "It's a magnificent aircraft," she said. "Just look at its history, it's been around for so long and done so well.

"This is something you learn as a test pilot, how to look at aircraft critically. When you look at a P-3, its lines are so clean. Its speed range is from 115kt in the landing configuration to 405kt near sea level – it flies throughout that range beautifully. It's just an intricate system of ropes and pulleys, but there's something really magnificent about the engineering feat that is the P-3."

If being a squadron XO and a B Category Maritime Captain and an AP-3C Check Captain weren't achievements enough, Maz holds a Bachelor of Science (Honours) in mathematics and physics with a university medal in physics, she has a Master of Systems Engineering and a Masters of Science (Flight Test Engineering), and is an experimental test pilot.

Maz is also a member of the Royal Aeronautical Society and Australian Women Pilots Association, is an associate member of the Society of Experimental Test Pilots, and regularly speaks at professional and academic events around the country.

She is, like so many of her peers, and as the current Air Force recruiting ads promise, accomplished.

SCIENCE & ADVENTURE

Maz was born in the former Yugoslavia, and in 1995 at age 13 migrated to New Zealand with her parents to escape growing tensions and conflict in the Balkans.

As proof of the old adage that the apple doesn't fall far from the tree – both of her parents are surgeons – Maz excelled at sciences at school in New Zealand. So when she started thinking about life after high school, she was naturally drawn to opportunities that would combine practical science applications with adventure.

"I consider myself an engineer and scientist by training and

'It's 135,000 pounds of romping, stomping, anti-submarine warfare machine!'

MAZ JOVANOVICH

Maz Jovanovich with that "magnificient aircraft", the AP-3C Orion. DEFENCE VIA MAZ JOVANOVICH

The "world becomes your playground because of the many roles that the P-3 carries out". DEFENCE

education, but I'm also a historian and philosopher by choice," she said. "While science wasn't the only thing I was interested in, it was definitely where my gifts and major interests lie.

"It was probably when I was about 16 that flying started to crystallise as something I'd like to pursue in order to combine those two dual loves of adventure and science."

In 2000 Maz won a scholarship to go to Scouts New Zealand's Walsh Memorial Scout Flying School at Matamata where she logged 10.2 hours in a Cessna 152 and went solo after six hours. "One reason I wanted to do that was because I wanted to make sure that I would actually like it," she recalls. "I understand there are some people who strap into a small aeroplane for the first time, they get airborne and they hate it.

"I didn't want to go through the rigmarole of going through air force selection if I wasn't sure this was something I actually wanted to do. Intellectually, I wanted to do it, but I wanted to know that the physical sensation was also something I wanted to do."

She needn't have worried. "I loved it, absolutely loved it!" she said. "I still remember that feeling, we took off and I think what I said was 'WEEE!'

'I was actually pretty glad that I started from next to nothing.'

"I'm forever grateful to my high school for getting me that scholarship because it really changed the course of my life. For the three weeks we all camped in tents at the airfield, and during the day we flew. It was just a really buzzy experience, and really gave me an insight into the fact that this was something I wanted to do."

Maz joined the RAAF straight after finishing Year 12 in New Zealand and attended the Australian Defence Force Academy (ADFA) in Canberra. "I've never actually lived in Australia outside of the military," she said.

"At ADFA I started doing a Bachelor of Technology Aeronautical (BTech Aero). That's three out of the four years of an aeronautical engineering degree, but after the first year I quit that because I wasn't enjoying it. I switched to a double degree of pure science, maths and physics. The reason I didn't like BTech Aero was because I was craving the first principles stuff, the deep understanding as opposed to the application at that stage."

The subsequent masters degrees she has completed and her flying career to date have scratched that application itch. "While I wanted to end up flying, I also definitely wanted to go to university," she said.

After completing her honours year at ADFA in 2004, Maz went straight to the Basic Flying Training School (BFTS) at Tamworth in January 2005.

"If I had retained anything from the Scout Camp, it was so minuscule that I can't really pinpoint anything," she said. "But, I was actually pretty glad that I started from next to nothing. I just knew I liked it and I didn't have any bad habits to take on to the CT-4, which was nice.

"There are different ways of flying an aeroplane, and the military wants you to fly aeroplanes in a particular way – it's called attitude flying," she added.

"Sometimes the way you learn to fly in the GA environment is different. If you fly enough in the GA environment to pick up muscle memory, it can be very difficult to change that."

After BFTS it was off to No 2 Flying Training School (2FTS) and the PC-9 at RAAF Pearce near Perth. Unlike many new military pilots who aspire to go on to fast jets, Maz hadn't yet identified a preference for what

aircraft she'd like to fly. "I was not really willing to put all my eggs into one basket," she said.

"I got to 2FTS and I just wanted to graduate and get my wings, so I didn't really start thinking about types until later through 2FTS. I made a very deliberate decision early on to just take it one step at a time rather than shoving off headlong in a direction that may or may not eventuate."

Towards the end of her training at 2FTS, Maz expressed a preference to go to the AP-3C due in part to that aircraft's high operational tempo.

"I was very, very excited to go to the P-3," she said. "I desperately wanted to go on operations and fly ops all over the world, and the P-3s have been doing that forever.

"The other thing was, and I don't know when this awareness came in, but I knew that I would be well suited to the multi-crew environment," she added. "I knew that would be something that I would both enjoy and be good at. That's not to say that I didn't think I'd be good in the single-seat environment, it's just that I knew this was more me.

Like a kid in a toy shop, Maz's face genuinely lights up when she talks about the Orion.

"Firstly, there's the pure aircraft nerd side of it," she said. "Then what it does is really excellent – 90 per cent of what we do is operational.

"In my first five-year tour as a line pilot, I was flying search and rescue missions out of the Solomon Islands. I flew anti-piracy missions off the coast of Somalia, I've chased subs on exercise off the coast of Southern California. I've flown in the Pacific, Indian Ocean, South-East Asia – the world becomes your playground because of the many roles that the P-3 carries out.

"And then there's high-end anti-submarine warfare which is very challenging – I once had it described to me as a chess game at 200 knots, against an opponent you can't see. Then of course there was the Middle East. I've done one tour flying over Iraq, and two tours flying over Afghanistan, in addition to the maritime tasking we did there. Again, a completely different set of roles, but very, very rewarding."

The overland mission the AP-3C has been employed on speaks to how useful the platform is.

"The aircraft was not designed to fly orbits at flight levels. But, it did the job and it did it well."

Maz flew three tours of the Middle East area of operations.
DEFENCE VIA MAZ JOVANOVICH

TEST PILOT

Through her speaking engagements and published papers, Maz is building a reputation for thought leadership within the Air Force and the wider defence and academic communities, and says she had never come up against any professional or cultural restrictions to do so.

"I guess I'm lucky that I'm part of a very progressive Air Force," she said.

"It's not something that Air Force pushes on anyone, but it's something that fits with me, and the Air Force has never been anything but supportive of those predilections."

In 2011, the RAAF called for expressions of interest for maritime pilots to apply to become a test pilot. Maz immediately applied and was shortlisted after an initial selection process. The process also requires the applicant to build a network of advocates.

"There are always a lot of phone calls in the background, because one of the most important things as a test pilot is to have credibility in your community," she explained. "At a

relatively junior rank you might have to make some big calls and, more than anything else you need your community to believe in you.

"Obviously the phone calls that were made about me were positive, because I got invited down to ARDU for a week of selection activities," she added. "During that process they run a combination of academics and some exams, a couple of flying briefs, and then a couple of sorties where you are really demonstrating your rate of uptake.

"They teach you a couple of basic flight test techniques on the ground, then they have you replicate them in the air. And they just want to see whether your learning gradient is still what it was on pilot's course, because test pilot school is all about gradient."

Maz's love of science obviously attracted her to the idea of being a test pilot.

"I love the experimental side of the TP work," she said. "I read *The Right Stuff* when I was quite young, and I always found that side of it, the pushing the envelope side of it, really fascinating.

"And of course, when you're a line driver you look at your options," she added. "You weigh up what you think you might want to do and when I found out this was an option, I was sold. There were also a couple of people early on who had mentioned it...the squadron QFI (qualified flight instructor) at 10 Squadron when I was a 'bograt' co-pilot talked to me and said, 'You know what? I reckon in the future, you might want to look at the test world'."

Maz is unable to pinpoint exactly what it is that makes someone a good TP candidate. "I never spoke to that QFI about what it was that made him say that," she said. "But he'd been around for a long time and he saw something, that's the important bit. I guess it's an aptitude, but it's also a set of characteristics that would make you suitable for that kind of work.

"Obviously there has to be a degree of flying aptitude there. But there also has to be a methodical approach, and an interest in that deeper understanding of why aeroplanes work the way they do, as opposed to just thinking, 'well, it does this when I do this, so I'm just going to do this.' I've always been more of a, 'Why does it do that?' kind of person."

At the end of the ARDU week candidates sit a selection board, after which they are advised of their suitability. Maz was advised in mid-2012 that her application was successful and that she would be attending the USAF Test Pilots School at Edwards AFB in California.

Maz with a MiG-15 at Edwards. VIA MAZ JOVANOVICH


T-38s over Edwards Air Force Base. USAF


Flying the F-15E on test pilots course. VIA MAZ JOVANOVICH

"The current Commander SRG (Surveillance & Response Group), Air Commander Craig Heap was actually the OC (92WG) at the time," she recalls. "He called me into his office to give me the good news. He said, 'You're going to the USAF school.' I didn't immediately process that, because I had defaulted to the US Navy school at Pax (Patuxent River, Maryland) because that's where we'd been going."

Most RAAF test pilot candidates attend the USN Test Pilots School at Pax River, the Empire Test Pilots School (ETPS) in the UK, or the privately operated National Test Pilots School (NTPS) at Mojave in California. The RAAF had not sent a test pilot candidate to Edwards since 1991.

"When he said it again, I clicked, 'Edwards?'," she said. "Because that's a massive dream come true just in itself. For an aeroplane geek, to drive to work past an SR-71 every day... just magnificent. So that was a real surprise."

Edwards AFB is perhaps the holy land of aerospace development.

"It's magic," says Maz. "Edwards is either in the middle of nowhere, or it's in the middle of everywhere.

"The environment...there is all sorts of awesome stuff flying over your head every day...B-1s, B-2s, F-22s, F-35s... But also things like Dream Chaser—we watched its first free-flight. And there was one memorable weekend when, driving on to base we saw a 787 doing touch and goes as part of its own testing.

"And then there's the aircraft museum, and the school itself which has an F-104 out the front on a stick. And photos on the wall, and the people who had walked those halls, just being there was surreal. You can't help but feel a little bit of, 'How did I get here?' I still feel like that even now."

The first step for new candidates at the USAFTPS is to qualify on the Northrop T-38, the USAF's fast jet trainer.

"I started out hating that aeroplane, and I ended up loving it," Maz recalls. "It's a hard little aeroplane to fly, but that makes sense when you think that it was designed as a trainer when the people who flew it would graduate on to the 'century series' (F-100 to F-106) fighters, which were notoriously

difficult to fly.

"The T-38 is a very interesting aircraft," she added. "You walk out to the aeroplane the first time and your first thought is, 'Where are the wings?' It's also got some very peculiar aerodynamic characteristics. It's got a very steep back of the drag curve, so you can find yourself in trouble quite easily. But they don't because the USAF doesn't fly that aircraft in the pattern using alpha (angle of attack) the way you fly a Hawk or a Hornet.

"One peculiarity of flying a T-38 is that you're flying around base in the closed pattern at 180kt," she added. "Your minimum speed on final is 160kt but your landing speed is 135 knots, so there's an instant there where you're supposed to instantly lose 25kt. But of course, that doesn't happen.

"One of the things that was very uncomfortable for somebody of my background was the fact that at about 100ft you just chop the power in the T-38. That takes so much self-control for somebody who grew up flying a P-3 which gets a lot of its lift from the blown nature of the wing. If you chop the power in a P-3, you go straight down."

Maz flew 23 different aircraft types at Edwards, including the F-16 VISTA (Variable stability In-flight Simulator Test Aircraft) which is a F-16D modified with a bespoke advanced flight control system, allowing the handling characteristics of the aircraft to be modified while airborne.

Other types Maz flew included the Beech C-12 (King Air), standard F-16s, the F-15E, the KC-135, the F/A-18F, a MiG-15, an Antonov An-2 biplane, a Grumman Albatross amphibian, and an Extra 300.

"You fly an aircraft, you do a selection of flight test techniques, and you get a feel for the aircraft," she explained. "And then you write a short report on it in which you compare and contrast it to other aircraft, that's called a 'quick look evaluation'.

"The idea is that, once you know what you're doing in the test pilot sense, you should be able to look at the aeroplane, look at its documentation, form a rough idea of how it's going to behave, jump in, spot check the points that you know are going to be interesting from looking at it and from looking at its control systems, etc. Then you have at least some information about how that aeroplane flies. The idea is that if you only have one shot at having a look at a particular aeroplane, this is the methodology you use to look at it."

Speaking at a Science Week presentation at Questacon in Canberra last year. DEFENCE

One of the things the students do towards the end of the course is to visit the Edwards museum. "You just walk around," she said. "And from all the things you've learned about shapes of surfaces and stability derivatives etc, you can now look at an aircraft and you can quite accurately predict exactly how it's going to behave just from what it looks like. That's really cool."

When Maz graduated and returned to Australia, she regained her qualifications as an AP-3C maritime captain, but her main job was as a test pilot at ARDU, working on various test programs then underway.

"I worked on some KC-30 programs, not as the test pilot but as part of the flight test team," she said. "I also did the initial concept demonstration of the non-intrusive flight test instrumentation (NIFTI) on PC-9, the initial handling and testing with the pods and the sensors.

"My favourite program was on a P-3 that was 'misbehaving', in that it had an 'interesting' aerodynamic characteristic about it and we were trying to explore that. In the end, we ended up tufting the aircraft – we stuck thousands of bits of string to it and turned it into a flying wind tunnel model. So, this is 2015, within a few years of the P-3's end of life of type, and I'm doing the purest of pure structures and aerodynamics flight test. If you had told me that that was going to be a thing, I would not have believed you. But that was a really awesome experience."

'My heart and soul are deeply in the operational world.'

Maz isn't sure what is next in her flying career, but she hopes to stay in the operational world and to have a long Air Force career.

"I really enjoyed my work at ARDU, but I knew that my future lay in the operational world," she said. "I feel like I went away and got the test pilot skill-set so that I could round out my flying expertise, but my heart and soul are deeply in the operational world."

Whether that next step is transitioning to the new P-8 Poseidon or a tour in Canberra, remains to be seen. But her first love will always be the P-3.

"When it works, it is just like rolling around the world with a family, doing important work and having fun.

"That's what I love more than anything else, and it's hard to make this statement, but I would give up the test pilot stuff to do another tour as a maritime captain, on a maritime crew. Because that is the best job in the world."

‘The formula to this success may seem relatively straightforward.’

xxxx xxxxxxx

More than 400 Caravan EXs have now been built. TEXTRON AVIATION

A GRAND DESIGN

Flying the Cessna Grand Caravan EX

WRITER: OWEN ZUPP

Performance can mean many things to many aircraft.

Fast, slow, short-field, heavy-lifter. Often an aircraft's role can be ascertained merely by looking at it. In the most obvious case, a flying boat, more subtly, a freighter. Yet, even when the design suggests the suitability of an aeroplane to a particular task, there can still be much to be discovered when we pause to look a little closer. Such is the Cessna Grand Caravan EX.

A growing reputation

The Cessna 208 Caravan family first came into being in 1985, seeking to fill the role of a single-engine utility turboprop across a range of operations.

Federal Express, or FedEx, then ordered a freight version of the aircraft without cabin windows. Known as the Cargomaster the design was further developed to become the Cessna 208B Super Cargomaster by extending the fuselage by 1.2m and fitting a substantial cargo pod on its underside. This larger version was then developed for passenger operations and the Grand Caravan came into being in 1990.

The stretched Caravan seemed to provide just what operators were looking for and came to dominate that niche of the market. To date, around 500 Caravans have been delivered, while well over 2,000 Grand Caravans have found their way onto flightlines around the world, of which 100 are on the Australian register. That number includes special mission aircraft in service with the NSW and Queensland police forces.

The success of the design was further emphasised by the fact that it remains fundamentally unchanged. A Garmin G1000 glass avionics suite and TKS Ice Protection were added in 2007, while the Grand Caravan EX with its more powerful engine was introduced in 2012. For the EX the ever-reliable Pratt & Whitney Canada PT6 engine was upgraded to the PT6A-140, generating 867shp, or 200 more horses than its predecessor. More than 400 Grand Caravan EXs have since been sold.

The formula to this success may seem relatively straightforward. Single pilot operation, simple systems, a high degree of reliability, versatile in its capability and low operating costs. A simple formula that would be a challenge for any manufacturer. But Cessna seems to have got it right.

Behind the numbers

Whether an aircraft is a private tourer or a commercial workhorse, there are certain facts and figures that are particularly meaningful to

The Grand Caravan EX introduced a 875shp PT6A-140.
OWEN ZUPP

the operation. It may be the range of an aircraft with the entire family on board, or it may be whether the available payload is enough to make a freight company profitable. With its vast range of applications, the Grand Caravan EX has to answer questions like those for multiple scenarios, including when the aircraft is equipped as a floatplane.

The EX with an external cargo pod has a maximum takeoff weight (MTOW) of 3,995kg and offers a useful load of more than one-and-a-half tonnes at 1,607kg. With a full usable fuel load of 990kg, the EX has a maximum range of just over 900nm and a payload of 600kg, or seven people, depending upon their weight.

However, this aircraft can, and does, use that available payload in a variety of ways. In a maximum seating configuration of 14 people on board (at 77kg each), the aircraft can still carry 520kg of fuel and offer a range of 360nm on commuter or scenic runs. In doing so, it runs at a miserly 38 cents per seat-mile. Configure the aircraft more spaciously to carry 11 in a commuter configuration and range extends to more than 550nm.

'Within the cabin, the Caravan EX is a chameleon.'

If a special mission is called for such as police surveillance, it has an outstanding endurance of eight hours, with excellent slow flight characteristics which means it can hold station and loiter with efficiency.

The numbers for the task-specific Super Cargomaster are even more impressive as the absence of seats logically lowers the empty weight and avails a greater payload – nearly 1,800kg in fact. Not immediately evident by the numbers is the volumetric efficiency of the cabin. It's angular, rather than tubular, cross-section provides a better fit for the boxes it is asked to lift. No wonder FedEx loves this aeroplane!

In its own right, the cargo pod carries 494kg in its 3m^3 capacity. Its four compartments are accessible by large individual doors, with the central compartment holding the anti-icing fluid if the TKS system is fitted.

Even when loaded to its capacity, the Caravan EX can takeoff from 660m and land in only 570m. While the aircraft is not pressurised, fitted with supplemental oxygen it has a

A towering but conventional tailplane. OWEN ZUPP

ceiling of 25,000ft, but to be honest that's not where the Caravan calls home. At 10,000ft, it is free to ply its trade at a very respectable 185kt.

With that maximum range of over 900nm, the Caravan EX has long legs, but its versatility is the most impressive aspect of its performance figures. Fast or slow, long range or loiter, comfort or cargo, the aircraft can fit the bill.

Standing tall

The heat from the ramp outside the Hawker Pacific facility at Bankstown Airport can be felt through the soles of the shoes. The low cloud and rain of the previous day have been replaced by a cloudless sky and a sun that is beating down. While the Caravan EX is approved for flight into known icing conditions (FIKI), the current conditions are more reflective of the environment in which the aircraft would be called to operate in around Australia's top end.

The most striking first impression is how tall the Grand Caravan sits on its fixed tricycle undercarriage – it dominates the other light aircraft around it. However, sheer size and capacity is not its only strong point as I begin an external walkaround with Textron pilot, Jeremy Schrag. This is a very well thought-out aeroplane.

The Cessna trademark wing struts extend up from the fuselage just in front of the main landing gear. Nearby is the filler port for the anti-icing fluid and single-point refuelling station if it is fitted – a greatly appreciated option for floatplane operations. Sensibly, this all takes place about the aircraft's centre of gravity and the strut extends up to the wing on both sides at a junction which houses fresh air intakes for the cabin. Some aircraft have these intakes, or ducts, on the aft fuselage where they are still susceptible to harvesting the scent of engine exhaust – not the Caravan. They are well removed and definitely situated in the free airflow.

The wing itself is the first hint that the Caravan EX is "just a big Cessna 182", as so many people assert. It is a big wing, true, but aside from the streamlined weather radar pod on the leading edge of the right wing and LED navigation, takeoff and landing lights, there's nothing fancy. Big solid flap hinges, relatively highly cambered aerofoil, dual pitot-static probes and so on. The sprung-steel undercarriage has a broad gait and little more. The aeroplane looks built to work, but the subtle fact is that it still cruises at 185kt. Clydesdales aren't often racehorses.

The nose gear is also deceptive. At first glance it appears to be the standard nose oleo arrangement, but it is actually a dampening arrangement engineered with a slightly arced drag link and a snubber system. This is good news for outback operators as there is no integral seal that can fail and leave the nose strut compressed. No oil – no worries. Very clever.

There is very little that needs to be said about the venerable Pratt & Whitney PT6. Beneath the cowls is a very well laid out turboprop engine turning out 867shp. Manually activated inertial separator to the rear, 'sight glass' oil level gauge, easily accessed hot section for maintenance and an even easier-to-access and remove battery. For the record, in a situation where electrical power is lost, the battery can provide up to 60 minutes of power with some shedding of services.

The exhaust is channeled out via a single exhaust stack beneath the fuselage on the right-hand side. This not only rids the forward field of view of an exhaust stack protuding on each side of the cowling but removes the distortion of visibility that such a configuration can cause and consequently interfere with surveillance duties. That exhaust scent is also dispatched down and away from the passenger cabin.

Head-on the Caravan EX boasts a four-bladed Hartzell propeller with a great deal of clearance from the dirt airstrips that it could be called to operate from. Like a number of highly powered single-engine turboprops, the engine is slightly offset to counter the yaw on takeoff that such a powerful engine can generate.

Stepping back and continuing to walk around the Caravan EX, the 'stretch' from its predecessor is apparent. Two 60cm sections, fore and aft of the wing root, separates the Grand Caravan from its forbear. Logically, the stretch is either side of the centre of gravity, so one could assume that there was minimal impact upon the balance characteristics of the aircraft when it was extended.

The aft section of the aircraft has a towering, but conventional, tailplane. The entire empennage is solid and practical, with both the rudder and elevators horn-balanced. There is a control lock evident on the port-side for use when parked in gusty conditions, although this automatically disengages when the

elevator is deflected upward about one-fourth of its travel. On the underside is the port for the 'pogo-stick' to avoid any possible chance of the Caravan EX sitting on its tail during loading.

Entry to the cabin can be achieved through three major means – the passenger airstair on the right side, the huge two-part freight door on the left side and the crew door. Although the Caravan sits tall, the passenger airstair extends low to the ground allowing ease of access. On the opposite side, the cargo door can accept a pallet, but there's more to it than that. With the single exhaust located underneath and on the other side of the fuselage, the Caravan can load and unload with the engine running, achieving hot turnarounds without the exhaust flowing straight back at the ground crew.

From a pilot's perspective, the crew door allows boarding via a small self-contained ladder. Once standing at the entry to the cockpit there is a handle to brace with, allowing an excellent view of the wing's upper surface and one last peace-of-mind check that the fuel caps are in place and secure. This is a very well planned aeroplane.

Taking flight

Within the cabin, the Caravan EX is a chameleon. Its interior can range from a spartan freighter interior through to the 'Oasis' suite of executive luxury. In between lies a range of variations that offer commuter passenger comfort, while a combi option can plug windows and remove seats to quickly ready the aircraft to carry cargo.

Seated in the cockpit, the Caravan EX has a presence. This is partially due to the height the pilot sits above the tarmac and is reinforced by the excellent visibility. The outlook is achieved by the expansive windscreen supported by a large side window with a low sill. Furthermore, the leading edge of the wing sits some distance back and so as to not obscure the view.

Inside, the cockpit is well laid out and functional. Switches are grouped logically, everything is within easy reach and the fuel selectors are big and obvious, located overhead – minimising the piping to the tanks one would suspect. Everything has a substantial feel and it does actually feel like a big 182 – but that's a good thing as that aircraft has a reputation for reliability and getting the job done.

One distinguishing feature of the latest EX is the Garmin G1000 NXI avionics suite. The Garmin G1000 first appeared in the Caravan in 2007, but last year saw the introduction of the NXI. It has increased processing capability which means that it boots up more quickly after start. Additionally, it has an enhanced HSI with various overlay options, a vertical profile display, numerous charts and an optional 'surface watch' function which offers various cues and warnings relating to the runway for takeoff or landing.

The Grand Caravan EX features the Garmin G1000 NXI, seats for up to 14, and the much-loved cargo pod. TEXTRON & OWEN ZUPP

Jeremy and I are both keen to get underway and allow the air conditioning to cool us down, so without fuss we start the PT6 with the simplicity that these amazing Pratt & Whitney engines are renowned for. In no time at all, the engine is stable and the NXI avionics come to full life in a fraction of the time normally associated with the G1000.

Taxiing the Caravan is simple, and the rudder pedal forces are well in line with the aircraft's size. The brakes don't need to be touched either until approaching the run-up bay as the speed is simply controlled by easing into 'beta' range to slow down. Preflight procedures are minimal and straightforward, lending the aircraft favourably to multiple sectors and short turnarounds. Soon we are cleared for takeoff to the west and entry into controlled airspace.

Jeremy had advised me that the performance figures were conservative, and he wasn't kidding as we became airborne just beyond the numbers and climbed away at an impressive angle.

From the outset, the aircraft

handles without vice. It has to be positively flown and trimmed, but when it is sitting in its slot, it is very stable. This makes for a smooth ride for passengers and a stable platform for the special missions roles to which the aircraft can also be adapted.

Level at 6,000ft with the prop RPM at 1,750 we have a true airspeed (TAS) of 184kt, just as advertised. I also note a blue bug on the torque gauge, colloquially known as the 'cruise bug'. This clever blue indicator appears to show the optimal torque to be set, taking into account the actual ambient conditions in a way that the tables in the performance manual cannot.

Clear of controlled airspace, I fly a series of manoeuvres including steep turns and I am very impressed with the handling of the aircraft, both with and without the yaw damper engaged. Throughout, the aircraft responds in pitch and roll in the right measure for the inputs through the yoke and once an attitude is set, it holds it. In the slow speed regime this is particularly evident, and it is easy to see why the aircraft is well suited to surveillance operations with such good low speed handling and extensive endurance.

Moving through the flap range, in both extension and retraction, there are definite pitch changes, but these can be easily trimmed out. In fact, Jeremy showed me the ideal way to manage the situation with ease by starting the electric trim as soon as the flap is selected and holding it until the flap reaches the selected position. The timing of flap and trim is virtually identical and makes for very smooth transitions.

All too soon we begin a descent to return to the circuit and although the Caravan EX looks like a workhorse, as we said, looks can deceive. I can personally attest to the fact that the aeroplane can quite quickly approach its limiting airspeed when it is pointing downhill.

The aircraft's excellent handling characteristics hold true in the circuit. On downwind behind much slower aircraft, the Caravan EX can be reeled right in to conform to the traffic and with a little extra width, save air traffic controllers a headache. Aiming for around 80kt over the threshold, the speeds are comparative to a much smaller aeroplane and the propeller disc serves as a tremendous aid in speed control.

Raising the nose cowling to the horizon sets the attitude for the flare and the wide-sprung undercarriage offers a great degree of forgiveness. Even with only Beta selected, the landing roll is short, so it is easy to see how the landing distance quoted in the manual can be achieved, if not beaten, when reverse is employed.

Taxiing back to the parking bay, Jeremy reminds me of a light shudder the undercarriage can sometimes produce under braking due to the geometry of the landing gear. However, despite our best efforts, we are unable to replicate the effect, so I suspect its occurrence may be the result of a particular taxiing technique.

With the brakes parked, I shut the Caravan EX down and its propeller slowly spools down to a halt. I open the crew door and extend the ladder. This has been a most enjoyable flight.

'Once an attitude is set, it holds it.'

Exquisite simplicity

The numbers in which the Grand Caravan has been produced and the minimal differences the latest EX bears compared to the original model stand testament to the designers 'getting it right' in the first place.

It is a relatively simple aircraft, but able to perform a broad range of roles with reliability and cost efficiency. It could be anticipated that a commercial pilot with some hours in the logbook could transition onto the aeroplane without too much difficulty. This not only reduces training costs but allows the Caravan EX to comfortably slot in as the turboprop flagship of an otherwise piston-engined fleet.

From its favourable handling characteristics and operating envelope to its practically thought-out nose gear assembly and exhaust system, the Grand Caravan EX exudes exquisite simplicity in an aircraft that will please those who operate them as well as those who are fortunate enough to fly them.

Both the NSW and Queensland police forces operate the Caravan EX. OWEN ZUPP

UNDER THE INFLUENCE

FATIGUE AND THE PEL-AIR DITCHING

The ditching of Australian aviation governance Part 2

WRITER: BEN COOK

When was the last time you did something that, in hindsight, you thought was foolish, stupid, not consistent with your normal behaviour, and possibly something that made you feel a little embarrassed about afterwards?

One of my experiences (a little over 20 years ago, but it only feels like yesterday) that left me feeling this way involved a big night out as part of a weekend flyaway that could have cost me, and my aviator mates, our careers.

Our mix of personalities, a not-so-healthy combination of egos, and some environmental factors (alcohol) led to some very poor decision making. The outcome: one of the guys was going to drive a hire car off a long pier into the ocean!

The only reason this didn't happen is the person who signed for the hire car was too worried they would be held accountable, so he wrestled the keys away from a very disgruntled pilot who was about to earn a pooled $500 from the other members of the group. And we had a grand vision of waiting for the media with a beautiful sunrise and national stardom greeting us all.

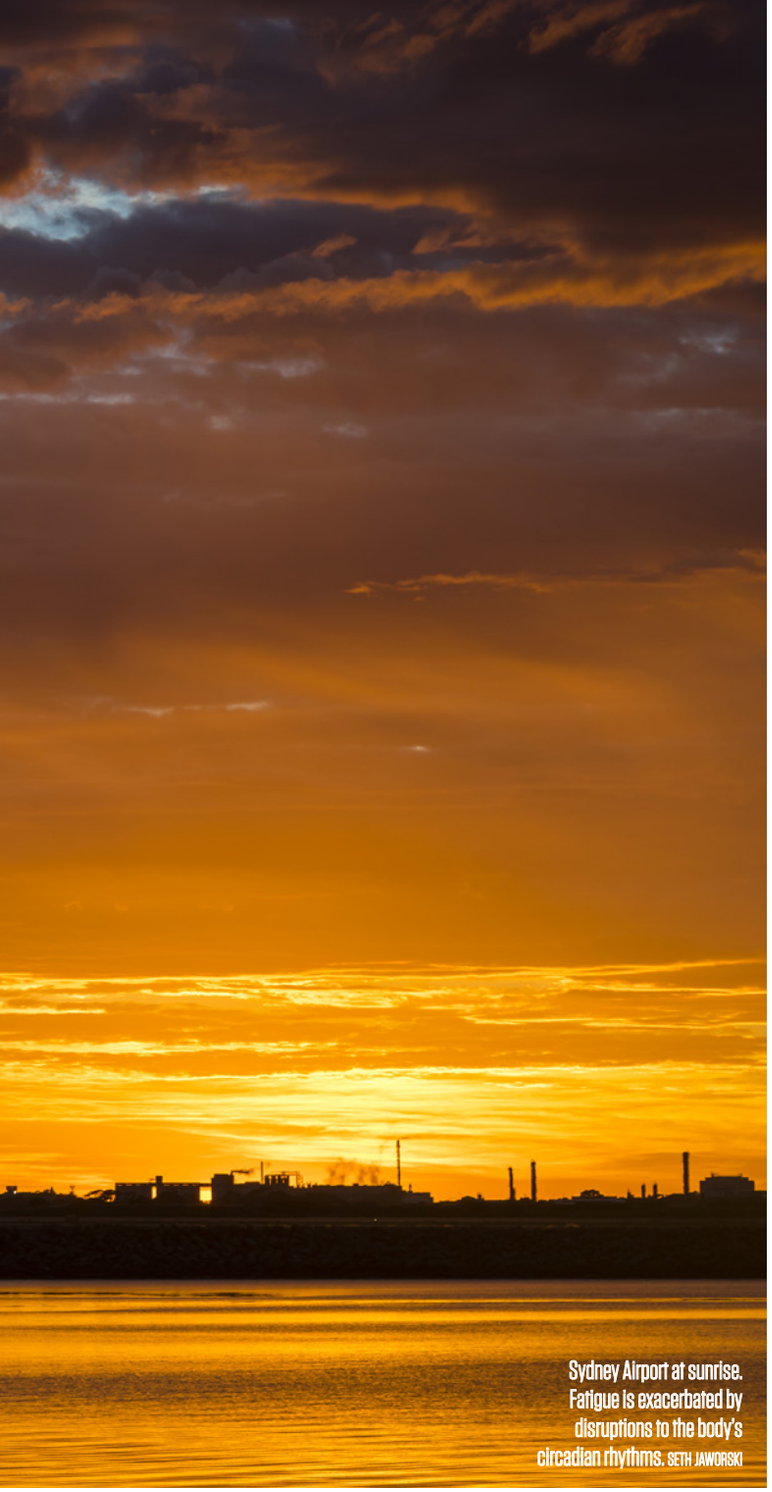
It all sounds stupid in hindsight but it's the power of personalities, eroded decision-making (via alcohol consumption) and an unnecessary acceptance of risk, which could have resulted in permanently changed careers – or injury.

Yet this was a turning point for me to better understand the myriad of human factors that can quickly take us away from being the best we can be.

It was also indicative of the power of local culture. What's accepted as normal practice within an organisation – what we actually do rather than what the policy and rules say we should do.

At the time of this event we worked within a culture that often rewarded and acknowledged foolish behaviour. It was almost like a badge of pride as to which group could outdo the previous and set a new benchmark of bravado and future stories to regale. Worst of all, it was led and encouraged by many of the more senior check and training pilots and unit executive!

From a personal perspective it took me over seven years to move away from these less than professional traits. But at the time I was just wanting to fit in, which is normal



Sydney Airport at sunrise. Fatigue is exacerbated by disruptions to the body's circadian rhythms. SETH JAWORSKI

human behaviour.

Can you relate to a similar event?

The intent is to highlight the mix of human factors (culture, personality, attitudes, group norms and egos) that can heavily and adversely influence our performance in the aviation workplace. And just like alcohol-fuelled incidents where you or your friends have made some bad decisions, one of the most pervasive human factors that degrades performance is human fatigue. And some of the outcomes, such as poor decision-making, fixation, tunnel vision, or acceptance of unnecessary risk, is remarkably similar to the behavioural traits experienced under the influence of too much alcohol.

I'm always careful when analysing the decision-making of others when I read aviation accident reports to remind myself of my own episodes of degraded performance. From the outside, to anyone external to myself or my group, we probably looked arrogant, stupid, reckless and foolish. But at the time we were just doing what we believed was acceptable. In the heat of the moment we had very limited capacity to manage and control this mix of human and organisational factors, plus a lack of supervision and leadership to help more junior crews re-align their behaviour.

'Dom was not operating by himself in a vacuum.'

Reliving the nightmare

The crew and passengers of Pel-Air Westwind II VH-NGA, which ditched into the waters off Norfolk Island on November 17 2009, including Dom, the aircraft captain and Karen, the flight nurse, they've had to relive that event over and over.

Why me? We were doing what we normally do so how did we end up with no fuel and a ditching onto the ocean? Why wasn't the correct weather passed to us? Why, why, why?

While the crew have reflected in detail on what could have been done differently, the simple fact remains, they were doing the best they could at the time in accordance with normal company practices. These practices may be different to those you've experienced. That is the power of a workplace culture and leadership in shaping normal workplace practices and behaviour; you often don't know any different until you work for another organisation that performs the same process to a higher standard.

For those working for larger aviation organisations with more resources (more people, more support, more money) I'm sure you can look back and reflect on times where, in hindsight, there were gaps in operating practices, but you didn't know any different.

On the night of the accident, Dom was not operating by himself in a vacuum. He was licenced by CASA, trained by structures that CASA created, and he worked for a company using procedures CASA had approved. Yet in the investigation, it appeared CASA found Dom was the sole focus of the problem.

His employer, Pel-Air, found him skilled enough to make him a captain and never had cause to discipline him at any time. After the accident, it did not find that he had violated any company procedures.

Then there is the Australian Transport Safety Bureau (ATSB) report, which I believe focused too much blame on Dom, with inadequate consideration of Pel-Air's leadership, workplace culture or the normal practices of many of the Westwind Pel-Air pilots.

There are many things – in hindsight – that Dom wishes he could have done differently. He could have been more sceptical of the information he had in front of him as the day unfolded. During his career, he had never arrived at a destination where he couldn't land, nor had he arrived at a location and found the weather forecast wildly different from the real world. Like you and I sitting in our chairs at zero knots with the benefit of hindsight, he wishes he had the experience to have stood back and seen all the hazards – the error chain – lining up and the ability to draw a line and make a change to the plan.

We know from the ATSB report that Dom had a history, like other company pilots, of normally carrying extra fuel in the tip tanks.

So why was the extra fuel not loaded on board? What happened to the normally conservative decision-making on the day of the accident?

Was it fatigue-induced brain fog?

The smoking gun – fatigue

In 2008, when I was the then manager human factors for CASA, we were fortunate to have a specialist accident investigation team from the US National Transportation Safety Board (NTSB) Human Performance Division deliver a fatigue factors training course.

This course was attended by several local regulatory and investigatory personnel (over 60 people in total) from the Australian aviation, rail and maritime industries. The course provided detailed insights into the extensive work of the NTSB regarding the investigation and impact of human fatigue across all modes of transport. It also provided a copy of what, for the time, was a best-practice fatigue investigation checklist, including crucial factors and behavioural cues to help gather evidence to determine whether fatigue was a contributory factor.

A few days after the Pel-Air ditching I was asked to attend a background brief prior to conducting a special CASA audit, which for the CASA human factors team involved a review of the Pel-Air Fatigue Risk Management System (FRMS).

As I was listening to this brief I

had an 'aha' moment: a clear sense that a few factors were lining up to warrant consideration of fatigue. Unfortunately, at the time of the investigation and due to some of the miscommunication between the ATSB and CASA, not all of the fatigue-related information was considered and collected as part of the investigation. To this day fatigue has not been cited as a contributory factor.

I still hold a firm belief that fatigue contributed to this accident and my opinion is backed by a recognised fatigue accident investigation subject matter expert.

But before we look specifically at Pel-Air, let me explain the basics of fatigue science and provide another aviation accident case study that was methodically investigated.

Pel-Air Westwind II VH-NGA ditched off Norfolk Island in November 2009. AA ARCHIVE

Some basic fatigue science

The International Civil Aviation Organization (ICAO) defines fatigue as a "physiological state of reduced mental or physical performance capability resulting from sleep loss, extended wakefulness, circadian phase, and/or workload (mental and/or physical activity) that can impair a person's alertness and ability to perform safety-related operational duties".

If you've been working hard physically while also being required to do lots of critical thinking, or you've been exposed to varying work start and finish times (eg rotating shifts from day to night) that have been impacting your normal amount of sleep, or you've flown halfway around the world and your normal sleep pattern is no longer aligned with the local conditions, then it's likely you're exposed to the risks of fatigue.

One of the biggest challenges is the insidious nature of fatigue – it can proceed in a gradual, subtle way, but with very harmful effects.

What does this mean for you and I? It's simple, if we don't make good decisions during lower levels of fatigue risk (eg earlier in the day), as our continuous hours of wakefulness increase there will be a gradual, often unrecognisable degradation in our ability to perform.

This can lead to normally high performing teams making poor decisions and accepting higher levels of risk without an ability to recognise they're now performing below the standard required to do the job safely. It creeps up on them and gets to a point where they can no longer self-correct. This is why support from independent supervisors – personnel not exposed to the same levels of fatigue – is so critical in managing such outcomes.

Disrupted sleep patterns and a build-up of fatigue are part of what many of us need to carefully manage if we are to perform at our best within the aviation environment.

When reviewing fatigue risk, you should consider:

- sleep length (sleep/wake patterns for at least the last 72 hours);
- sleep quality (good quality, deep sleep versus disrupted/fragmented sleep);
- total time awake;
- circadian factors (the primary circadian trough is approximately midnight to 0600, especially 0300 to 0500, while a secondary 'afternoon lull' occurs at approximately 1500 to 1700);
- sleep disorders, health and/or medication issues;
- and whether performance, behaviours, or appearance are consistent with the effects of excessive fatigue – evidence of impaired decision-making or an inability to adapt behaviour to accommodate new information.

'Fatigue is likely to have contributed to the eroded decision-making of the crew.'

Pel-Air fatigue factors

Some may perceive me as not adequately independent to discuss Pel-Air fatigue factors, particularly given I was part of the CASA team that completed a special FRMS audit. So, I passed the ATSB Pel-Air accident investigation report to one of my professional colleagues, a subject matter expert on human factors investigation.

Using best-practice fatigue investigation checklists, we both came to the same conclusion: fatigue is likely to have contributed to the eroded decision-making of the crew.

The ATSB accident report did make the following key findings:

- Obtaining less than five hours' sleep in the previous 24 hours is inconsistent with a safe system of work. Other research has indicated less than six hours' sleep in the previous 24 hours can increase risk.
- In terms of sleep during the previous 24 hours, the aircraft captain had about 3.5-4 hours' sleep at Apia. Given this sleep occurred during the day, and was interrupted, it is likely to have been of lesser quality than normal. His sleep during previous days was reportedly normal, although his sleep the night before the outbound flight may have been slightly truncated by up to 1.5 hours due to personal factors. Overall, primarily due to restricted sleep in the previous 24 hours, it is likely the captain was experiencing a level of fatigue likely to have a demonstrated effect on performance. However, there was insufficient evidence to conclude he was experiencing a significant level of fatigue.

With consideration to an independent review of the fatigue factors for the Pel-Air accident:

- The sleep/wake patterns in the previous 72 hours were disrupted.
- The sleep quality obtained by the aircraft captain on the day of the accident was poor, including local interruptions (hotel cleaning staff), inadequate facilities (excessive external light entering the hotel room), a period of wakefulness and an increased level of anxiety (a desire to get more sleep before the late afternoon departure). By

independent estimates, the total sleep time is more likely to be 3-3.5 hours of average quality sleep.

- Circadian factors also impacted the quality of sleep as the aircraft captain was trying to obtain sleep during the day, which for many people can be very difficult. Furthermore, one of the critical decisions (refuelling the aircraft) was made around the afternoon window of circadian low (between 1500 and 1700).
- Did the aircraft captain display behavioural cues that were not aligned with normal behaviour and previous decisions? Yes, including the decision to not add the fuel to the tip tanks and ignoring the point of no return and weather reports because he had fixated on a simple plan to land and was too impaired to recognise growing evidence that the plan was not working. The impact of elevated levels of fatigue is that people do not realise how impaired they are and press on 'lethargic and indifferent' with a simple plan.

There was also clear evidence to identify systemic (organisational) failings of the Pel-Air FRMS, which ultimately contributed to inadequate external support to independently assist the crew with managing their elevated levels of fatigue.

This evidence includes:

- Inadequate CASA oversight of the Pel-Air FRMS including evidence that many problems identified during previous CASA surveillance were never appropriately actioned.
- Evidence of company FRMS breaches, including a crew member who was allowed to conduct a duty totalling 23 hours and 45 minutes.
- There were at least six occasions when a duty period was more than 15 hours, and several other duty periods that were 14 to 15 hours. A significant proportion of the longer duty periods included late night hours (between 2200 and 0600).
- Pel-Air rostering personnel did not have specialist training in fatigue management and did not receive specialist guidance or training regarding the assumptions and limitations associated with the fatigue model.
- There was a deficient company fatigue reporting culture and reactive FRMS processes.
- The FRMS training was completed via computer-based training and Westwind pilots reported the training material had limited effectiveness.
- In this case, the flightcrew's time off duty was initially expected to be less than eight hours. It was extended to about eight hours only after the crew experienced a delay getting access to rooms at the hotel in Apia. Ultimately, the crew did not have the opportunity for eight hours' sleep, which was not consistent with good fatigue management practice.
- Ultimately, the operator's Westwind pilots did not conduct a significant amount of duty time overall, and the duty periods associated with many of their trips were not problematic. Nevertheless, the length and timing of the duty periods associated with some of their trips were likely to result in significant levels of fatigue, and this fatigue was not being effectively identified, assessed and managed. Overall, the operator did not have sufficient risk controls in place in addition to a local fatigue modelling tool to manage the duration and timing of duty, rest and standby periods.
- In summary, the flightcrew should have been provided with a longer time off duty in Apia to enable them to have more sleep opportunity.

Further, the ATSB accident report analysis identifies the limitations of biomathematical models of fatigue (BMMF):

It is widely agreed they should not be used to make specific decisions regarding a specific individual's fatigue level, and any attempt to do so should be interpreted with great caution.

Unfortunately, the ATSB may have placed an over-reliance on the BMMF results (it modelled the Pel-Air sleep data through three separate models) to the detriment of a more careful analysis of the above fatigue factors.

'For every complex problem there is an answer that is clear, simple, and wrong.'

Elevated fatigue levels impacts decision-making. PAUL SADLER

Simple tools for complex problems

There is a great quote from American journalist and scholar Henry Mencken: "For every complex problem there is an answer that is clear, simple, and wrong".

From my experience conducting fatigue audit and surveillance across many aviation organisations, many are attempting to use simple tools to manage a complex problem. It's no wonder a common line I hear from aircrew is they don't know how the fatigue management system works – they feel fatigued, but the boss or chief pilot says they're good to go.

The CASA special audit and the ATSB Pel-Air accident report found numerous systemic failings, including:

- Westwind pilots reported the rostering of their duty periods appeared to be heavily based on a fatigue score. They were never asked about their level of alertness or recent sleep when tasks were assigned, or during the progress of a trip.
- Some pilots indicated they were provided with insufficient information about the fatigue program and they did not understand how it produced its scores or why its scores seemed to be inconsistent with their perceptions of their own fatigue levels.
- The problem of over-reliance on a local fatigue model had been identified by both CASA and the operator since 2004. The local fatigue model was still being used as the primary means of determining whether a Westwind flightcrew member could be assigned a new task.
- In addition to the over-reliance on a local fatigue model and the management of standby, the operator needed to more actively obtain information about pilots' alertness levels prior to allocating a task, particularly in situations where pilots had been on long periods of standby, flight times coincided with normal sleep times, and/or pilots were conducting trips that involved disrupted sleep patterns. Relying on pilots to proactively report problems with sleep or alertness is only likely to be effective if the operator has a mature and well-functioning

reporting culture.

» Other than the activities conducted in 2001-2002, and the development work involved in upgrading the fatigue management system (FMS) to an FRMS, there was no evidence that a formal system review as described in the manual had been conducted prior to the accident in November 2009. As far as could be determined, the operator never conducted a study or analysis to review the suitability of using a default fatigue score of 75 for its operations.

Pel-Air, having experienced significant growth as it entered aeromedical evacuation services, conducting regular short notice operations to remote aerodromes, often late at night, had an ineffective FRMS, poor FRMS training and an over-reliance on a simple fatigue modelling tool that had never been validated. And all of this under the watchful eye of CASA.

And now if you combine a poor FRMS with some other evidence available regarding elements of leadership and company culture (as strongly linked to determining accepted workplace behaviour and norms) you start to see why the Pel-Air crew, under the influence of fatigue, was doing the best they could at the time in accordance with the regular practices of other company pilots.

Company culture: near enough is not good enough

There are many examples in the ATSB report of what I consider glimpses of less than ideal leadership – particularly an inability to learn lessons from previous experiences to enhance company standards and performance. This is important to ensure more junior pilots truly develop workplace practices to manage the risks inherent in their operations.

The ATSB identified the following, which provide a better understanding of the culture of the Pel-Air workplace at the time of the accident:

» The standards manager's general manager position involved a significant commercial role, creating a potential conflict between commercial and safety perspectives when making decisions.

» The Westwind standards manager advised the ATSB that, after he was no longer chief pilot, he still in effect managed the Westwind fleet's activities. However, in April 2009, he had a disagreement with the chief pilot regarding their respective roles. From that time he undertook more of a background role, providing advice to the chief pilot as and when required. In particular, he had less involvement with training and checking activities, and had no involvement in developing or maintaining the operator's manuals.

» A Westwind check pilot conducted a proficiency check on the Westwind standards manager. The check included a base check, line check and instrument rating in 0.7 hours at Darwin without a flight to another airport. All aspects were classified as satisfactory. The associated form indicated some items, including the mandatory items 'rejected takeoff' and 'night flying', were waived. [Could this be a sign of striving for minimal compliance rather than the achievement of good standards?]

» During interviews, the ATSB became aware there was one flight to Norfolk Island that diverted to Auckland in early 2009 due to low cloud at Norfolk Island. This event was not formally reported as an incident, although it was known to management personnel. [Was this a missed opportunity to identify a new hazard (changed weather conditions) and to update company fuel management and weather practices to better manage that hazard in the future?]

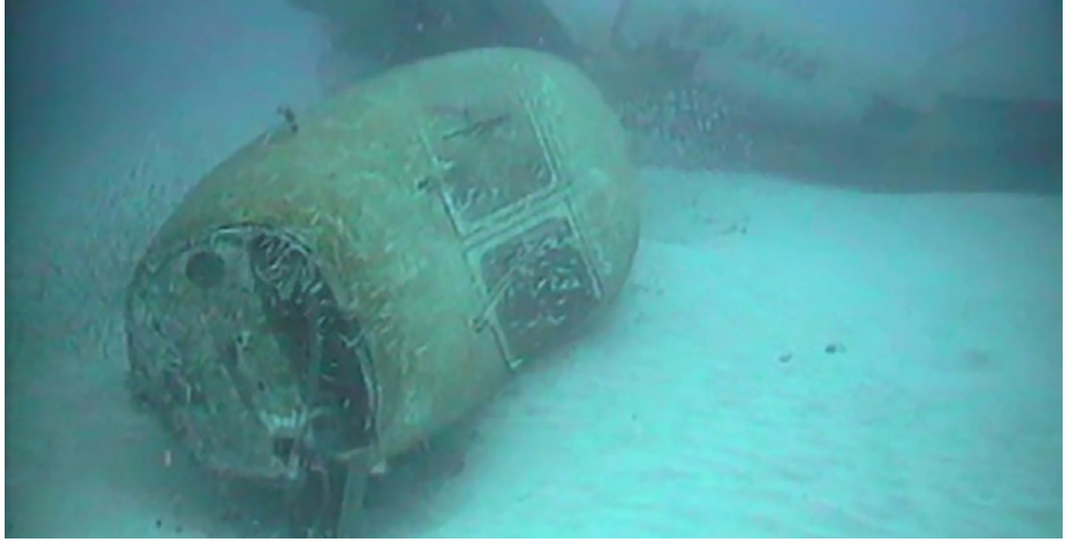
» As far as could be determined, no proficiency checks were conducted on international flights or air ambulance flights. Most captains completed their line training based in Darwin on freight flights. There was no formal training program for captains that covered the unique requirements of air ambulance flights, international flights and/or flights to remote aerodromes. Most pilots had some exposure to such operations during their first officer flying, but the amount varied significantly.

» The Westwind standards manager reported how-goes-it charts [charts for managing fuel planning] were introduced into Westwind operations several years prior to the accident. He stated he used a how-goes-it chart to calculate points of no return (PNRs). He also thought that other Westwind pilots were taught this technique, and he expected that other pilots were using the technique to calculate PNRs and monitor the progress of relevant long-distance flights. Some Westwind pilots reported they routinely used how-goes-it charts for relevant flights. However, most pilots, including the captain of the accident flight, reported they did not use the charts and had not been taught how to use them. [If you don't know there are better ways of doing business how do you gain insights into more adequate fuel management practices?]

» Westwind pilots reported they rarely if ever received feedback from the Westwind standards manager or other personnel regarding aspects of fuel planning or fuel usage on their flights. [How do you achieve new standards of behaviour if they're not reinforced

'And all of this under the watchful eye of CASA.'

The tail of VH-NGA is winched to the surface so its cockpit and flight data recorders could be recovered as part of the ATSB's reopened investigation into the ditching. ATSB



Wreckage of VH-NGA on the seabed off Norfolk Island. ATSB

by more senior pilots and check captains?]

- There was no requirement in the operations manual for point of no return (PNR) fuel calculations to be cross-checked between the flightcrew.
- Westwind pilots stated fuel planning and inflight fuel management aspects were covered during command line training. However, this was not an area of focus and the scope of their coverage was limited to the freight flights, where standard flight plans were typically used. Pilots also recalled that concepts such as critical points (CP) and PNR were covered, but they were not discussed in detail or emphasised.
- During 2009, the chief pilot became aware of various problems with the conduct of some training and checking activities across the fleets.
- In summary, the lack of clear definitions of roles and responsibilities had a significant potential to influence the extent to which operational and safety standards were being monitored, maintained and managed within the Westwind fleet after the new chief pilot commenced in November 2008.
- The operator's processes for identifying hazards extensively relied on hazard and incident reporting, and it did not have adequate proactive and predictive processes in place. In addition, although the operator commenced air ambulance operations in 2002, and the extent of these operations had significantly increased since 2007, the operator had not conducted a formal or structured review of its risk controls for these operations. Overall, had the operator adopted more thorough proactive and predictive hazard identification processes, it is likely at least some of the inadequate risk controls associated with its air ambulance operations would have been identified, particularly in terms of flight/fuel planning and inflight fuel management.
- CASA's procedures and guidance for scoping an audit included several important aspects, but it did not formally include the nature of the operator's activities, the inherent threats or hazards associated with those activities, and the risk controls that were important for managing those threats or hazards.
- Consistent with widely-agreed safety science principles, CASA's approach to conducting surveillance of large charter and air ambulance operators had placed significant emphasis on systems-based audits. However, its implementation of this approach resulted in minimal emphasis on evaluating the conduct of line operations (or 'process in practice'). Although there are pragmatic difficulties with interviewing line personnel and conducting product surveillance of some types of operations, such methods are necessary to ensure there is a balanced approach to surveillance, particularly until CASA can be confident that operators have mature safety management systems (SMSs) in place. [If CASA surveillance is too shallow how do more senior personnel (chief pilot, standards managers, check and training pilots) know whether their own practices are adequate and aligned with best practice?]

Ultimately, inadequate regulatory oversight also contributed heavily to a false sense of security within Pel-Air. How devastating it must have been post-accident to have CASA inspectorate staff suddenly find so many systemic issues that had not been picked up during previous CASA surveillance.

Wrap up and fatigue checklists

A key driver of accepted standards and normal practices (what you do when no one is looking) within any workplace is leadership, and it heavily influences workplace culture. Dom and the other crew members were doing the best they could in accordance with what they'd been shown to do. These were the same practices as many other crews flying for Pel-Air.

Anytime you make judgements regarding culpability (the balance between a focus on the failings of the system/organisation versus the accountability of an individual member) it is normal to devote close attention to leadership, culture and their influence on workplace practices and behaviour. There is clear evidence of failings with leadership, including inadequate oversight by CASA, and flawed ATSB investigation processes, which have not been adequately considered – leading to a heavy emphasis on the actions of the aircraft captain.

Importantly, fatigue is the smoking gun, likely to have adversely influenced the decision-making on the day.

The aim of this two-part article is not to discredit the aircraft investigators, who were doing their best with the information available at the time, but rather to consider some other systemic factors that may help us better understand what contributed to the accident.

As mentioned in Part 1 of this article last issue, due to concerns regarding the quality of the first release accident investigation report, the Transportation Safety Board of Canada (TSB) completed an independent review of the ATSB. Unfortunately, the TSB found that early misunderstanding of the responsibilities of CASA and the ATSB in the investigation were never resolved. This misunderstanding persisted throughout the investigation, and as a result, ultimately led to a less than ideal ATSB investigation.

Resolving such issues is largely the responsibility of more senior managers (such as CASA and ATSB executive and managers) and in themselves are representative of systemic failings of Australian aviation governance at that time. One can only feel the frustration that must have negatively impacted some of the well-trained and highly specialised accident investigators, trying to do the best they could in a less than ideal regulatory and investigatory system.

'Fatigue is the smoking gun.'

KEEPING WATCH

Israel's long heritage of unmanned aerial vehicles

WRITER: MAX BLENKIN

Israel is a pioneer of unmanned aerial systems (UAS) with Israeli-made unmanned aerial vehicles (UAVs) used extensively by the Israeli military and by a wide variety of nations, including Australia, the United States, China, Russia and the United Kingdom.

As a group, Israeli UAVs have likely seen more operational service than those of any other nation.

That all had to start somewhere and that somewhere was an Israeli Defence Force (IDF) requirement to look into the rear areas of hostile neighbouring nations without risking expensive and difficult to replace aircraft and highly trained pilots.

In the opening hours of the Six Day War in June 1967, the Israeli Air Force (IAF) comprehensively destroyed the air forces of Egypt, Syria and Jordan before most even had an opportunity to get off the ground.

In the ensuing War of Attrition (1967-70), Russia re-armed Egypt and Syria with modern air defences, featuring SA-2 and SA-3 surface-to-air missiles and their radar systems.

Just how effective was this system was amply demonstrated in the opening days of the October 1973 Yom Kippur War when the IAF experienced unsustainable losses.

But well before then, the IDF knew it had a problem in conducting the deep reconnaissance of neighbouring backyards it once freely undertook.

Ever willing to consider fresh ideas, a radio-control aircraft enthusiast staged a demonstration where he flew a model aeroplane out several hundred metres, took some photos with an onboard film camera then flew back.

This was in 1972 and demonstrated that this was a viable concept.

Then Minister of Defence Moshe Dayan called on Israel's defence industry to come up with an unmanned capability able to fly out, not hundreds of metres but 100 kilometres to conduct surveillance.

Israel's first practical UAV was the Tadiran Mastiff, built by Tadiran Electronic Industries, and first flown in 1977.

Although many remote-controlled military aircraft had gone before, Mastiff is regarded as the world's first modern military UAV, equipped with a video camera and datalink to provide real-time battlefield surveillance.

Mastiff was followed by the Israeli Aerospace Industries (IAI) Scout, which first flew operationally in 1981.

Mastiff and Scout appear remarkably similar, each with a full weight around 150kg, a pusher propeller piston engine and endurance of around seven hours.

'In the opening round, UAVs imitated Israeli combat aircraft.'

Both feature the twin tail booms characteristic of Israeli UAVs. That allows better positioning of the aerials and undercarriage and leaves the fuselage free to carry mission payloads.

When these early UAVs were first fielded, the ability for a commander to observe enemy activities in real time was truly astounding.

But compared to what's possible now, this was pretty basic – grainy black and white video, in daytime only, from an unstabilised Sony video camera with 150mm lens, transmitted through a basic datalink.

Loiter time was modest, perhaps a half hour over Beirut before having to fly back.

But it was a beginning, observed Shaul Shahar, the head of IAI's Military Aircraft Group. Much of his 26 years in the IDF was spent on unmanned systems.

Shahar said every year brought additional capability. The first Lebanon war demonstrated a requirement for night observation, which was introduced in 1983, though first-generation cooled IR seekers produced low resolution imagery.

The Heron TP is the product of 40 years of development of Israeli UAVs. IAI

A US Marine Corps RQ-2 Pioneer on its launch rail during Operation Desert Shield in November 1990. US DOD

Missions over Beirut showed the need for longer endurance. Resolution of day and night sensors steadily improved and stabilisation allowed the camera to remain steady no matter how the aircraft moved.

In 1992, an Israeli startup company said they could replace the black and white camera with a colour camera. The trial conducted over south Lebanon proved a revelation.

But it was Israel's imaginative deployment of UAVs in the Lebanon war which really made the world take notice of this new capability.

In around two hours on June 9 1982, the IDF scored one of the most lop-sided victories of recent military history, shooting down more than 80 Syrian aircraft and obliterating the air defences in Lebanon's Bekaa Valley.

This was probably the biggest air battle since WW2 and a triumph of good planning and effective execution (see On Target elsewhere this issue – Ed).

Considering how well Syrian and Egyptian air defences had performed in the 1973 Yom Kippur War, this underlined the importance of networking and the superiority of Western over Soviet military systems.

At the time, the IDF operated two platoons of Mastiffs and two of Scout, with six aircraft in each platoon. Well before the fighting started, UAVs were used to plot the position of Syrian SAM batteries and other forces in the Bekaa.

In the opening round, UAVs imitated Israeli combat aircraft, prompting Syrian radars to switch on and reveal their positions, which were then attacked with anti-radiation missiles fired by IAF F-4s.

At least two UAVs remained over the Bekaa throughout the battle, providing real-time battle damage assessment and updates, relayed through other UAVs to IAF E-2C and Boeing 707 command and control aircraft.

Israeli UAVs also orbited over three Syrian airfields, providing early warning that Syrian jets were on the way. As many as 86 Syrian aircraft were shot down. Some Israeli UAVs were reportedly destroyed and an aircraft damaged but no Israeli personnel were killed.

A Taridan Mastiff III on display at the Israeli Air Force Museum. BUKBOED/WIKIMEDIA

Although Israel had used UAVs since the mid-70s, this was a clear demonstration of their utility in high intensity conflict of the type which could have erupted between Western and Warsaw Pact forces during the Cold War. Plenty of people took notice.

Israel has since produced a diverse and bewildering array of UAVs which have been widely exported. The UK website dronewars.net, which keeps tabs on proliferation of armed UAVs, cites exports to 49 countries.

It also lists close to 50 different types of UAV produced by Israeli companies. This becomes confusing as one basic airframe may be produced in different variants and given different designations as it is progressively updated.

As well, some Israeli designs have also been produced in other countries.

Zvi Feldman, senior assistant to the IAI Military Aircraft Group general manager, said they had more than 52 customers worldwide.

"We have flown approximately two million flight hours. We have UAVs from five kilograms to over five tonnes. We deal with all kinds of UAVs for various applications – surveillance,

battle damage, whatever," he said.

Ron Tryfus, vice president for marketing and business development for the IAI systems, missiles and space group, said a significant percentage of IAI products were initiated and driven by an IDF operational need.

"This is very important. This is something that is in IAI DNA," he said.

"It's not only that you cannot buy it abroad. There is no such product. If you want to build something from scratch and to have it ... on time to the customer, which will not be 10 years later, they come to IAI because IAI is a centre of excellence for different capabilities."

The Australian Defence Force (ADF) is quite familiar with Israeli UAVs.

Operations in Afghanistan showed a very clear need for UAVs to support ground operations and the ADF took over the Canadian lease of three IAI Heron 1 UAVs, flying more than 27,000 hours for Australian and coalition forces.

The RAAF retired its Heron 1 fleet in June 2017, leaving a gap of three years or more in which it has no UAS capability.

The Herons are gone but other equipment of Israeli origin remains in service.

The current Australian Army tactical UAV, the RQ-7 Shadow is an American aircraft, although it was developed from the RQ-2 Pioneer, a joint design of IAI and US firm AAI.

Pioneer grew out of the Scout program and was acquired by the US Navy, Army and Marine Corps from the mid-1980s.

Pioneers flew a large number of reconnaissance missions during the 1990-91 Kuwait war. US battleships used Pioneers to adjust the aim in gunfire support missions.

In the most notable incident, Iraqi defenders on Faylaka Island spotted a low flying drone and, realising they were set to cop another pasting, waved handkerchiefs, undershorts and sheets to indicate their desire to surrender.

The IDF may well be a pioneer in another area – launching missiles from UAVs against ground targets.

However dronewars.net says the evidence is obscure because Israel has never admitted to employing armed UAVs.

It says the first reliable record of missiles being fired from drones by any nation was by the US in November 2001 at the start of the war in Afghanistan.

Israel may not admit it but there's plenty of evidence that it has, including reports from Gaza. Certainly, Israel promotes its diverse range of UAVs as battle proven.

Media reports suggest Israel has fitted weapons to a range of its UAVs including Heron 1 and its successor, the Heron TP, as well as the Elbit Hermes 450, none ever officially acknowledged.

Neither does IAI acknowledge that Heron TP it's seeking to sell Australia under Project AIR 7003 can be armed. It says that's a matter for the Israeli MOD and the IDF.

Ron Tryfus notes that UAVs can be constantly upgraded through their lives, gaining more sophisticated avionics, new software packages and "maybe other external loads which I refrain from mentioning now."

That Heron TP can be armed is no mystery as that's precisely what the ADF says it wants and this was clearly indicated in the 2016 Defence White

The RAAF retired its Heron 1 fleet in June 2017, leaving a gap of three years or more in which it has no UAS capability. DEFENCE

Paper. However, surveillance would remain its fundamental mission.

Through AIR 7003, the ADF is seeking to acquire a medium-altitude long-endurance (MALE) unmanned aircraft system for support of future defence operations. These aircraft could also be employed in a range of civil missions including bushfire observation and post-disaster surveillance.

There appear to be just the two contenders, IAI with Heron TP, big brother to the familiar Heron 1, and General Atomics Aeronautical Systems (GA-ASI) with its Reaper series of armed UAS.

IAI unveiled Heron TP at the Paris Airshow in 2007 and it entered service with the IAF in 2010.

In IAF service it's known as the Eitan (Ethan). IAI is close to signing a deal with the German Ministry of Defence and Heron TP is also being considered by others, including India.

This is a big UAV, with a wing span of 26 metres, compared to 16.6 metres for Heron 1 and 20 metres for the General Atomics Reaper.

Under the IAI proposal, it would supply Heron TP aircraft and flight control systems and Australia could choose its own sensors, mission systems and datalinks to ensure they are fully compatible with coalition networks. In practice, that means sensitive US networks.

While Australia has experience of Israeli UAS, Israel has used Australian technology in one of its UAVs, the Searcher 3.

Popular Mechanics magazine has termed the Rotem-L as the "Kamikaze Quadcopter from Hell". IAI

Searchers replaced Scout and Mastiff UAVs in IDF service from 1992 and have since been sold around the world. Users include Russia, India, Spain and Singapore.

Searcher 3 aircraft are powered by the Australian-made Jabiru engine.

Israel may have another claim to fame for a novel UAS application, fielding the first loitering munition, a technology now used by more than a dozen countries.

Tryfus says a loitering munition is something between a UAV and a cruise missile.

This is particularly useful for dealing with enemy air defence radars which may switch on only intermittently. The loitering munition orbits overhead then attacks the moment it senses a radar emission.

Loitering munitions do the same job as traditional anti-radiation missiles such as the AGM-88 HARM but can do it more persistently and without endangering a manned aircraft.

"You want to be able to get to the area of the target, stay there for a long time and close the loop between observation and attack," Tryfus said.

"You can loiter in the area of the target for a long time and by a long time I mean hours. It all depends on how many times you want to go down on the target and then back up to loiter, which is also another capability."

It may be that the radar operators realise that the moment they switch

The Heron TP is a big UAV, with wing span of 26 metres. IAI

on, they will be obliterated so they stay switched off. That still amounts to fulfillment of the suppression of enemy air defences (SEAD) mission.

IAI produces a family of loitering munitions and its Harpy, introduced to service in the late 1980s, is regarded by some as the first true loitering munitions.

Harpy is a 135kg UAV with a 500km range and 32kg warhead, specifically intended to target radar systems.

Harpy has been exported to, among others, Turkey, India and China. Sales of this advanced technology to China sparked strong protests from the US. China now produces its own loitering munition which bears a curious resemblance to Harpy.

The Harpy and its latest variant, the larger and longer endurance Harop, are both single-use munitions intended for the SEAD mission.

These can act autonomously, attacking without involvement of a human operator.

IAI also produces smaller loitering munitions, Green Dragon and Rotem-L for use by soldiers in the field.

Green Dragon is a 16kg electrically-powered UAV with a 2.5kg warhead and 75 minutes endurance. It features a day and night seeker and is intended to give small units and special forces a precision strike capability along with the ability to watch over their operational area.

Rotem-L is an even smaller package, weighing five kilograms, with two able to be carried by a soldier in a special backpack.

Unlike Harpy or Green Dragon, Rotem-L is a quadrotor UAV powered by batteries and intended to give soldiers a surveillance and precision strike capability, especially when fighting in urban areas.

Popular Mechanics magazine termed Rotem-L as the "Kamikaze Quadcopter from Hell".

And unlike other single-use loitering munitions, it can be used more than once.

"You can use it multiple times, unless you decide to attack the target. If you decide not to attack, even if armed, we have a very smart patented disarming capability," Tryfus said.

"Everything is based on an operational need. This is not a Toys R Us or DJI loitering aircraft."

Rotem-L need not even be armed all the time.

The warhead comprises one or two Mark 26 fragmentation hand grenades which the operator can fit to the aircraft as needed. If not needed, the same receptacle can house extra batteries to extend endurance from 30 out to 45 minutes.

Being battery-powered, this aircraft is virtually silent. It's even fitted with a collision avoidance system so it can fly through windows and inside buildings.

Rotem-L features a day and night sensor and datalink, streaming high definition imagery to the operator's tablet computer. Green Dragon is operated from the same sort of tablet.

Should the operator spot a suitable target, it's just a matter of selecting attack mode on the tablet and the aircraft executes a shallow dive then detonates the onboard grenades.

Tryfus says Rotem-L could even land on a moving car.

"That could surprise someone. There are cases in which you want to put it on your own car to bring it back," he said.

These are reportedly now in service with the IDF.

The Harpy is a loitering munition with a 500km range and 32kg warhead. IAI

Green Dragon is a 16kg electrically-powered UAV with a 2.5kg warhead and 75 minutes endurance. IAI

LIKE NO OTHER

The view from the office of a Virgin 737

WRITER: CHRIS FRAME

From its formation as a low-cost carrier 18 years ago, right up to this day, Virgin Australia has relied on the skill and expertise of thousands of pilots to safely deliver millions of passengers across Australia, and the world.

Originally comprising of a small, close-knit team of pilots operating just a handful of secondhand Boeing 737-400s for the then Virgin Blue, today the airline employs over 1,500 pilots who command a fleet of aircraft ranging in size from the giant Boeing 777-300ER to the turboprop ATR.

Yet despite the growth of the airline, Boeing's 737 remains the workhorse of the Virgin fleet, with 82 of these robust narrowbodies criss-crossing the skies each day.

Captain Veronica Binns is one of the people you'll find in command of a Virgin Australia 737.

Joining the airline in 2003, Captain Binns was based in Brisbane during Virgin Blue's formative years, relocating to Sydney as the airline quickly expanded.

Virgin's 2009 move to open a pilot base in Perth allowed Captain Binns an opportunity to return home to the West Coast. It was here that she spoke to *Australian Aviation* about her life on the flightdeck.

The dream

Becoming a pilot takes commitment. Such a career is extremely rewarding, yet it demands a high degree of personal sacrifice, as well as a true passion for the industry.

For a young Veronica Binns, this passion was first sparked by an interest in space travel and a childhood ambition of becoming an astronaut on the NASA Space Shuttle.

"I collected books and magazines on space and made many models of the space shuttle. I even wrote to NASA when I was 10 to ask how I could become an astronaut. They very kindly replied to me with an envelope

Flying offers a view from the office like no other. VERONICA BINNS

full of pamphlets and photos," Captain Binns reminisces.

"I'm very grateful to that person who replied to my letter, as it made me feel that my dreams weren't impossible."

Subsequent travel on airliners fuelled a passion for commercial aviation in the future pilot, with visits to the flightdeck leaving a lasting impression. This was the era pre-911 when a visit to the flightdeck was a memorable form of inflight entertainment, as well as being a rite-of-passage for many young flyers.

"It's unfortunate kids don't have this opportunity anymore during flight as most of my colleagues remember doing the same when they were young," Captain Binns comments. "We love to encourage kids to visit the flightdeck on the ground when time allows, it's great to see their reactions and hopefully inspires a new generation of pilots."

In addition to childhood experiences in the air, family played an equally important role in Captain Binns' aviation journey. In fact, her grandmother's family was heavily involved in Australian National Airways (ANA) and used to share tales of rubbing shoulders with Sir Charles Kingsford Smith, as well as visits to the Douglas Aircraft factory in the 1930s.

Such a family connection cemented a firm love of aviation into Veronica Binns, a love she retains to this day.

A long road

The journey to becoming an airline pilot is a long, challenging and expensive one. For Veronica Binns, this journey started just over three decades ago in a move that set her on a path to realise her flying ambitions.

"I started learning to fly in 1989 although I didn't get a commercial licence until 1995 due to finances, university studies and travel," comments Captain Binns.

"I did a TIF (trial introductory flight) when I was 18 and was hooked from the start. I didn't think it would become a career for me back then, as I was studying for a science degree in geology and archaeology at university."

> 'Some months I wouldn't fly at all, so sometimes it felt like one step forwards, two steps back.'
>
> VERONICA BINNS

But as the trainee pilot's hours began to increase, the prospect of a flying career took hold. Yet as with most young aviators, costs were a major hurdle to overcome if Binns was ever to sit in the captain's seat.

"Some months I wouldn't fly at all, so sometimes it felt like one step forwards, two steps back," Captain Binns reflects.

"I had lots of part time jobs during uni and my mum helped where she could financially. It still took me five years to obtain my commercial licence."

Despite receiving help from her mother as well as working multiple jobs, the financial impact of perusing a flying career could have been an insurmountable obstacle. Yet Veronica Binns pushed on, determined to succeed in realising her dream.

"I was fortunate to obtain a scholarship from the Australian Women Pilots Association while I was training for my instrument rating,

The Boeing 737 is the mainstay of the Virgin Australia fleet.
SETH JAWORSKI

which was helpful," Captain Binns says.

"Like many pilots the challenge was to get the first job and then the next and the next – each time trying to fly something bigger and get experience. Getting time off from general aviation jobs to go to interviews, or study for airline transport pilot licence (ATPL) subjects while working full time was tricky."

Despite these difficulties, strong friendships were forged between Binns and her colleagues. The young aviators came together to support each other as they juggled training, study and work, helping Binns overcome any hurdles and achieve her goals.

"All your friends were in the same situation and we helped each other out. The friends that I made during these challenging times are the ones I will cherish the most."

Going commercial

Of all the commercial aviation careers pilots can peruse, airline flying is perhaps the most revered, while it also offers one of the most stable flying lifestyles. As such, securing a job as an airline pilot is considered the pinnacle of many pilot's careers, with most airline pilots remaining in this role until retirement.

"I love the 737! It's often referred to as the "Toyota of the skies"."
VERONICA BINNS

Captain Binns' journey to becoming an airline pilot progressed throughout the 1990s. She advanced her skills with charter work for mining companies as well as a stint as a certified flying instructor at a small flight school.

A move to the Northern Territory saw Binns flying King Airs and Metros, before moving to Queensland to take up her first airline job at Sunstate Airlines. Captain Binns quickly realised that airline work presents new challenges, which grow in tandem with the size and complexity of the equipment flown.

"The job is not just about getting from A to B safely, there are lots of other layers involved with all departments. We rely on all the human and technical elements to come together to get an aircraft airborne," Binns explains.

"Becoming a Captain involved learning how to manage situations and people. Environments and the people you work with are constantly changing and you need to adapt to handle these changes effectively and efficiently."

With valuable experience gained within Sunstate Airlines, Captain Binns' final move was to Virgin Blue in 2003. She has remained with Virgin ever since.

"I followed the start-up of Virgin Blue closely. I was close to obtaining the requirements to be able to apply during their infancy. There was definitely a vibe of positivity and freshness that came with the brand as it arrived in Australia. Being part of a new brand in Australia was an exciting prospect," Captain Binns recalls.

"I joined the Virgin team in Brisbane on the 737... When Virgin opened its Perth base in 2009 I was able to move back home which was great. At the time, there was no Boeing 737 base in Perth, so I began my training on the Embraer 190. The company opened a Boeing base in Perth a few years later and I retrained back onto the 737 about two years ago."

Taking flight

Follow any pilot on social media and two things are quickly apparent.

The first is the sheer beauty of the flying experience. From cloud-filled skies to views of cities from the air, rugged coastlines to the twinkle of landing lights, the views from the flightdeck trump any view from land-based offices.

The second is a sense of comradery that the flightcrew, cabin crew and ground staff share, as they all come together to provide a service that is as much a logistical feat as it is a physical one.

In speaking with Captain Veronica Binns, it becomes clear that these experiences are the best part of working at 38,000ft. Yet these magical photographs so easily accessed online offer but a glimpse into life above the clouds that is as challenging as it is rewarding.

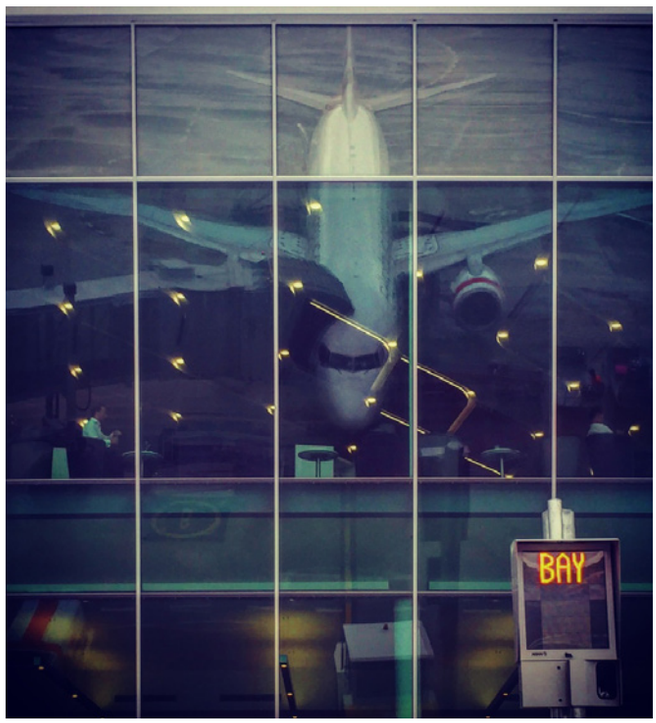
"The best part of the job has always been the people I work with. Of course, being in the sky was where I always wanted to be, but it's been the people I've met and worked with on the way that has become the best part. Another part that I will never tire of is the view out of the office window. The perspective pilots get of our planet is a privilege and one that constantly amazes me."

Such remarkable positive experiences help overcome the challenges of a career in aviation, which include long periods of time away from family and friends. Captain Binns is a local Western Australian, growing up in Perth. But to achieve her aviation goals she spent the better part of two decades far from home.

This long-distance career choice makes the quality human connections with her Virgin Australia family that much more important. People are the number one reason why Captain Binns loves her job, and Virgin's company culture helps Binns and her colleagues remain positive, upbeat and supportive of each other.

Fortunately, Captain Binns was able to return to her home city in 2009 and was trained to fly the now-retired Embraer E190 jets that were based at Virgin's Perth hub. Captain Binns has since returned to the Boeing 737 and says that flying from the West Coast is her number one pick.

"Perth is where I grew up and where my family is, so I would have to say that I've got it as good as it gets! Perth offers a great lifestyle and WA has some amazing places to visit."



The mirrored reflection of a 737 at the gate. VERONICA BINNS

Virgin's 737 pilots can find themselves rostered to fly anywhere on the 737 network. This is managed on a 28-day roster basis of which Binns says "no two are the same."

"We can be away for anywhere up to four days. It doesn't really matter where we have layovers, generally if I have enough time in a particular place there is always something to do. As an airline pilot, the country becomes a lot smaller and you can feel like a local in most places."

Additionally, Virgin Australia is a family-friendly employer allowing Captain Binns the flexibility to select as many day trips as possible. This allows her to be home at nights, allowing her to spend time with her children.

Veronica Binns joined the then Virgin Blue in 2003.

Reflections

Much has changed at Virgin since Captain Binns joined the company in 2003. The airline's expansion, coupled with its rebrand into a full-service carrier has led to new aircraft types being introduced and others, such as the E190 being retired.

Yet among all the change, there is one consistent; the Boeing 737. It was the first and remains to this day the most numerous type in the airline's fleet. And despite having flown other types, the baby Boeing remains a star in Captain Binns' eyes.

"I love the 737! It's often referred to as the 'Toyota of the skies'. It's solid, reliable, tried and tested," Binns explains with a smile.

Yet despite a love for the 737, Captain Binns' favourite aircraft isn't a commercial airliner. In fact, she finds it difficult to narrow her favourite down to just one type.

"I have a few favourites. I flew the Tiger Moth when I worked at Jandakot and it will always hold a special place in my heart. I also loved the Baron and dream of flying holidays with the family in one," Captain Binns says.

"I also do miss doing aerobatics, as I used to teach aeros when I was instructing, so I'd love to one day try some aeros in an Extra Aircraft or the like."

But for now, Captain Binns' career with Virgin Australia offers her an enjoyable lifestyle, great friendships and a "view from the office" like no other.

So, the next time you board a Virgin Australia Boeing 737 listen out for the welcome aboard announcements – as it may well be Veronica Binns at the controls. But regardless of who your pilot is, take just a moment to reflect on the years of hard work, dedication and commitment that have taken place for that voice to say "this is your Captain speaking."

The Pipistrel was the first Australian-registered electric-powered light sport aircraft to fly. ELECTRO AERO

BARELY A SOUND

Australia's first electric-powered light sport aircraft takes flight, pointing to an electric future

WRITER: CHRIS FRAME

In January this year, an aviation milestone was achieved, as the first Australian-registered electric-powered light-sport aircraft took flight.

Lifting off from Jandakot Airport in Western Australia, the Alpha Electro, built by Slovenia's Pipistrel, can remain airborne for an hour with an extra half hour in reserve.

While this flying time is but a fraction of that achievable from avgas-powered aircraft, it represents a significant leap forward for electric-powered motors. The Alpha Electro ushers in a number of innovative design improvements that boost the endurance of electric-powered aircraft.

"The Alpha Electro is unique due to its highly-optimised and award-winning low-drag fuselage and wings," says Joshua Portlock, executive chairman and founder of Electro.Aero which operates the Alpha Electro.

The design and airborne endurance of the Alpha Electro makes it the perfect aircraft for Electro.Aero to launch Australia's first flight training program for electric-driven aircraft.

Looking back

With the modern day push towards efficient and environmentally friendly propulsion, you could be forgiven for thinking electric engines are a new development in aviation. However, electric-powered air transport has its roots in the 19th century.

The first electrically-powered aircraft was flown in the 1880s by French aviators Gastov and Albert Tissandier. Their airship flew from Paris, using electrically powered motors. The pioneering aircraft found work conducting meteorological surveys on behalf of the French Academy of Science.

While achieving moderate acceptance as a form of power for airships, widespread use of electric motors in fixed-wing aircraft proved elusive, due to limitations in the scalability of electrical storage methods at the time.

The advent of improvements in battery efficiency throughout the late 20th century would finally allow

Electro.Aero's FlyKart proof of concept flying go-kart.
ELECTRO.AERO

for storage to be light and efficient; opening the door for electric motors to become a viable option for fixed-wing designs.

Fixed-wing success was first realised ninety years after the Tissandier's airship flight, when an Austrian HB-3 Brditschka glider was converted to carry an electric engine. Yet despite its successful flight, electric motors remained largely the domain of unmanned aerial vehicles.

Throughout the 1990s, electric motors gained a widespread reputation as a pioneering aviation technology, thanks to its use in several ground-breaking research aircraft designs including NASA's solar-powered Pathfinder.

And by the 1990s, battery-powered engines had finally found their way into limited use in light aircraft. The first production model was produced for the Alisport Silent Club's sailplane, although a conventional engine is also available for use on this type.

At the dawn of the 21st century, the benefits of electric propulsion started to become more attainable. Battery storage was improving at a quickening rate, and cost of acquisition of electric engines decreased. Coupled with operational efficiencies, the technology began to appeal to a variety of commercial users.

"Electricity is substantially cheaper than petrol per flight and the mechanical simplicity of only one moving part for the electric motor means maintenance cost is lower too, while also improving reliability," comments Portlock.

'It is only one simple throttle lever to control thrust.'
JOSHUA PORTLOCK

And it's not just accountants who will appreciate the efficiency of electric aircraft. Portlock says that there are operational benefits for pilots, particularly when performing flight-training missions.

"It is only one simple throttle lever to control thrust and the pilot does not have to worry about mixture control, oil pressure, fuel pumps, magnetos, carb heat, etcetera, like in a legacy light aircraft. This is especially important during training where the student pilot should be focusing on learning the flight controls primarily and not distracted by the complexity of engine management."

Electro.Aero

Electro.Aero is at the forefront of electric-powered flight in Australia, and the organisation has its roots in a drive to participate in this propulsion revolution.

Witnessing a seemingly exponential improvement in electric propulsion throughout the aviation sector, Joshua Portlock founded the organisation in 2014.

Its mission is to advance the transition to environmentally sustainable aviation. True to that mission, the Jandakot-based business has been linked to the development of a variety of concept aircraft, as well as being instrumental in electric aircraft certification.

"We have developed some great proof of concepts, such as our FlyKart flying go-kart," says Portlock, referring to a personal electric VTOL aircraft that can carry a person as well as fly remotely.

"More recently we've identified the opportunity to fill a technology gap in the sustainable aviation propulsion technology with our ElectroDucts. These are highly-integrated, modular electric-ducted fans, optimised for maximum efficiency, minimum weight and highest performance from static thrust up to the maximum airspeed typical of light aircraft. This results in shorter takeoff distances, higher climb rates and longer flight times for a given battery size."

Reaping the benefits

Initially, the environmental benefits of electric motors were the core driver of the Electro.Aero business, and environmental factors are often touted as a leading driver to adopting such technology.

But in pioneering the propulsion, Electro.Aero has identified a number of unsung benefits of electric aircraft. Such benefits range from noise abatement factors to passenger comfort.

"After researching other benefits and flying in a prototype Alpha Electro, it became clear that the reduced noise, vibration and harshness made electric aircraft even more attractive to fly," Portlock points out.

There is growing interest in Electro.Aero's ElectroDuct design, which provides a series of advantages for both manned and unmanned aircraft. A self-contained modular propulsion unit, the ElectroDuct design incorporates the duct, propeller, motor controller and batteries to allow for a fully integrated system in any new-build or conversion project.

Optimised to offer superior performance in experimental VOTL or ESTOL profiles, the company sees a range of potential customers. Uses vary from air taxis to light aircraft conversion, as well as heavy unmanned aerial vehicles.

Furthermore, a strong focus on market feedback has seen Electro.Aero take steps to ensure the design of the ElectroDuct addressed issues evident in traditional propeller designs, further boosting its appeal.

"Our ElectroDucts are safer with the enclosed propellers, can be smaller for the same thrust or produce far more thrust for the same size and power. A pair of ElectroDucts mounted either side of the fuselage are even more efficient than one propeller

inefficiently blowing air over the fuselage, as the ducts are getting much cleaner uniform airflow in and out, without the additional blown fuselage drag," Portlock explains.

Electro.Aero touts a reduction in the operation costs for commercial pilot training centres, as well as improvements in the propulsion redundancy for air taxi operators, as two industries that will see immediate benefits from the ElectroDuct.

"The biggest long-term potential of our ElectroDucts is employing them in new VTOL transitioning aircraft designs that can takeoff and land vertically like helicopters and cruise efficiently to maximise speed and range," Portlock comments.

"This will eventually facilitate personal on-demand aerial mobility from point-to-point, substantially reducing transit times, especially during peak hour traffic, over cities or large bodies of water."

Enter Pipistrel

The most notable local advance in electric-powered aviation is Electro.Aero's maiden Australian flight of a Pipistrel Alpha Electro.

The two-seater aircraft received Australian certification in late 2017. The January 2018 flight from Jandakot was the first for a production electric aircraft in Australia.

The aircraft sports a 60kW electric motor and can climb at a rate greater than 1,000ft/min. Operators can then throttle back to 20kW and cruise at around 85kt. However it is the aircraft's range that makes it a standout among existing electric models.

"The Pipistrel Alpha Electro is unique due to its highly optimised and award winning low drag fuselage and wings, allowing it to get about an hour of endurance plus reserve, which is more than adequate for initial training," comments Portlock.

The first flight incorporated two circuits at Jandakot. Having accomplished a smooth inaugural flight, the aircraft has since been used to train flying instructors who will ultimately utilise the aircraft as a pilot training vehicle.

The aircraft's traditional appearance was juxtaposed with its unusually quiet engine; which instantly demonstrated its noise abatement features.

"It really is the quietest light aircraft that any of us have ever seen" said Electro.Aero finance director Richard Charlton at the time of the maiden flight.

"This is the start of the next revolution in general aviation. We are already fielding enquiries from airports located in major cities where noise complaints have become their number one concern."

The aircraft has been granted a Recreational Pilot Certificate from Recreational Aviation Australia (RAAus). As such it is a RAAus-registered aircraft, carrying the RAAus tail number of 23-0938.

A Special Certificate of Airworthiness from the Civil Aviation Safety Authority (CASA) allows the aircraft to be used by Electro.Aero in a training role. It can carry two people, and has a maximum takeoff weight of up to 550kg.

The success of the Alpha Electro's introduction into Electro.Aero's fleet has since been coupled with the organisation's launch of the first electric pilot training program in Australia.

Offered in conjunction with Cloud Dancer Pilot Training, the program includes the full spectrum of pilot training scenarios such as circuits, stalls, steep turns and forced landings.

Run out of Jandakot, trainees will also experience flying in controlled airspace, communicating with Jandakot's air traffic control tower as well as utilising radar coverage at the airfield.

"The feedback has been extremely positive," says Portlock. "We're finding the improved comfort, lower complexity and better affordability are contributing to more new people wanting and able to fly, who previously have not thought of undertaking flight training due to either cost, complexity or comfort."

'It is the Pipistrel's range that makes it a standout among electric aircraft.'

The future

There is little doubt that the future of electric-powered aircraft looks bright. As technology improves, design benefits will see range widen, continued reductions in operating costs and an ongoing uptake from operators around the world bringing unit prices down.

Further advantages of electric motors include weight savings, reduced mechanical complexity and lower vibrations. Yet electric aircraft do come with some limitations.

This includes power storage barriers, as battery technology continues to underperform againstliquid fuel in energy storage, limiting range when compared to conventionally-powered aircraft.

Yet despite these limitations, Joshua Portlock is buoyant about the future.

"The technology is steadily advancing to improve battery energy density, reduce airframe weight through more advanced manufacturing techniques and improving propulsion system efficiency, such as our ElectroDucts, to maximise endurance," he comments.

"In five years we'll see the legacy fleet of training get replaced by electric fixed-wing aircraft. In 10 years we'll most likely see VTOL air taxis employing our ElectroDucts for minimum noise and maximum performance."

But for now, if you live in or around Jandakot Airport and see the silhouette of a small aircraft pass overhead, listen carefully. If there's hardly any sound, chances are it's an Electro.Aero aircraft flying at the forefront of Australia's aviation revolution.

Celebrating the Pipistrel's first Australian flight. ELECTRO.AERO

DITCHED

Stand by for trans-Tasman fireworks later this year as Air New Zealand and Virgin Australia end their seven-year alliance. In reality the break-up isn't much of a surprise but it will likely spark a new wave of intense competition on routes between the two countries.

WRITER: TOM BALLANTYNE

In an interview earlier this year Air New Zealand chief executive Christopher Luxon told this writer that partnerships were a key plank in the carrier's strategy. Pointing to serious connections with the likes of United Airlines, Singapore Airlines, Air China, Cathay Pacific Airways, All Nippon Airways, Aerolineas Argentinas and, of course, Virgin Australia, he declared they were "a really great set of JV (joint venture) partners for the markets we need to go to".

Apparently, when it comes to Virgin, the wedding has suffered from the seven-year itch. When their JV, covering flights between Australia and New Zealand, expires in October the parties will not apply to renew it.

Why the divorce? According to Air NZ chief revenue officer Cam Wallace, the market dynamics on flights between the two countries have changed and the time is right for each airline to focus on its own objectives.

Previously regarded as a vital buffer against the rival pairing of Qantas and Emirates Airline which also codeshared across "The Ditch", the Auckland-based flag carrier now clearly believes that when it comes to Australia it can stand on its own two feet.

"This move will enable us to deliver a more consistent customer experience by using our own fleet and delivering an improved schedule, which we'll provide more details about shortly," said Wallace.

Virgin appears nonplussed by the development, with chief executive John Borghetti declaring it will now look to compete vigorously and that it "provides opportunities for the Virgin Australia Group on the Tasman, including operating both the Virgin Australia and Tigerair Australia brands in the market."

Virgin has had a strong presence in the market since 2004, Borghetti said, and will continue to enhance its offering to suit both the business and leisure markets.

"Virgin Australia will continue its strong focus on providing competition and outstanding service on the Tasman, which remains an important part of our network and strategy as an airline group."

It's a clear signal that trans-Tasman flyers can look forward to happy days when it comes to ticket prices.

So, what has changed?

Trans-Tasman flying has traditionally been a volatile business with profitability often scarce through various waves of over-capacity and fierce competition. Air New Zealand hasn't only had to face a head-on battle with rival Qantas but compete with fifth-freedom flights operated by an array of international airlines operating services into New Zealand via Australia. They include Emirates (its JV with Qantas got a five-year extension in March), Singapore Airlines, Taiwan's China Airlines, Philippines Airlines, South America's LATAM Airlines and Malaysia's AirAsia X.

The strategic alliance with Virgin, forged at the end of 2010 – it included codesharing, feeding passengers onto each other's domestic networks, sharing lounges and ground facilities as well as frequent flyer benefits – was seen as a key plank in combating this threat.

In more recent times, however, the pressure has eased. Four of the 10 international operators reduced capacity last year. These were Emirates (by 4.4 per cent), Jetstar (by 10.2 per cent), China Airlines (by 21.6 per cent) and Philippine Airlines (by 10.8 per cent). Philippine Airlines withdrew from the trans-Tasman market altogether at the end of 2017, replacing its Manila to Auckland via Cairns service with direct flights between Manila and Auckland.

Most significant, however, has been an adjustment in the way the Qantas/Emirates duo are tackling the market. Until last year it was common to see three giant Emirates Airbus A380s parked at Auckland Airport, a sight that appeared to many observers to

After seven years together, Air New Zealand and Virgin Australia are parting company. ROB FINLAYSON

be a bit of overkill. The Dubai carrier operated separate flights to Auckland through Brisbane, Melbourne and Sydney, as well as another service to Christchurch through Sydney. From March this year it ditched Melbourne, Brisbane and Sydney to Auckland, retaining only its Sydney to Christchurch A380 service.

Emirates president Tim Clark said demand on its Australia-Auckland flights had been hit after the launch of its nonstop flight between Dubai and Auckland last year and due to competition from new entrants. The Dubai carrier is evaluating adding another nonstop Dubai-Auckland flight or a new nonstop Dubai-Christchurch flight in the future, Clark said.

At the same time, as part of its renegotiated agreement with Emirates, Qantas increased the frequency of its services between the two countries, adding seven new return flights per week between Melbourne and Auckland and an extra two return services per week between Brisbane and Auckland, with some up-gauged from a Boeing 737 to a widebody Airbus A330.

Nevertheless, according to Qantas, the total number of seats between Australia and New Zealand on all airlines will still fall by 3.7 per cent after the changes. On the one hand, that is likely to benefit Air NZ with capacity cuts potentially leading to a boost in airfares. That will depend on what Virgin decides to do and to what measure it throws budget Tiger into the fray. Overall, however, Luxon says there is now "much more rational behavior on the Tasman which is really fantastic because there was over-capacity sitting there".

Virgin Australia boss John Borghetti says Tigerair Australia could now look to operate trans-Tasman services. ROB FINLAYSON

'Luxon says the business has been highly resilient and highly competitive.'

It is a market that has seen continual growth since 2008. The number of seats available between Australia and New Zealand grew from 7.55 million to 10.25 million from 2008 to 2017, representing a 36 per cent increase in capacity over the past 10 years. During the same period, the average capacity on departing flights between Australia and New Zealand increased from 196 to 217 seats, indicating the use of larger aircraft.

OAG schedules show that the percentage of trans-Tasman flights operated by narrowbody types has actually increased, from about two-thirds in 2008 to 75 per cent of all services in 2017, but that there has been an increase in the frequencies operated by larger narrowbody aircraft. The 737-800 and A320 were the main single-aisle aircraft used between Australia and New Zealand in 2017, while smaller types including the 737-300 and 737-400 have been phased-out since 2008.

Passenger statistics from the Department of Infrastructure, Regional Development and Cities, up to and including October 2017, show that Auckland was the second largest international destination from Australia last year.

Another reason why Air NZ has opted to go it alone on the Tasman is that it has never been in a stronger position, both financially and in terms of its confidence as a stable operator able to compete head-to-head with the best. In August it reported a NZ$382m (A$351m) after tax profit for the year ended June 30 2017, down 17 per cent on a year earlier but still the second biggest profit in its history. This despite a year in which it faced several major issues, including a burst fuel pipeline to Auckland Airport.

While Luxon concedes the past 24 months have been "quite a challenge" he says the business has been highly resilient and highly competitive. With many carriers around the world complaining they are carrying more passengers for less money with yields down, he says it's a different story at Air NZ.

"If you look at our monthly statistics, we've had an improving RASK (revenue per available seat-kilometre) situation for the last year. That's been a very big focus for us, to get the revenue mix right and to make sure that where possible when we have got rising costs around fuel that we are trying to recover that through revenue. If you look at our RASK and yield, they have been moving in a very positive direction."

While trans-Tasman is important, he is also set on establishing Air NZ as the major player in transporting people from Asia, including China, through New Zealand to North and South America. It's another reason why it feels Virgin is no longer a must have in its plans and the central players, strangely enough, have been a goose and a kiwi bird. Unlikely as that may seem, a unique advertising campaign featuring Dave the Goose and, more recently, Pete the Kiwi (the New Zealand bird who wants to see the world but is hampered by his inability to fly), flying to North and South America from Australia via Auckland aboard Air NZ has been a huge success.

Luxon says it has been going "superbly well" and points out over the last three years Air NZ has really built a much stronger presence in Australia.

"We're the number one corporate reputation company in Australia, which is unusual for a foreign company to have that title. We have obviously expanded our sales presence across all the states and we have then been able to have a compelling story to say if you are sitting in Adelaide why not jump on a Dreamliner, come through Auckland... and then transition out to Buenos Aires, to Houston, to Los Angeles. To give you a feel for it ... 40 per cent of our traffic to Argentina are Australians, 25 per cent of our traffic to Houston would be Australians. It's been a great source of extra volume when you come from a country of five million people to be able to tap into a much larger market."

Air NZ's network is now 30 per cent bigger than it was five years ago.

"So that is affording us some opportunities and connectivities that haven't happened before. For us, to go from Australia through New Zealand out to the east coast of North and South America is really very interesting. To be able to connect China and South-East Asia through Auckland to South America is also very interesting. Being three hours closer to the Americas than the eastern seaboard of Australia means that yes, we think there's a huge opportunity for us to do launching into the east coast of North and also South America."

In the midst of this Air NZ has been facing a wave of new competition from fast-growing Chinese airlines. As well as Air China, China Southern and China Eastern, the likes of Sichuan Airlines, Tianjin Airlines and Hainan Airlines are also flying in. But Luxon has taken an innovative approach to nullify their impact.

"Yes, the Chinese have come in but a lot of that is from secondary and tertiary cities which impacts us less. We have also built a pretty good business model for China which is that we have gone after much wealthier upper middle-class travellers. What we are interested in is the free and independent traveller, not the group traveller. You can fill the planes up with different customers but if you don't have the right margin structure and economics it's a real problem. Your planes are full but you are losing money flying to China."

In fact, over the past four or five years, Air NZ has changed all the wholesalers and retailers it deals with in China.

"We go after wealthy 30-year-old couples, wealthy middle-class families and 80 per cent of the people now coming on our flights are spending eight days or more in the country, almost as much as a US tourist in terms of their daily spend. That's a much better mix for us. They are also customers who only have limited annual holidays, two weeks a year and they want to start their holiday on an Air New Zealand flight interacting with Kiwis, so they have consciously chosen Air New Zealand over the Chinese mainline carriers. That's how we have margined our business up and how we've got the economic model of that right."

'We're the number one corporate reputation company in Australia.'
CHRISTOPHER LUXON

In the light of all of this nobody should be surprised the Air NZ-Virgin marriage is coming to an end. The relationship hasn't always been made in heaven. Air NZ sold its 26 per cent stake in Virgin to Chinese interests in 2016, unhappy with the lack of returns it was getting on the investment as Virgin continued to struggle to make profits.

It has actually been winding back many features of the alliance with the Australian carrier ever since. From November last year Virgin's Velocity Frequent Flyer members were no longer able to earn or redeem points on Air New Zealand's longer international flights, such as from Auckland to Los Angeles or Houston, nor could status credits be earned or lounge access enjoyed prior to those flights.

A year earlier, Virgin passengers were also turfed out of Air NZ's Australian lounges except when actually travelling to New Zealand. It does, however, appear Auckland doesn't want to cut all ties to Virgin and will seek to arrange to continue some kind of codesharing arrangement on Virgin domestic flights in Australia. Negotiations are ongoing.

Air NZ and its subsidiaries now operate a fleet of 106 aircraft with 56 of those in the mainline operation: 30 Airbus A320s for domestic and short-haul international flights, with eight Boeing 777-200ERs, seven 777-300ERs and the eleven 787-9 Dreamliners operating long-haul international.

Subsidiary Mount Cook Airline operates 27 ATR 72 turboprops and Air Nelson 23 Bombardier Q300s to towns throughout New Zealand. Two more 787s will arrive this year as well as four A321/320 neos. Also due to arrive are four more ATRs. The airline is currently going through an RFI (request for information) and RFP (request for proposal) process with Boeing and Airbus in terms of a replacement for the 777-200 fleet. Under consideration are Boeing's 787-10 and 777X as well as the Airbus A350.

Air New Zealand has been very successful in hubbing passengers from Australia through Auckland. ROB FINLAYSON

‘I am a tragic. I think the guys I work with probably call me an aeroplane nerd.’

CHRIS MAYR

VH-WLF

BUTCHER BIRD

One man's passion to fly his very own Focke-Wulf Fw 190

WRITER: MAX BLENKIN

PHOTO – MARK JESSOP

VH-WLF bears the colour scheme and markings of Luftwaffe ace Hans Dortenmann. MARK JESSOP

As a youngster with an aviator father and a passion for flying, Chris Mayr made scale models of German World War 2 aircraft and dreamed of one day owning and flying one in particular – a Focke-Wulf Fw 190. And now he has.

A mainstay of the Luftwaffe throughout the war, the Fw 190, named Würger (shrike or butcher bird), is a low-wing fighter, powered by a giant BMW radial engine and able to mix it on terms equal or better with allied Mustangs and Spitfires right through to the end of the war.

"The Focke-Wulf just appealed to me. It is one of those very aggressive designs and I took to it at a young age," said Mayr, whose day job now is flying Boeing 737s for Virgin Australia.

So why not the Messerschmitt Bf 109, the most common German WW2 fighter?

"I love them all. The Focke-Wulf was always my favourite. It was certainly the one I drew the most in my school books and built the most models of," he said.

"There are photos of me floating around with a book of the Focke-Wulf 190 standing on the billiard table at home. That was when the bug bit."

The flying bug bit early too.

"Dad was and still is a private pilot. He came to Australia in 1961 and started flying powered aircraft at Casey Airfield in 1971 and gliders around Albury in 1974," he said.

'But the desire for a Focke-Wulf never faded.'

"He never owned or flew any warbirds although he did have a Tiger Moth, Wilga, Luscombe and Yak-52 at various times. The Wilga is the aircraft that I spent the most time flying in as a kid and the one that I unofficially learnt to fly in."

"I have grown up with aviation. I remember spending some of the best years of my childhood at Casey Airfield. Later, when I was in high school I would wag the two periods between recess and lunch to sneak down to Moorabbin and take my buddies for a fly."

"I am a tragic. I think the guys I work with probably call me an aeroplane nerd."

Mayr said his passion for German equipment, which extends to German cars and the family's pet Dachshund 'Sizzle', probably stemmed from his German heritage, with his father born in Stuttgart, Germany in 1940.

"He remembers growing up in wartime Germany and having to hide in air raid shelters as a child. He used to tell me stories about them hiding Focke-Wulfs and Fiesler Storches and things in the Black Forest and covering them with netting and branches. So I have always had a fascination with German military equipment," he said.

He officially learned to fly in a Cessna 172 and was licensed at 16, then embarked on a flying career, initially flying tourists around Ayers Rock and freight down to Tasmania. From there he joined Rex flying the Saab 340 before landing a job with Virgin. After five years on the Embraer E190 he moved on to the 737.

Along the way, Mayr acquired a Yak-50, an uncompromising Russian-built aerobatic aircraft.

But the desire for a Focke-Wulf never faded.

This aircraft stemmed from a design competition for a new fighter run by the German aviation ministry in the mid-1930s.

The Messerschmitt Bf 109 was the outright winner but the ministry prudently decided they should have other designs under development in event the Bf 109 was outclassed by allied aircraft.

Aeronautical engineer Kurt Tank submitted a series of designs and it was one featuring the BMW radial engine that attracted attention.

Tank envisaged a robust aircraft able to withstand battle damage and operate from rough airstrips and to which the armament was integral to the design, not added almost as an

afterthought.

The Fw 190 first flew in June 1939 and began operational service in France in August 1941. It proved an immediate success, serving alongside the Bf 109 throughout the war.

The problem for modern day warbird enthusiasts is that few are left.

Around 20,000 were built during the war but not many survived. Most of the existing original aircraft were based with Jagdgeschwader (JG) 5 in Norway, avoiding the worst of the attrition from the late war air battles over Germany and the eastern front.

In contrast, almost 34,000 Bf 109 aircraft were made up to the end of the war, the most of any fighter in history.

Most of these original WW2 Focke-Wulf aircraft are on static display, with very few, perhaps half a dozen in airworthy condition.

Then there are replicas, thanks to a small German firm called Flugwerk which in 1997 began producing new-built aircraft based on original plans and some tooling and parts.

Mayr's aircraft was assembled in the US of Flugwerk repair parts and comprises about 90 per cent new construction and the rest original components.

"Mine has the identity of a July 1944 aircraft and some of the parts of that aircraft. The reality is that most of the wreckage fits in a couple of big plastic containers I have in a factory near home," he said.

"That's not unlike a lot of the Spitfires and P-40s getting around these days."

In contrast, most surviving P-51 Mustangs are original or mostly original as many survived the war and continued in frontline service, including in Australia.

Mayr's aircraft's parent was found buried in Rheims, France, where it had apparently been stripped of usable parts and discarded during the war. Its German work number 173056 indicated it was constructed at the Focke-Wulf plant at Marienburg, Germany, in July 1944.

However, this plant was destroyed in a bombing raid on October 9 1943. It's thought sub-assemblies from 173056 were recovered from the ruins and transported to Cottbus for final assembly.

The wreckage of aircraft 173056 was located in 1989 and acquired by US warbird enthusiast Don Hansen who began restoration in Baton Rouge, Louisiana in 2000. The restored aircraft first flew in the US on October 9 2011.

While there are a few original parts, such as the tailwheel unit, the engine is not one of them. There are few original wartime BMW 801D-2 14-cylinder radial engines or their spares remaining.

So the next best thing is the Russian Ash-82T, licence-built in China. This is a 14-cylinder twin-row radial comparable in power, around 1,900 horsepower, and engine capacity, around 41-litres, to the original powerplant.

This aircraft is the Fw 190-A8 version, produced from February 1944, a type likely to have been routinely encountered by allied aircraft in the vast air battles over northern Europe.

Mayr's aircraft – Australian registration VH-WLF – bears the colour scheme and markings of Luftwaffe ace Hans Dortenmann, although he never actually flew Focke-Wulf 173056.

Dortenmann shot down 38 aircraft, 16 over the Eastern Front and 22 over the Western Front, including six Mustangs. He survived the war, worked as an architect and died in 1973.

Mayr said he had been looking for a Focke-Wulf 190 for some time.

"It had always been my mission to at some point in my life at the very least to fly one and preferably own one," he said.

He nearly did a deal to buy an aircraft from Germany but that fell through. Some time later he saw an ad on Barnstormers, the US website of aircraft for sale.

'I thought now's the time.'

CHRIS MAYR

"I contacted Claus Colling, the founder of Flugwerk in Germany and asked him about this particular airframe. I spoke to a few different people around the world and everybody said this was one of the best if not the best still flying," he said.

Chris Mayr and his father pose in front of VH-WLF.

"So I was very quick to hop on the deal. I thought now's the time. I put down the deposit sight unseen although it was contingent on an inspection. A month or two after putting down the deposit I managed to get across to the States to check the aeroplane out."

Mayr committed to buy in November 2014. The aircraft was transported by ship via Panama in a pair of 40-foot shipping containers, arriving in July 2015. It was assembled by Hazair at Albury, where the aircraft is now hangered.

First flight in Australia was on November 9 2015, with German pilot Klaus Plasa in the cockpit.

Plasa, a serving German air force officer, is the acknowledged world expert on flying the Focke-Wulfe Fw 190. He first flew this very same aircraft following its long restoration.

Mayr, who lives in Melbourne, said Albury was the best location for his aircraft.

"The main thing for me was to find a location where they had the ability to maintain an aircraft like that and an airfield from which I could operate it safely. Albury is very long and wide. You can land a 737 there if you have to," he said.

With a shiny new aircraft, Mayr's next task was to fly it, guided by Plasa.

"I looked to Klaus for guidance, him being the most experienced Focke-Wulf guy around. I have always tried to surround myself with very experienced people from whom I can learn," he said.

"Klaus was already in the country. He had done five hours of test flights of the aircraft after we re-assembled it."

For his first flight, Mayr was on his own and he admits this was a little bit nerve wracking.

"I wouldn't have done it if I thought it wasn't going to end well. I looked to Klaus for his advice and I said I expect you to stop me if you think I'm not ready for this," he said.

"Klaus is the ultimate professional. He never would have let me go if he thought I wasn't ready.

"We had done a little bit of flying training in a Harvard beforehand.

I also own a Yak-50 which I reckon was better preparation for me personally but of course the Yak-50 is only a single seater.

VH-WLF and Hurricane VH-JFW get together ahead of the Scone Airshow in late March. MARK JESSOP

"So at least Klaus could see how I fly in the Harvard and he could judge my abilities.

"The first flight was out of Albury. I prepared thoroughly and it all went smoothly. I went up and flew what I would call my standard profile for a first flight in a single-seater as I did with the Yak. I did a series of shallow turns to the left and right, then steep turns to the left and right, then stalled the aircraft to determine an approach speed.

"I climbed to altitude and stalled it clean and stalled it dirty and from that I can determine an approach speed – just multiply the stall speed by 1.3 so I know what I'm looking for on final.

"What I really wanted to determine were the basic handling characteristics of the aircraft so I am not discovering how it feels in a turn for the first time when I am turning to land."

He has flown some gentle aerobatics in the Focke-Wulf.

"For such a heavy aeroplane it has a fairly impressive roll rate. It is relatively light on the controls. It is more manoeuvrable than I was expecting it to be," he said.

"I haven't flown a Mustang or a Spitfire so I can't really compare it. But from speaking to people who have, they describe the Focke-Wulf relative to those aircraft as a 1,900hp aerobatic plane. That's good. It's unstable which makes it a good fighter, very manoeuvrable."

'You have about an hour's worth of fuel and then you want to be back on the ground.'

CHRIS MAYR

Mayr now has about 50 hours on this aircraft, some of it at airshows where VH-WLF is becoming a regular. Fifty hours possibly makes him the second most experienced Focke-Wulf 190 pilot in the world, behind Klaus Plasa.

"You have about an hour's worth of fuel and then you want to be back on the ground. An hour is pretty tiring," he said.

"It is a demanding aircraft to fly well and I try to fly it well. I will give myself a thorough pre-brief and debrief. I will take notes after every flight just to criticise my flight and see what I can do better to try and improve.

"There are lots of little things that make it challenging. You have to wear an oxygen mask which is hooked up to a ram air supply. Below about 80kt it's hard to breath in and above 80kt it's hard to breathe out.

"You do that as a matter of safety. There is a lot of carbon monoxide that creeps into the cockpit because the exhaust stack is either side of the cockpit."

In preparing for the Fw 190, Mayr also learned how to parachute.

"I do definitely fly with a parachute. It would be pretty hard getting out because it is such a tight cockpit," he said.

"That was all part of my preparation for the Wulf. I wanted to have the mindset that if anything necessitated a bailout, I wouldn't hesitate.

"There are only two scenarios that I can think of which would lead to me bailing out of the aircraft. That would have to be an uncontained fire or a flight control failure. Pretty much anything else where you are in control, you would ride it to the ground."

Mayr does acknowledge the Focke-Wulf, with its weight and high wing loading, has glide characteristics just slightly better than a falling brick.

He says his favourite moment in owning the Focke-Wulf occurred at the recent Scone Airshow. On the Saturday, he flew a display in conjunction with Hawker Hurricane VH-JFW. But on Sunday, the display was cancelled because of a strong crosswind.

"We were sitting in possibly the two rarest aircraft in the southern hemisphere. It just wasn't worth the risk," he said.

And then an elderly blind man started feeling around the parked aircraft. It turned out he was a fellow aficionado of German equipment and

the Focke-Wulf 190 was his favourite aircraft. He had lost his sight in his 20s.

"He had been driven there by his family from Taree just to be near the Focke-Wulf. It nearly brought a tear to my eye," he said.

"We walked all around the aeroplane. He was visualising it by feeling it. I described all the characteristics to him. He knew more about the aeroplane than I did I reckon."

Mayr says his short-term challenge is to master his Focke-Wulf but he has other plans involving German aircraft.

First off he has to oversee final assembly then test fly his Fokker Dr.1. Yes he also owns a replica of the World War 1 triplane in which Manfred Albrecht Freiherr Von Richthofen – the Red Baron – achieved his final 19 of 80 kills.

It was also the aircraft in which he died, shot down by Australian soldiers in France on April 21 1918, a century ago.

The aircraft is based in Caboolture, Queensland with the Australian Vintage Aviation Society.

"That only arrived in the country a month or so ago so it is still being assembled. We are trying to get this jigger up and running in time for the airshow up there on April 21 and 22," he said.

He also wants an SG38 'primary glider' of the type used in Germany for initial basic flight training.

Between the wars, Germany was forbidden to have its own air force but saw a time when it would have an air force, for which it would need aircrew.

Glider training was conducted as a type of youth activity. Video on Youtube shows groups of strapping young Germans launching gliders by running downhill and towing the aircraft into the air on long ropes.

"It is just a very basic aeroplane. I would love to own one of them and in fact that is probably the next aircraft that I will buy. You can get modern replicas. You can buy them as a kit, a very quick-build kit because there's not much to them," Mayr said.

Then there's the Messerschmitt 262, the world's first practical jet fighter, fielded by Germany late in WW2. This aircraft far surpassed anything on the allied side but it was too late and too few in number to make a difference.

"In the USA the Collings foundation have a two-seat Messerschmitt 262 which you can go and do a type rating on. That is on my bucket list. I am aiming to get over there in September and do a type rating, which would be pretty awesome," he said.

And finally, there's the Messerschmitt Me 163 Komet, the world's only operational rocket-powered fighter, hurriedly developed towards the end of the war to attack bomber formations.

This diminutive aircraft was blindingly fast, exceptionally dangerous for its pilots and mostly unsuccessful as a bomber interceptor. But it was an example of Germany's stunning technological achievements late in the war.

There are a number of examples in museums around the world, including the Australian War Memorial. None have flown under rocket power since the dying days of WW2 and none of the surviving examples can still fly.

'I have a long way to go before I can master the Wulf.'

CHRIS MAYR

However, one was made in France as a glider and among those who have tried it out was Klaus Plasa.

"I am determined o build a Messerschmitt 163 before I die but it won't be rocket-powered obviously because you can't get rockets easily. I have had some discussions with a guy who wants to build one for me," Mayr said.

That will either be a glider or one powered by a jet turbine engine.

"If we go the turbine route it becomes a little more challenging because obviously you have to find somewhere for the intakes which the rocket powered version didn't need," he said.

Building the aircraft as a glider would still be within the spirit of the concept as original Komets only had three and a half minutes of rocket power to get them to altitude, after which they glided home.

"I have a long way to go before I can master the Wulf if I ever manage to master it. But I feel I need to fly a 163 at some point in my life."

VH-WLF starred at the Scone Airshow. PETER CHRISTMAS

Traffic

Key aircraft movements from across the region

WRITER: GORDON REID

A380 VH-OQF arrives at Sydney on April 11 after repainting in the new Qantas colours in Dubai.
BERNIE PROCTOR

QANTAS GROUP NEWS

Qantas commenced direct flights from Perth to London on March 23 with **787-9 VH-ZND** operating the inaugural daily QF9 from Melbourne to Perth and London/Heathrow. VH-ZND had earlier operated its first international service for Qantas on March 16 as QF95 from Melbourne to Los Angeles.

A380-842 VH-OQF ferried from Sydney to Dubai as QF6053 on March 24 where it the first A380 to be repainted in the new Qantas livery. As QF6012 VH-OQF then departed Dubai on April 10, arriving in Sydney on April 11.

747-438ER VH-OEF has returned to service having been in Hong Kong for planned maintenance since February 6 (Traffic/April). As QF6016 VH-OEF departed Hong Kong for Sydney on March 29, arriving on March 30.

737-838 VH-VZG (Traffic/April) now carries the name *Yarralumla*.

737-838 VH-VZH, which is the former ZK-ZQC (Traffic/April), was registered to Qantas on March 8 and re-entered service on March 23 as QF798 from Brisbane to Townsville.

QantasLink/Network took delivery of **A320-232 VH-VQS** in Perth on February 24 (Traffic/March) and placed the aircraft in service on March 22 when it operated Network 6686 from Perth to Karratha.

A320-232 VH-VQU will be the second of type to be operated by QantasLink/Network (see Jetstar below).

QantasLink returned **Dash 8-Q402 VH-QOI** to service on March 22 after the aircraft had been repainted in Townsville.

Dash 8-315 VH-SBW was in an all-white scheme when it operated QF2109 from Brisbane to Townsville on March 19 before entering the Flying Colours hangar for painting in the new QantasLink livery. While in Townsville VH-SBW was named *Goulburn*.

Jetstar withdrew **A320-232 VH-VQU** from service on March 17 after the aircraft operated JQ973 from Perth to Melbourne. The following day VH-VQU ferried from Melbourne to Darwin and Singapore as JQ8997 where it was being prepared for delivery to QantasLink/Network.

A320-232 VH-XJE msn 2423 was previously operated by Jetstar Asia as 9V-JSE but returned to the Australian register on March 22 with Qantas Airways as the holder and Jetstar Airways as the operator. VH-XJE, which had earlier seen service with Jetstar as VH-JQW between December 15 '07 and June '10, ferried from Singapore to Melbourne on March 27 as JQ8996.

Jetstar A320-232 aircraft undergoing planned maintenance in Singapore of late have included:

VH-VGU, which departed Melbourne on March 8 as JQ8993 for Darwin and Seletar;

VH-VGV, which had been in Seletar for planned maintenance since February 27, ferried from Seletar to Darwin and Melbourne as JQ8994 on March 11;

VH-VGY, which had been in Seletar for maintenance since February 3, ferried to Darwin and Melbourne as JQ8997 on March 18;

VH-VQL, which had been in Seletar for maintenance since February 24, ferried to Darwin and Melbourne as JQ8992 on March 23;

And **VH-VQU**, which departed Melbourne on March 18 as

JQ8997 for Darwin and Seletar and planned maintenance.

Jetstar Japan took delivery of **A320-232 JA22JJ** msn 5877 at Narita on March 27 after the aircraft ferried in from Toulouse via Abu Dhabi and Hanoi.

AIRLINE NEWS

In this issue we report the delivery of a 757 freighter to Pacific Air Express, a Fokker 70 to Alliance, a Fokker 70 to Air Niugini and a BAe 146-300 to Cobham.

Air New Zealand 787-9 ZK-NZH returned to service on March 25 when it operated NZ125 from Auckland to Melbourne. Due to problems afflicting certain 787's Trent 1000 engines ZK-NZH had been removed from service on December 6 (Traffic/March).

Air New Zealand's lease of **A340-313X 9H-FOX** finished on March 27 after the aircraft operated NZ102 from Sydney to Auckland. The following day 9H-FOX departed Auckland for Singapore using the callsign 'Moonraker 471P'.

A340-313X 9H-SUN was redeployed from the Auckland to Perth route to Auckland-Sydney on March 27 with NZ105 being its first service. Then after operating NZ108 from Sydney to Auckland on March 30 9H-SUN's lease was terminated and on March 31 it departed Auckland for Panama City as HFM561P.

ANZ Link/Mount Cook was planning to take delivery of **ATR 72-600 ZK-MVR** msn 1487 in early May with **ATR 72-600 ZK-MVU** msn 1500 to follow in June.

Air Niugini took delivery of **Fokker 70 P2-ANY** at Port Moresby on February 5 after the aircraft ferried in from Darwin as PX4397. P2-ANY entered service on March 25 when it operated PX90 from Port Moresby to Cairns.

Alliance Airlines took delivery of **Fokker 70 OE-LFQ** msn 11568 at Brisbane on March 31. The ferry flight from Bratislava to Brisbane, which was contracted to Southern Cross as SXI 1818, operated via Belgrade, Hurghada, Nagpur, Yangon, Surabaja, Darwin and Townsville. On arrival into Brisbane the aircraft was noted to be still carrying the colours of Austrian Airlines.

Cobham Aviation took delivery of **BAe 146-300QT EC-MCL VH-NJI** msn E-3154 at Adelaide on March 19 after the aircraft ferried in from Darwin and Alice Springs. The BAe 146 departed Liege on March 7 for Brindisi, Hurghada and Al Bateen, arriving at Darwin from Denpasar on March 10. While on the ground at Darwin the 146 was reportedly damaged.

Qantas 787-9 VH-ZND taxis in at Heathrow after operating the inaugural QF9 from Perth on March 24. QANTAS

Fiji Airways reportedly will lease **A330-243 S7-ADB** msn 751 from Air Seychelles.

Hevilift took delivery of **ATR 72-500 VH-FVM** at Brisbane on March 12 after the aircraft ferried in from Cairns (Traffic/April).

Pacific Air Express took delivery of **757-225PCF N315ST** msn 22611 at Christchurch on March 12 after the all-white aircraft ferried in from Goodyear, Arizona via Phoenix, Honolulu and Apia. The 757 was registered **VH-PQA** to Pacific Air Express of Banyo, Queensland on March 20.

VIRGIN GROUP NEWS

Virgin Australia **777-3ZGER VH-VPF**, which had been in Singapore for maintenance since February 27 (Traffic/April), departed for Melbourne on March 23 as VOZ9948 (arriving March 24).

A330-243 VH-XFE, which had been in Singapore for maintenance since March 5 (Traffic/April), departed for Melbourne on March 28 as VOZ9944 (arriving March 29).

E190-100IGW VH-ZPA ferried from Nashville, Tennessee, where it had been in storage, to Lake Charles, Louisiana on March 9 for painting prior to delivery to South Africa's SA Airlink.

VARA ATR 72-600 VH-FVP was withdrawn from service on March 14 after operating VOZ664 from Sydney to Canberra. On March 19 VH-FVP as VOZ9944 was ferried from Canberra to Nelson for maintenance and storage.

REGIONAL AIRLINE NEWS

HARS F27-500 VH-TQN was performing engine runs at Auckland on March 19.

Hevilift took delivery of **AW139 P2-HCC** at Port Moresby on March 27 after the helicopter, which was using the callsign 'Tonka', ferried in from Essendon via Griffith, Bourke, Charleville, Clermont, Townsville, Cairns and Horn Island.

Sharp Airlines has added three Metro aircraft previously operated by Pearl Aviation to its fleet.

Metro 23 VH-OYB changed ownership from Pearl Aviation Australia to Sharp on March 7 with the aircraft operating between Adelaide and Challenger.

Metro 23 VH-OYG, which changed ownership from Pearl Aviation Australia to Sharp on November 13 (Traffic/March), was noted operating Sharp services from Essendon on March 30 still carrying Pearl titles.

Metro 23 VH-OYN changed ownership from Pearl Aviation to Sharp on November 30 '17 with the aircraft operating between Adelaide and Beverly.

BIZJET NEWS

In this issue we report the deliveries of a Gulfstream G650ER, King Air 200GT and a King Air B200C and the departure of a Gulfstream G650ER and a Citation Mustang.

Gulfstream G650ER N66ZG msn 6303 was delivered to Rank Services in Auckland on March 28 after the aircraft arrived direct from Phoenix. N66ZG has replaced **G650ER N948JB**, which had earlier departed Auckland for the US and was later delivered to a Brazilian operator as **PR-GVI**.

Global Express N880ZP, which was delivered to Essendon on February 12 (Traffic/April), has been registered **VH-OFX**.

The registered owner of **Falcon 900 VH-PPD** changed to Trepang Services

BAe 146-300QT EC-MCL arrives at Adelaide on March 19 on delivery to Cobham Aviation. RYAN HOTHERSALL

All-grey King Air 350i VH-ZPE at Cairns ahead of its delivery to the RNZAF. ANDREW BELCZACKI

of Parap, NT on February 26.

Citation Mustang VH-EJT had been registered to an owner in Osborne Park, WA but was cancelled from the register on March 13 on its sale in the United States. On March 22 the Mustang was placed on the US register as **N324MJ** to Clovis One of Lancaster, California before departing Perth for Port Hedland and Ujung Pandang on April 3.

All-grey painted **King Air 350i VH-ZPE** departed Cairns for Brisbane on March 23 before continuing to Lord Howe Island and Ohakea on March 23 where it was handed over to the RNZAF.

Rangeflyers **King Air 200GT N60BY** msn BY-60 arrived at Jandakot on March 17 from Banda Aceh and Broome.

Air Service Liege **King Air B200C** OO-ASL msn BL-49 arrived in Cairns from Biak on March 18 before continuing to the Gold Coast on March 30.

FERRY FLIGHTS

Field Air Air Tractor **AT-502B VH-FZQ** departed Ballarat for Lord Howe Island on March 26 before continuing to Hamilton on March 27.

Airvan 8 msn TC320-17-241 has been exported to China and on March 6 it was registered **B-10VH** to Jing Gong General Aviation of Beijing.

Helibiz **Bell 212U VH-TOR**, which ferried from Cairns to Port Douglas on February 14, was cancelled from the register on March 21 when sold in Papua New Guinea.

Airwork New Zealand **BK117 B-2 ZK-ISE** has been exported to Papua New Guinea and on March 10 it ferried from Mackay to Rockhampton, Townsville and Cairns before continuing to Cooktown on March 11.

Aviair **Cessna 208B VH-TOV** was cancelled from the register on March 13 on its sale to Redding Aero Enterprises of Redding, California. Now registered **N106VE** the Cessna departed the Gold Coast on March 23 for Apia, Honolulu and Merced, California.

Textron Aviation **Cessna 208B/EX N5420C** msn 208B5420 (Traffic/April) arrived in Darwin from Kupang on March 4 at the start of a demonstration tour of Australia. The Cessna was later noted at Brisbane, Gold Coast, Scone, Bankstown, Sydney, Essendon, Ballarat, Wilpena Pound, Forrest, Kalgoorlie and Jandakot where it arrived on March 20.

Cessna 340 N1022W, which arrived Broome from Johor Bahru on December 19 (Traffic/March), was damaged on landing at Lilydale, Victoria on March 24.

Cessna 182S VH-OPA departed Bankstown for Coffs Harbour on March 11 before continuing to Lord Howe Island on March 12 and Norfolk Island on March 13.

Diamond DA62 N259SS arrived in Darwin from Kupang on March 8 before continuing to Alice Springs and Parafield on March 9.

Diamond DA42s OE-UDB and **OE-UDO** arrived in Broome from Denpasar on March 29 before continuing to Alice Springs and Bankstown on March 30.

P-750XL ZK-KDI msn 206, which is the first of four planned for delivery to the PNGDF (Papua New Guinea Defence Force), was noted at Hamilton on March 22.

P-750XL ZK-KEJ msn 220, which was registered on March 7, has been sold in Poland. The PAC 750XL was noted at Hamilton on March 22 carrying the registration **SP-MOC** however this was later removed with the aircraft reverting to ZK-KEJ for its ferry flight to Poland.

Piper M-600 N858SG (Traffic/April) completed its tour of Australia on March 20 at Darwin after arriving from Maroochydore, Croydon and Normanton. After overnighting it departed Darwin for Kupang on March 21.

AUSTRALIAN GP FREIGHTERS

The Australian Grand Prix was run at Albert Park, Melbourne on March 25 and this resulted on visits by a number of Boeing 747 freighters which were carrying GP cars and equipment into and out of Avalon.

Air Bridge Cargo **747-83QF VQ-BFE** as ABW9106 arrived at Avalon from Hong Kong on March 18 before returning to Hong Kong on March 18 as ABW9107.

Air Bridge Cargo **747-8HVF VQ-BFU** as ABW 9137 arrived at Avalon from Hong Kong on March 27 and departed to Singapore as ABW9138 on March 28.

Air Bridge Cargo 747-83QF VQ-BLR as ABW9104 arrived at Avalon from Hong Kong on March 13 before returning to Hong Kong as ABW9005 on March 14.

Atlas Air 747-47UF **N493MC** as QF7581 arrived at Avalon from Sydney on March 27 and departed the same day to Singapore as QF7581.

Atlas Air 747-47UF **N499MC** as GTI8742 arrived at Avalon from Singapore on March 19 and departed the same day to Guam as GTI8972.

Cargo Logic Air **747-83QF G-CLAB** arrived at Avalon from Singapore as CLU9135 on March 17 before departing to Hong Kong on March 18.

Cargolux **747-8R7F LX-VCA** as CLX732 arrived at Avalon from Singapore on March 16 and the same day returned to Singapore as CLX733.

Cargolux **747-4R7F LX-WCV** as CLX852 arrived at Avalon from Singapore on March 28 before returning to Singapore as CLX853 on March 28.

Cathay Pacific Cargo **747-867F B-LJH** as CPA028 arrived at Avalon from Sydney on March 26 and departed to Hong Kong as CPA028 on March 27.

Cathay Pacific Cargo **747-867F B-LJM** as CPA022 arrived at Avalon from Sydney on March 27 and departed to Hong Kong as CPA022 on March 28.

Hevilift AW139 P2-HCC at Essendon in March. GORDON REID

Cathay Pacific Cargo **747-867F B-LJN** as CPA2023 arrived at Avalon from Hong Kong on March 18 before returning to Hong Kong as CPA2022 on March 19.

Silk Way West Airlines **747-4R7F 4K-SW008** as flight AZG3823 arrived at Avalon from U-Tapao on March 30 and the same day departed as AZG3824 to Singapore.

ASEAN SUMMIT MEETING

The ASEAN summit meeting in Sydney on March 17-18 saw a number of VIP transports visit.

Thai Air Force A340-500 60204/HS-TYV callsign 'RTAF209' arrived in Sydney from Bangkok on May 16 and departed to Don Muang on March 19.

Kingdom of Cambodia **A320-214 B-6738** callsign 'KOC01' arrived in Sydney from Phnom Penh and Darwin on March 16 before returning to Phnom Penh via Darwin on March 18.

Malaysian Government **A319CJ 9M-NAA** callsign 'NR1' arrived in Sydney from Subang on March 16 before returning to Subang on March 18.

Brunei Government 747-8 V8-BKH arrived in Sydney from Bandar Seri Begawan on March 16 before returning to Bandar Seri Begawan on March 18.

Indonesian Government 737-8U3 A-001 arrived in Sydney from Halim on March 16 before departing to Wellington on March 18. A-001 later transited Canberra on March 19 while en route from Wellington to Halim

HEAVY METAL

UAE Air Force **A330-243MRTT 1302** as UAE1301 arrived in Canberra from Singapore on March 16.

Antonov Airlines **An-124 UR-82027** as ADB3918 arrived in Perth on March 27 from Houston via Honolulu, Nadi and Brisbane before departing to Johor Bahru as ADB318F on March 30.

Volga Dnepr **An-124 UR-82077**, which arrived in Perth on February 20, departed on March 10 to Tokyo as VDA2539.

Nippon Cargo **747-4KZF JA05KZ** arrived at Avalon from Narita as NC637 on April 3 before returning to Narita as NC6178 on April 3.

Nippon Cargo **747-8KZF N17KZ** arrived at Avalon from Narita as NC639 on April 3 and departed to Narita as NC6180 on April 4.

Republik Indonesia 737-800 A-001 in Sydney for the ASEAN summit. SETH JAWORSKI

Kingdom of Cambodia A320-214 B-6738 in Sydney for the ASEAN summit. LUKE MCDERMOTT

TAG Aviation UK **757-2K2/WL G-TCSX**, which carries Four Seasons titles arrived in Sydney from Papeete on March 8 and departed to Denpasar on March 11.

Travel Service Airlines **737-8Q8 OK-TSD** callsign 'Smart Wings 4201' arrived in Darwin from Nauru and Honiara on April 3.

Conair **RJ85 C-GVFK/391** departed Avalon on March 12 for Brisbane, Honiara, Majuro, Honolulu and Abbotsford on completion of its fire attack contract.

Aurogold Aviation **Legacy 650 N106EC** arrived in Darwin from Don Muang on March 11 before continuing to Brisbane and Wellington. N106EC later visited Queenstown, Auckland and Sydney before departing Darwin for Don Muang on March 19.

Coulson **EC-130Q N130FF** as CUL390 departed Avalon for Norfolk Island, Pago Pago and Kahului on March 23 on termination of its fire attack contract.

Volga Dnepr An-124 UR-82077 departs Perth on March 10 bound for Tokyo. KEITH ANDERSON

Warbirds

Warbirds, classic aircraft, museum and airshow news

WRITER: DAVE PROSSOR

Hurricane VH-JFW pictured here during an air-to-air photo shoot ahead of the Scone Warbirds Airshow. The aircraft is based with the Pay's Group at Scone. MARK JESSOP

YAK BENT AT WANAKA

Spectators got more than they bargained for at the Warbirds over Wanaka Airshow at Easter when Yak-3M ZK-YYY collided with a cherry picker parked too close to the runway.

The aircraft was landing on the grass alongside the sealed runway and was rolling to a stop when the right wing hit the cherry picker and was torn off. The Yak came to a halt but not before the prop and the tail struck the ground. Pilot and owner Arthur Dover clambered out of the badly damaged machine and gave a wave to the crowd who were pleased to see that he was uninjured.

Why the cherry picker was parked so close to the runway was a cause of much finger waving. And the high nose of the Yak ensures that the pilot does not have a great forward view. As his vision is focused on the left side of the nose he did not see the cherry picker on the right side.

SCONE AIRSHOW RETURNS

No fewer than two Spitfires, a Hawker Hurricane, a Fw 190, Grumman Avenger, two CAC-built Mustangs, a Kittyhawk, Wirraway, a North American T-6 and many others all made for a fabulous Bengalla Scone Warbirds Airshow.

Although most aircraft flew as part of the display a strong cross-wind on the show day, Sunday March 25, prevented a few of the show aircraft from taking to the air. But spectators were also able to look over the Pay Group's Vintage Fighter Restorations workshop to see two Spitfires being brought back to life.

It was some years since the last Scone airshow so warbird buffs had a whole new range of aircraft to admire.

Bring on the next Scone Warbirds airshow!

AAAA FLY-IN

The annual Antique Aeroplane Association of Australia Fly-in at Echuca was also affected by weather but only after the main day. Over 100 antique, classic and contemporary aircraft got to the event, despite a number from northern NSW being grounded by weather.

Some of the types present included a Scottish Aviation Bulldog, all the way from WA! There were several Cessna 120/140 high wings, an Avro 643 Cadet, a BA Eagle, a Vultee BT-13, a DH Hornet Moth, a Stinson L-5, a Piper L-4 and four DHC Chipmunks.

Awards went to Ian Richardson's Auster V VH-ABA for Grand Champion Warbird; Grand Champion Antique was Taylorcraft BC-12D 24-8422 of Stephen Hassall; and Grand Champion Classic was David Morton's Piper PA-22-150, VH-TSY.

The best NAA T-6 went to the little River Syndicate for VH-TXN. The best CT-4/Victa award went to

Harvard VH-LNT, pictured here at Toowoomba, has been acquired by Jace Harrison of Riddell's Creek in Victoria. The South African Air Force-painted Harvard ferried from Toowoomba to its new Victorian home in mid-March. LENN BAYLISS

Caroline and Mark Skidmore for their CT-4A, VH-MCT. John Bruce was presented the Best Chipmunk award. The President's Choice went to Kevin and Vicky Bailey for their Stinson Reliant, VH-UXL.

MUSEUM NEWS

From the now closed Mareeba Sid Beck Military Museum the new Maryborough Military Aviation Museum has recently acquired the remains of CAC Wackett Trainer A3-87/VH-AJY (c/n 321). The aircraft comprises a steel tube fuselage with a Warner Scarab engine.

Aircraft and other military history items are slowly being sold off from the Beck museum, after Sid's passing in December 2013.

Further south, CAC Wirraway A20-722/VH-CAC was to be formally handed over to the Nhill Aviation Heritage Centre on April 28. The aircraft has been purchased from owner Borg Sorensen and is to be the centrepiece of the NAHC museum located at the airport, a World War 2 RAAF base in western Victoria. A former RAAF Avro Anson is also being restored to be part of the museum and other exhibits are planned.

REMEMBERING DUFFY'S DELIGHT

Warbird enthusiasts will well recall the name *Duffy's Delight* that adorned the cowling of the RAAF Museum's CAC Mustang, A68-170 (now VH-SVU).

The name on the cowling came from Squadron Leader Kevin Duffy who in the 1970s was the first chief flight instructor with the Point Cook Aero Club. The Mustang was in the hangar next to the aero club hut at Point Cook. With his interest aroused Kevin Duffy found that he had actually flown the machine years before.

He arranged for some restoration work to be carried out on the Mustang, and after much work the aircraft got to the stage where the engine could be run. On a Saturday in 1971 it is said that the machine did a high-speed run and the wheels actually left the ground for a short hop. But it was to be some years before the aircraft actually took to the air and the wheels retracted.

It is with regret to note that Squadron Leader (retired) Kevin James Duffy passed away on March 21 2018. He was aged 95.

Kevin Duffy may be gone but warbird enthusiasts will always associate the name *Duffy's Delight* with Mustang A68-170/VH-SVU.

REGISTER UPDATE

The former Harts Flying Fighters Yak-3UA VH-YZK, which was impounded at Archerfield for many years before being cancelled from the register in July 2017, has been sold into South Africa.

The Yak took up the US registration N17ZA in January using a trust company in Nevada. The use of US registrations through a specialist aviation trustee company has become popular with owners of warbirds in Europe and other countries where non-production aircraft types perplex government authorities and can cause long certification delays.

From New Zealand we learn that Curtiss P-40E ZK-RMH, 41-25158, has changed hands to Mr O H Wulf of the UAE. The change of ownership took place on January 23.

Australia has had quite a few changes in the last month or so. North American SNJ-5 VH-USN, 90624, moved from The Official Trustee in Bankruptcy to Bishopp Aviation of Kelvin Grove, Queensland, on January 17. The aircraft is yet another aircraft from the former Harts Flying Fighters collection to go to a new owner.

Interstate S-1A VH-VCQ, c/n 9, has a new owner in David Zemel of Chapman, ACT as from January 19.

Cessna 140 VH-COO, 10805, moved to Matthew Eastman of Holland Park, Queensland on January 26.

Long up for sale CAC Winjeel VH-WIJ/A85-436 was transferred from Roger Richards to Aerotec of Toowoomba, Queensland on March 28.

Geoff Hill took ownership of Stinson L-5B VH-BFR, 2744, on February 27. Geoff is located at Taylors Lakes, Victoria. A wise man, Geoff did a tailwheel refresher course before going to fly his machine.

BAC 167 Strikemaster Mk 80A VH-AOE moved to new owner Geoff Moesker of Brendale, Queensland on February 21.

Three Austers have changed hands. VH-WAZ, a J-1B, moved to Colin Hokin of Bridgewater, Victoria on March 14. VH-JSG, a J-5G, went to Allan Harding of Temora, NSW on March 26. And VH-KBV, a J-5R, went to Chris Harrison of Denison, Victoria on March 26.

From the UK we learn that SCAN Stampe SV-4C G-BEPF has been sold into Australia. Also from the UK is Piper L-4B Cub VH-OPY, which has a new owner in John Daley of St Georges Basin, NSW. The aircraft was added to the register on February 22 and was previously G-AXGP.

Ex-RAAF AP-3C Orion A9-759 is now in storage at HARS's Parkes annex in central west NSW. The aircraft is to be used as a source of spares for HARS's flying Orion, A9-753. DAVE SODERSTROM

Contact Dave: flyer02@optusnet.com.au

Now more than ever

Flight instructors the forgotten link in the pilot foodchain

'Flight instructors are needed now more than ever.'

The looming pilot shortage is not an issue that is just going to fade into the background. As new aircraft arrive and new routes are announced, the inescapable fact is that there is a shortage of crews to keep pace with the expansion. Airlines are busily recruiting, advertising and conjuring cadet schemes in order to fill the shortfall before it reaches terminal velocity. However, one must wonder – who is going to train the next generation?

Once upon a time, students were taught by career flight instructors, many of whom had served as military pilots. And when the time came for their flight tests, they were conducted by full time examiners employed by the regulator – The Department of Aviation, Civil Aviation Authority, or Department of Transport, depending on which era you lived. These examiners of airmen were also predominantly ex-military who epitomised the expression "hard but fair". From first flight to holding a licence, there was a wealth of experience on hand.

Over time, the face of flight instruction changed. More instructors emerged with a solely civilian flying background and flight tests were delegated to chosen flight instructors within the industry. Rather than a post-military career, for many flight instruction became the first step in their career and in turn, a stepping stone to other branches of the industry. Experienced, long-term instructors became more scarce, replaced by a younger generation on the move.

With the passage of time, any gloss associated with flight training as a vocation also began to wear thin. Positions that were once full-time and salaried, transitioned to a 'retainer' and compensation for actual hours flown. Rainy months with little flying meant that the rent fell due and the coffers were often bare. It accelerated the desire for many instructors to leave the profession, and with them went their experience. The erosion of conditions and a downturn in general aviation and flight training made it even harder for instructors to remain in the field and the vocation became even less desirable.

Certain larger schools found refuge in international contracts and were able to maintain a substantial fleet and a team of qualified and reasonably compensated instructors. Elsewhere the decline continued, the aircraft fleets aged and the instructors hardly bothered to close the door on their way out. And now we need them and we need them in numbers.

Just as there is a lead time in recruiting and training an airline pilot to a revenue generating standard, flight instructors cannot be moulded out of clay and left to set overnight. A commercial pilot licence holder may achieve the barest of ratings in a reasonable timeframe, but senior instructors are far more difficult to come by. The experience is not merely an asset to the quality of knowledge that can be imparted, but it is required for a school to perform certain functions. And these are necessary functions if schools are looking to train the airline pilots of tomorrow.

Experience is needed to assess students at various stages of their training, to oversee operations such as night flying, to hold chief flying instructor posts and to gain the critical delegations from the regulator. Furthermore, there is a time lag and cost involved with every upgrade and approval that each instructor seeks, both in preparing for the qualification and, in turn, having it assessed and processed by the regulator.

A flying school is a multi-faceted operation, nurturing a raw student into a competent instrument-rated pilot. It is no mean feat and for too long it has been cast as the poor relative of flying operations. As with our traditional schooling, teachers are undervalued for the critical part they play in all of our lives. A quality flight instructor is a tremendous asset to both the organisation and the student pilots within their care. Accordingly, due recognition should be forthcoming for these valued professionals, as should proportionate compensation.

Perhaps the looming shortage will provide some leverage for the flight instructors of Australia. Without them, the next generation of heavy metal drivers cannot obtain their wings. Just as every other professional has a long line of tutors, lecturers and classrooms behind the framed degree hanging on the wall, so too does every pilot and set of epaulettes. Flight instructors and aircraft of significant quality will be needed to feed the demand and possibly, for once, flight instructors may have some voice in the matter.

Every pilot can cast their mind back to mentors and madmen. Instructors that they admired and those that didn't deserve the title of flight instructor. Quality flight instructors will be needed for inevitably, many of the existing experienced mentors will be swept into the airlines themselves, exacerbating the void. Yes, we need airline pilots, but each new first officer can only be hoisted into a flightdeck by the efforts of a number of flight instructors and ground school teachers beforehand. The entire food chain needs to be considered, not merely the high profile carnivores at the top of the pyramid.

Individually respected and yet often overlooked as a group, flight instructors are needed now more than ever. One can only hope that industry responds by truly recognising and compensating them for the critical role that they serve in a very complex training process. Our flight instructors are pivotal in providing the sound foundations for tomorrow's generation of pilots. Without them, the future may not be so bright as the current recruiting drive and advertisements might suggest.

Today's large aviation schools are multi-faceted operations, nurturing raw students into competent instrument pilots.
PAUL SADLER

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In order to achieve this shift, senior executives and change makers are encouraged to attend. 2018 is focused on changing culture, this program is not to be missed.

SPEAKERS

Nicole Pederson-McKinnon
Financial educator, commentator and author, as well as a qualified financial adviser and stockbroker

STRATEGIC LEADERSHIP: DOES GENDER MATTER?

Air Commodore Sue McGready
/ Director General, Defence Force Recruiting

EMOTIONAL INTELLIGENCE AND ITS IMPACT IN THE WORKPLACE

Andrea House
/ ARH System Chief Engineer, Airbus Australia Pacific

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'TAKING TIME OUT'

MODERATOR Professor Lisa Bradley
/ Assistant Dean (Teaching & Learning) QUT

Lisa Bradley has research interests in the broad area of Quality of Work Life. She is interested in investigating how people's experience of work can be improved, whilst always maintaining or improving organisational outcomes. She has looked at issues such as: discrimination at work; selection and performance appraisal processes; organisational culture; and most recently, work-life balance. Her research is applied and she works directly with organisations to ensure better practice can occur.

PANEL

Associate Professor Vicky Browning / Director Client Programs, QUT

Major Fiona McInante / Pilot and Training Instructor, The Australian Army

Michael List / Simulator Instructor (MRTT), CAE

ENGAGING MEN IN THE GENDER DIVERSITY JOURNEY AND HOW TO MAKE WORKPLACES MORE INCLUSIVE FOR WOMEN AND MEN

Troy Roderick
/ Independent Inclusion & Diversity Advisor; Strategic Advisor, Male Champions of Change; Executive Ambassador, Catalyst Australia; Former Global Head of Diversity & Inclusion, Telstra.

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The Association is an independent, not-for-profit membership based organisation whose primary aim is to contribute to the long-term health of the Australian aviation & aerospace industries.

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AIRPORTS
CAROLINE WILKIE
CEO – AAA

A coordinated approach

Land use planning outside airport boundaries

AUSTRALIAN AIRPORTS ASSOCIATION

The Senate's Rural and Regional Affairs and Transport legislation committee's recent recommendation that the Airports Act Amendments Bill be passed is welcome news for the aviation industry.

The changes would see airports such as Adelaide, Canberra and Gold Coast submit master plans every eight years, while Australia's largest four airports would continue to submit their master plans every five years.

The monetary threshold for when Major Development Plans (MDPs) were required would also be increased, taking into account indexation and increases in construction costs.

These proposed changes are welcome progress, reducing unnecessary regulatory burden while keeping the focus on safety outcomes.

They recognise airports' commitment to long-term planning which ensures the sustainable growth of our industry while also considering community wellbeing and future aviation needs.

However, the effective management of commercial development on airport land is only part of the story.

While airports complete master plans, major development plans and go through extensive consultation processes before embarking on new projects, the same doesn't always apply for development just outside the airport boundary.

As we see increasing demand for land in our cities, we must ensure land use planning recognises the need to protect the airspace around airports to make sure they can continue to meet the needs of airlines and passengers for many years to come.

The AAA has advocated for state governments to amend their planning schemes to align with the National Airport Safeguarding Framework (NASF) to avoid land use planning outcomes that put aviation safety at risk or reduce community amenity.

The industry also supports the development of a new NASF Guideline for Public Safety Zones, with a consultation process on the guideline set to get underway soon.

We must ensure all levels of government work together with airports to make sure we plan for the growth of our airports and our cities in a coordinated way, and ensure the safety and enjoyment of the community remains at the forefront of any considerations over new developments.

The success of the process for developments on airport land proves this can be done well – but it takes a coordinated approach to make sure surrounding areas are not adversely impacted by poor development decisions in the future.

If state and local government planning frameworks adopt these standards, we'll be better able to ensure a safe and sustainable aviation industry that not only serves the community well, but better integrates with how people live, work and travel for years to come.

'All levels of government work together with airports.'

Managing fatigue

Relating fatigue science to real-world operations

FROM THE REGIONS
MIKE HIGGINS
CEO – RAAA

RAAA
REGIONAL AVIATION ASSOCIATION OF AUSTRALIA

As part of our efforts to enhance the real-world operations and fatigue management capabilities of our members, in 2017 the RAAA launched a program utilising FDA-approved, scientifically-validated actigraphy technology which has been developed by the US military over 25+ years and with a research investment of more than US$37 million. It delivers sleep quantity, sleep quality, real-time and predictive alertness data to individuals on a smartphone app.

The program included completion of Circadian Australia's FRMS Standard Fatigue Training Online courses with the intent of enhancing participants' knowledge and their ability to self-assess their real-time and predictive alertness data, their sleep quality, and sleep quantity and determine their fatigue risk and fitness for work when reviewing their alertness data on their smartphone app.

It is a CASA requirement that flightcrew should manage their personal time to ensure they are rested and fit for duty and inform the operator of factors that may mean they are not fit for duty.

The RAAA acknowledges the challenges of relating fatigue science research findings and scientific evidence to real-world operations, given the multiple combinations and permutations of factors that impact on sleep, fatigue and recovery in operational environments.

However, this approach is significantly more effective in identifying potential sleep quality and quantity issues that may negatively impact on an individual pilot's alertness levels than any prescriptive 'one size fits all pilots' approach.

Still, it is understandable that the one size fits all approach is more palatable to regulators, who do not have the comprehensive or contemporary understanding of the application of this technology.

Importantly, the International Civil Aviation Organization (ICAO) defines the manner in which fatigue should be managed to be, "A data-driven means of continuously monitoring and managing fatigue-related risks, based on scientific principles and knowledge as well as operational experience that aims to ensure relevant personnel are performing at adequate levels of alertness".

Therefore, in order for CASA to become ICAO-compliant, the RAAA encourages the regulator to more seriously investigate and embrace the increasing recognition of real-time and predictive alertness technology in civil aviation and the military and many other 24/7 shiftwork-based industry sectors, combined with fatigue education and training that delivers the ability for individuals to reliably self-assess their fatigue (impaired alertness) in real-time operating environments.

One size does not fit all.

'This approach is significantly more effective.'

FIRE & AG
PHIL HURST
CEO – AAAA

Putting food on the table

Aerial application integral to farming success

During a recent trip to the northern NSW cotton fields to kick-off field trials of new powerline markers, the integrated nature of aerial application to our national farming systems stood out.

Crop protection through the timely and accurate application of herbicides, fungicides and insecticides contributes over $20 billion of value to the Australian economy according to a recent report from Deloittes Access Economics.

Without the ability to respond quickly to pest pressure, disease or weed competition in crops, Australia would simply not be the agricultural powerhouse it is.

The potential impact of that on many city dwellers – who struggle to understand where their food comes from, let alone the commercial risks inherent in farming – should not be lost on policy makers, primary educators or the agricultural industry itself.

Australian shopping trolleys would be all but empty without plant science and agricultural innovation.

Farmers take protecting their crops very seriously. When a single application at the right time applied by a professional can cover sunk costs and then put dollars into farmers' pockets, this should not be a surprise. The multiplier effect this has on local communities is immense.

This is why aerial application offers so much to agriculture. Highly-trained, highly-accountable pilots and operators investing hundreds of millions of dollars into specialised aircraft and equipment to ensure farmers get the support they need, when they need it.

Being able to cover up to six hectares a minute regardless of how muddy the paddock is and without the soil compaction and weed and disease transfer from tractors provides a wide range of benefits.

The ability to utilise small windows of opportunity to take advantage of good spraying conditions and cover large areas is good for the environment as well as production.

When travelling through agricultural areas at certain times of the year – such as cotton defoliation – the sound of turbines on ag aircraft hard at work should bring a smile to every aviator – knowing that here is another example of aviation's intrinsic value to all Australians.

'Farmers take protecting their crops very seriously.'

AAAA CONVENTION TO FEATURE SIDNEY DEKKER AND ALAN CORR

A great speaker line-up for AAAA Convention will include Sidney Dekker on aviation safety and Alan Corr from the US on optimal aircraft set-up. The Convention is on May 30- 31 at Seaworld Resort at the Gold Coast. Details are on the AAAA website.

Boards matter

The CASA and Airservices boards lack aviation experience

ROTOR TORQUE
PAUL TYRRELL
CEO – AHIA

Something is amiss with the makeup of the CASA and Airservices Australia boards. The pub test is that you would expect these senior aviation boards to be populated by people with significant commercial aviation and operational experience. Guess what? They are not. Things are so bad that the Airservices board has had to contract in an aviation consultant to provide commercial and technical advice.

The situation is almost as dire on the CASA board. Once the current technically capable and commercially experienced chair leaves at the end of June, there will be only one person left on the board with significant commercial aviation experience.

Having a lawyer or an accountant on a board can be a sound decision in terms of ensuring high quality corporate governance. But when such skills dominate government aviation boards something has gone awry.

These boards need people with deep commercial aviation industry skills in order to set clear policy and make informed judgements about the regulatory and air traffic management ideas being placed before them. They must lead and guide senior management, not the other way around.

How can board members make informed decisions if they have little or no commercial aviation experience? With one or two notable exceptions, what is the point and expense of these boards if they cannot command the respect of industry as well as the organisations that they lead.

Of course the make-up of these boards is not the fault of CASA or Airservices. These appointments are made by Cabinet after consultation with the relevant Department. No comment is made on the worthiness of individuals but rather shouldn't a government aviation board comprise considerable hands-on civil and commercial aviation experience?

The aviation industry is a complex and safety-focused environment. We swim in a sea of federal aviation law. The development of those laws and regulations are informed by the government aviation boards. If boards do not have the necessary aviation and aerospace experience how can they possibly give advice on the aviation laws that we live by?

The solution is for government to look very closely at the skills required and make highly considered appointments. The travelling public and the industry deserve aviation boards that have the skills to understand and add value to the myriad aviation issues that are placed before them.

The appointment trend can be turned around if there is the political will. The aviation industry is alarmed at what has happened and the government is on full notice that future appointments will be scrutinised carefully.

'Future appointments will be scrutinised carefully.'

CABIN PRESSURE
JOHN WALTON
@thatjohn

No spin class, but...

Thinking outside the seat

Qantas's historic Captain Cook 747 lounge is an iconic part of airline history (even if it does look its best in black and white, rather than the more eyewatering contemporary orange...). QANTAS

Virgin Australia's April Fool's Day joke about installing an indoor cycling spin class studio on its long-haul aircraft might have cracked a few smiles, but there'll be passengers beaming if Qantas' Project Sunrise aircraft end up looking the way Alan Joyce is suggesting they might.

Project Sunrise, "the last frontier in global aviation", challenges airframers Boeing and Airbus to refine their widebody jets to reach London and New York nonstop from Australia's east coast. But early flyers on the Perth-London nonstop Boeing 787-9 – and other similarly long flights – understand all too clearly the need to get up out of their 17in-wide seats.

At the same time, these "super long-haul aircraft" – as Joyce dubbed them – will need to be even more scrupulous about weight than the Qantas 787-9. The airline was so concerned about cutting kilos from the aircraft that the USB sockets next to the screen in premium economy only put out a low power 0.5A rather than the 2A modern phones need. Adding power supplies isn't all that heavy, probably not much more than a few kilos for the cabin, which rather epitomises the choices Qantas has made.

Enter – or re-enter – the Third Place. (See Cabin Pressure, June 2016, for more on the definition of this non-home, non-work zone, and what airlines are doing with their bars, lounges, self-service snack zones, and so on.)

'The cargo deck of widebody aircraft has been used for passengers before.'

Convertibility is likely to be the watchword, and it wouldn't be surprising at all if the galleys and areas around the doors of the aircraft were a key focus. The aircraft being considered for the Project Sunrise role will likely have four sets of doors, which could mean four sets of flexible spaces.

Many airlines already use their doors 2 area (where most widebodies board most passengers) as a welcome zone and self-service area for business class passengers, and that's also where the bars on Virgin Australia and Virgin Atlantic aircraft, the only single-level jets that offer them, are found.

The upper deck of Qantas's early Boeing 747-200B aircraft was dedicated to the Captain Cook Lounge, and a bar-lounge is certainly one option for Project Sunrise. But rather than the upper deck, it's best to direct our thoughts downwards.

The cargo deck of widebody aircraft has been used for passengers before, although only in flight rather than during takeoff and landing. Lufthansa's Airbus A340-600 aircraft, for example, have a set of downstairs lavatories for economy class. American Airlines predecessor Pacific Southwest Airlines (the pink-and-orange birds with the smile painted below the radome) took its Lockheed L-1011 jets with a cargo deck lounge that even offered integrated airstairs to the apron below. And of course numerous airlines use the space for crew rest bunks.

It's that rest purpose that seems most likely for Project Sunrise. As Qantas chief executive Alan Joyce said in London after the launch of nonstop Dreamliner flights from Perth, "could some of the freight areas that we may not be able to use be used as an exercise area? Could they be used for berths for people to sleep in? What are the out there ideas that could apply to this and really change air travel for the future. And nothing, nothing is off the table."

Outside the recent generation of first class suites, actual beds haven't been used in quite some time, with a few exceptions like Philippine Airlines' early 747 upper decks, which offered berths.

A business-plus version is certainly an option, with passengers paying a premium to sit in business class for takeoff, landing and meals, and able to retire, flying boat style, to the lower level berths in their Qantas dressing-gowns with a hot chocolate or a nightcap.

Offering berths on a by-the-hour or partial flight basis to premium economy and economy passengers might also be on the cards, but could cannibalise the critical business class revenue that makes a route like Project Sunrise work.

Is there another option?

"We are also looking at do we need and should we have four classes? Is there a new class that's needed on the aircraft?" Alan Joyce said.

Joyce is talking about the "comfort canyons", as Airbus's passenger experience executives call them, between the existing options on board. The canyon between premium economy and business class is currently the greatest on Qantas's fleet, moving from a fully flat bed with direct aisle access to a 2-3-2 (or 2-4-2) recliner at 38in pitch. What might span that gap?

Qantas has some time to figure this out. But not that much time: designing, testing, certifying and producing commercial aircraft components is a complex and long process. If the airline isn't already at more than a "hey, perhaps a spin class?" sort of point – in other words, if Joyce's suggestions of exercise areas and berths weren't testing the market waters rather than starting to think about third places – it needs to get its skates on.

ON TARGET
DR ALAN STEPHENS
WILLIAMS
FOUNDATION

Eighty to nil

Israel and the first networked air war

Network-centric warfare has become something of a cliché in advanced defence forces. Simply put, the term implies knowledge dominance, real-time command and control, and the immediate provision of tactical information to the fighter who needs it now.

The prototype was revealed by the Israeli Air Force overhead Syria's Bekaa Valley during the First Lebanon War in 1982.

The war started on June 5-6 when the Israel Defence Force invaded southern Lebanon. While the ground war was to end badly for all concerned, including the Israelis, the air war in the Bekaa Valley, site of the Damascus to Beirut highway, was a triumph for the Israeli Air Force. Network-centric operations were the key.

'They were operating as one component of a networked system.'

It's a truism that time spent on reconnaissance is never wasted. The IAF had been caught off-guard by its Egyptian and Syrian enemies in the October 1973 war, but this time it had done its homework. In addition to collecting information from fixed-wing reconnaissance flights and US satellite imagery, the IAF made skilful use of its new remotely-piloted vehicles. In the months preceding the war, RPV flights into the Bekaa Valley were used to trigger Syrian air-defence radars, enabling the Israelis to plot the position of surface-to-air missile batteries and compile a library of electronic data from which countermeasures (such as jamming) could be constructed.

Meticulous planning characterised every aspect of the IAF's campaign. A pleasing feature for military strategists was the extensive use of deception.

At around 2:00 pm on June 9, Syrian radar operators detected large formations of enemy aircraft at various locations around Lebanon. Simultaneously, however, a blanket of electronic countermeasures was thrown over Syria's command and control network. Additional confusion was created by Israeli decoy RPVs, at which panicked Syrian air defence operators needlessly fired SAMs.

The opening strikes against Syria's SAMs were made by some 24 F-4 Phantoms, which launched television-guided, high-explosive bombs from a distance of 30 kilometres. With the Syrian defences in disarray, the main IAF strike force of about forty aircraft attacked SAMs, AAA, radars and headquarters buildings. Orbiting at a safe distance from the battlespace, E-2 Hawkeye AEW aircraft coordinated the many components of the IAF's integrated force; while EW 707s jammed command and control services. Immediately the attack had finished, the IAF flew battle-damage assessment missions to assess the results and redefine targets for the next phase.

The Syrians' reaction was fascinating. Prior to the IAF strike, Syrian Arab Air Force fighter pilots had been flying combat air patrols in the area. A customary response would have been to direct them to engage the Israelis. Instead, they were ordered to withdraw, apparently with the intention of creating a free-fire zone in which Syria's SAMs and AAA would be able to shoot at anything they saw without having to identify it. This decision indicated that the Syrian commanders either doubted their fighter pilots, or were confident in their ground-based air defences. If it were the latter then their confidence was misplaced. Within two hours, all SAM batteries had been either destroyed or badly damaged, and Syria's strategy had been shattered.

The question now was whether the SyAAF's fighter pilots would be called up to try to regain control of the air over the Bekaa Valley. Several factors indicated that they were likely to struggle.

Israel's fighter pilots were the equal of any in the world and were flying leading-edge F-15s and F-16s and very good Kfirs, armed with advanced air-to-air missiles. They were operating as one component of a networked system featuring centralised command and control, real-time battlespace management, ECM superiority, and information dominance. By contrast, the Syrian pilots' standards were modest, their MiG-21s and -23s were obsolescent, and they were effectively fighting blind because of the destruction of their early-warning radars and communications, and the inadequacies of their network.

The combat was personally managed by the IAF's chief, General David Ivri, from his command post in Tel Aviv, some 300km away. Although the IAF had about 90 aircraft committed to the fight, Ivri preferred to vector separate waves of four-ship formations into the combat zone, where engagements with courageous but confused Syrian pilots would generally last only a minute or two.

While the battlespace may have been small, General Ivri and his staff managed an extremely complex situation with a degree of real-time control never before achieved in air warfare. Ivri later provided a neat musical analogy: rather than "playing" a set of individual instruments that more or less supported each other, he was "conducting" the full orchestra.

By the end of the first day almost 30 SyAAF fighters had been shot down for no IAF losses; by the time a ceasefire was called six days later, the ratio had increased to 80 to nil. The IAF had shown air forces everywhere the power of networked warfare.

An Israeli F-16 wearing Syrian air force 'kill' markings on its nose.
ZACHI EVENOR

YESTERYEAR
ERIC ALLEN

Mystery flights

An $8 outback NSW adventure

DC-3 VH-ANQ at Coolah, NSW November 10 1966. ERIC ALLEN

In the mid-1960s Ansett-owned Airlines of NSW would offer 'mystery flights' as a means of filling otherwise empty seats and introducing the public to the benefits of air travel. The arrangement was simple, you made a booking and arrived at Mascot on the appointed day to be offered a return flight allocated at the airline's discretion. For this adventure you paid the princely sum of $8.00.

It was a generous offer as the small revenue would hardly cover the cost of administrative overheads, at a time, much like today, when regional air routes were only marginally financially viable.

The tenuous nature of regional airline operations was highlighted by the controversy sparked by an August 10 1965 joint announcement from the Minister for Civil Aviation, Senator Norman Henty, and the NSW Premier, Bob Askin, transferring from Airlines of NSW to East-West Airlines (EWA) the Sydney-Bathurst-Parkes and Sydney-Kempsey-Forster-Scone routes from October 1 that year. It was anticipated that EWA's revenue would increase by £210,000 pa and gross operating profit by £50,000 (Australia would introduce decimal currency, replacing pounds, shillings and pence with dollars and cents, in February 1966).

No-one was happy with this move. Ansett strongly objected, "to confiscation of routes for the sole purpose of making a profitable airline more profitable by the compulsory transfer of business built up over the years by another private enterprise airline".

'No-one was happy with this move. Ansett strongly objected.'

Don Shand, EWA's chairman called the plan, "an absolute farce ... it makes no contribution to ensuring the long-term continuance of two independent airlines", and said he would approach the Premier for the allocation of additional routes.

The following day the general manager of Airlines of NSW said the airline may have to cancel an order for a Fokker Friendship for delivery in August 1966 plus a tentative Fokker Fellowship order if its routes were reduced again in 1966.

Early in September 1966 Airlines of NSW ceased services to Coolah, Burren Junction, Collarenebri and Googooga because the route was uneconomic. However, the service was then resumed after talks with the state government. It was a difficult situation with the airlines struggling to operate the routes economically and the NSW government keen to retain transport links to country towns.

Against this contentious background, on November 9 1966 this writer ventured to the Mascot Airport office of Airlines of NSW to book a mystery flight. But not just any mystery flight as I explained to the unimpressed person at the counter, I would very much appreciate a mystery flight on a Douglas DC-3. I was told firmly that I was kidding myself as there was no way that the airline would agree to my request. The explanation? "We are trying to popularise air travel and a flight on a noisy, hot and unpressurised DC-3 is not on. There is no way senior management would approve it."

I tactfully asked if, as a special matter, my request could be referred up the line. I was informed this would be done but it was futile and I should return in the morning to find out my flight allocation.

With no great sense of optimism I returned to the airport to find out the details of my journey. To my great surprise and delight I was offered a flight on a DC-3 to Coolah, Burren Junction, Collarenabri and return. (The aircraft could not land as originally intended at Goodooga because of flood waters at the airfield.)

It was a wonderful flight on DC-3 VH-ANQ, cruising at about 2,000ft over a vista of country NSW with the comforting sound of the Wright Cyclone R-1820-G202A engines purring in the background.

The crew did the lot, when two passengers got off at Coolah, they looked after the stairs and luggage. After Coolah the captain told me a DCA examiner who was to check him out was unable to join the flight, would I like the steak lunch which had been loaded on board for the absent examiner? It was delicious.

It was a great day but the breathtakingly poor economics for the suffering airline were readily apparent. There were two passengers paying normal fares from Sydney to Coolah with no-one else beyond there. On the return flight from Collarenabri there were no passengers, just me on my $8 ticket. So it was a flight from Sydney to the Queensland border on VH-ANQ with negligible revenue for the airline. No wonder both major airlines operating intra-state NSW services were struggling to make a profit on routes to smaller towns.

Don Shand told the EWA AGM in December 1966 that, "the transfer of five additional ports from Airlines of NSW in late 1965 was not advantageous because low passenger traffic and short stage distances made the additional air routes uneconomical to operate, even when integrated with other East-West services".

Airlines of New South Wales was correct in saying the Friendship was more comfortable. I would have several mystery flights in Friendships and the wonderful view through those large oval windows was a delight. But when ex WW2, second hand DC-3s were operationally and economically unsuitable for some airports on the Airlines of NSW network, brand new Fokker Friendships were even moreso.

With its "low passenger traffic and short stage distances" regional airline operating economics were just as challenging 50 years ago as they are today.

RIGHT HAND SEAT
DAVE PROSSOR

Knock-on effects

Where will the next commercial pilots come from?

It was before first light as I drove into the country airport. At the terminal was a Chieftain gleaming in the lights of the terminal building. I watched as the landing lights came alive and then the engines fired up. Wow!

The pilot of the craft had been up for possibly two hours beforehand to get the machine ready for the flight. He or she had to get the Chieftain to the terminal, check the fuel or refuel it, check the weather, log a flightplan, do the daily and get the machine ready for the departure.

The aircraft did a run-up and lifted off right on first light.

I had to look on in admiration. The pilot had gone through the hard yards of getting a licence, an instrument rating and then got endorsed on the Chieftain.

All that made me wonder how many up and coming new pilots will be able to follow on in the footsteps of that Chieftain pilot.

In recent times I have observed two budding CPL pilots going for their commercial ticket. One was almost at test time but was dressing in casuals while the other looked like something that the cat had dragged home. Attitude, attitude was all I could think.

I have long thought that for one coming up to the commercial test they should be dressing like they were about to go on a commercial job. Shiny shoes, blue or black slacks, pilot shirt with maybe one bar and pilot wings. Looking the part, acting the part, talking the part, being the part. Getting ready to impress a possible employer and then the paying customers who would no doubt be asking themselves how safe is their young pilot.

There is a lot to getting the commercial ticket these days. Some elect to do the 150-hour integrated course and others the 200-hour non-integrated course.

The 150-hour ticket may be good for foreign students who would go back home and do time in the right seat of an airliner but a new local commercial pilot with at least 200 hours in his or her log book is going to have a greater chance of getting a job than the 150-hour guy.

Flying charter and tourism operations gives a new CPL great experience in operational decision-making. PAUL SADLER

More time equates to more experience.

Another aspect is that many budding commercial pilots seem to have aspirations of going direct to an airline in some guise. Others look at getting the CPL and then become an instructor to build hours. Few seem to want to become a general aviation pilot and do charter and the like.

Looking at the big picture can be interesting. Getting a CPL and doing charter gains you enormous exposure to making decisions, good operational decisions. That is command character-building. The stuff of a good regional and eventually airline captain.

On the other hand we have new commercials getting an instructor's ticket and becoming a Grade 3 instructor. Unlike the old CAR 5 licence the new Part 61 grade 3 instructor then has to do more checks and tests in order to be able to instruct in such things as the Night VFR and even the CSU.

But wait, using a manual CSU is part of the requirements needed for the CPL test.

All that means more costs.

In the past it was a requirement to have a NVFR rating before going for instructor training. Then it became a requirement before the instructor test. Now it is not required at all. If the flight school wants a NVFR-capable instructor someone has to pay for extra training and then the cost of a test for that NVFR ticket. Ouch!

The instructor grade 3 in time becomes a grade 2 but there is an increasing resistance to become a grade 1 instructor. There is an expensive upgrade and test to be paid by someone and then comes increasing responsibility for little pay increase. The result is that a number of grade 2 instructors elect to stay at that level before moving on. This in turn means that there are fewer grade 1 instructors, fewer instructors who will become a head of operations, fewer pilots who will become CASA flying ops staff.

The knock-on effect is one that CASA does not seem to have considered. Indeed with the number of adverts for chief pilots and head of operations one wonders if all these will ever be filled.

An expression often heard in industry at present is that with Part 61 requirements CASA has effectively costed and regulated small operators out of existence. One result is that aero clubs and flight schools, with few exceptions, have disappeared from inland Australia.

At present the airlines are hoovering up pilots. In turn that means that the regionals are recruiting and then the charter guys move up the jobs ladder. Where are the replacement pilots to come from?

In recent years the cost of becoming a commercial pilot has become eye watering. Even if after gaining a commercial the average guy or gal will not be making the huge sums that their IT friends will make. Even the prestige of becoming an airline pilot is not what it once was.

One thing for sure is that we live in interesting times with many changes around the corner for existing and budding commercial pilots.

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'The knock-on effect is one that CASA does not seem to have considered.'

ASIA WATCH
TOM BALLANTYNE

More than an airline

AirAsia sets its sights ever higher

The AirAsia group now operates in excess of 500 aircraft. AIRBUS

Tony Fernandes, boss of Malaysia's AirAsia budget group, isn't one to miss out on popping up with his trademark red cap at big occasions around the world and when leaders of the 10-member Association of Southeast Asian Nations (Asean) held their annual talkfest in Sydney recently, there he was.

Fernandes was doing more than networking with the heads of governments who rule his heartland. On his mind was a further expansion of his empire. AirAsia now has businesses in Malaysia, India, Indonesia, the Philippines, Japan and Thailand, with plans to launch an airline in China. AirAsia Vietnam is also expected to take to the air before the end of this year and now, apparently, he has his sights set on adding Myanmar to the stable, a move that would see the carrier with coverage in 95 per cent of the burgeoning Southeast Asian market.

"Once you've covered Vietnam and Myanmar, you've got all the big (Southeast Asian) populations," he said. "Vietnam – we're talking about October – we've had great support from the Vietnam government and we have a great partner. My team are very bullish."

As for Myanmar, he concedes it won't be a big airline because there is a lack of airport infrastructure but says with 50 million people, "it will develop over time."

As with all his joint ventures outside Malaysia, Fernandes has to find a local partner to take a majority stake and it appears he is on the way. While refusing to divulge who that might be he did comment while in Australia: "We had a good meeting with someone in Sydney – he's got a good airline that we've known for a long time and he is a well-respected guy. We're going through that process."

AirAsia won't be the first to try to get a toe into the Myanmar market, which is seeing significant economic growth. Last year, Japan's All Nippon Airways (ANA) pulled out of a plan to form a new airline with local partner Golden Sky World after authorities rejected their application for an air operator's certificate. ANA chairman Shinichiro Ito has said since that it will try again and is determined to become involved in Myanmar aviation.

The move to add Myanmar to the list is a clear indication Fernandes intends to continue to grow his group, which now operates in excess of 500 jets, mostly single-aisle A320 series but also including A330s on low-cost, long-haul operations by AirAsia X.

The carrier is emerging from several turbulent years which saw some of the gloss rubbed off the brand. Profits were slim or non-existent at some of the subsidiaries, although there has been a revival in recent times. It also had to deal with the fatal crash of an Indonesian flight in 2014 that killed 162 people.

But Fernandes, who admitted to having so many fingers in so many pies he may have dropped the ball a little, has set about raising the bar and easing analyst fears the airline group may have over-extended itself. Recently, AirAsia has pursued an "asset light" model, forming a joint-venture for its Singapore and Malaysian ground-handling operations and recently selling its leasing business in a staged process that will ultimately see 182 aircraft pass to established leasing portfolio manager BBAM Ltd.

That will bring in around $1 billion, although the sale hasn't won universal approval from analysts. They warn that in the near term it could hurt AirAsia profits and leave it exposed to the risk of higher lease rates. Indeed, the leasing arm was a stable business and would likely have continued to produce good profits.

While the sale proceeds from the leasing business will be used to reduce debt, the bulk will be paid out as special dividends, potentially limiting the upside in a stock that has more than quadrupled since hitting a seven-year low in late 2015.

But the aim, says Fernandes, is to foster sustainable growth. In Hong Kong for a presentation to analysts and investors at Credit Suisse's Asia Investment Conference, he launched what he described as a "we're more than an airline" campaign. He points out AirAsia has been moving rapidly to launch additional services for its 80 million-plus customers, from financial offerings, including foreign exchange, to e-commerce and content. His portfolio already includes a payments company, logistics firm, food and beverages brands and a loyalty program.

"While Southeast Asian companies like Grab (an Indonesian ride-hailing company similar to Uber) have to go out and spend a fortune to build that brand and data, we have 89 million customers travelling with us every year and we have data going back 18 years. We're more than an airline – that's the message for 2018 – like Amazon is more than a bookseller. The biggest asset is our data and we're going to monetise that data over a series of joint ventures in three kinds of pools."

This will include turning its loyalty program points into a more formal currency through an initial coin offering, building a bigger logistics business and growing its content offering.

'We have 89 million customers travelling with us every year.'

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