

# THE COST OF DOING BUSINESS

BARRIE BARDOE



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# **THE COST OF DOING BUSINESS**

**The story of military aviation safety in Australia  
1914 – 2022**

**Barrie Bardoe**

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*This book is dedicated to Brooke Miller.  
The part of the journey we have shared thus far  
has been the most enjoyable and fulfilling.*

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## ***Learning to fly***

The first incident in Australian military aviation occurred on 1 March 1914. The nation's fledgling military aviation capability had been under immense pressure to get airborne and, on the morning of 1 March, this finally happened when one of the two instructors, Lieutenant Eric Harrison, took to the air in a Bristol Boxkite. The flight ended uneventfully, but a subsequent flight had to be cancelled when a dog leaped at the rotating propeller. The fate of the dog is unknown, but the propeller had to be replaced and flying was delayed a day, implying a bad outcome for the hapless canine. Another dog, possibly a replacement, was required to be chained up whenever aircraft were in operation – an early example of what now might qualify as a Safety Management System. On one occasion, it was not tied up and, like its predecessor, it leaped at the rotating propeller. Incredibly, it passed through entirely unharmed! Even more incredibly, on a subsequent occasion, it repeated the unlikely feat; all this from a bulldog! If there is a moral to this, it is that, although a dog can jump through a moving propeller, and even if it can replicate the feat, it does not mean it is safe for dogs to leap at propellers. As the story of Australian military airworthiness and safety unfolded, it seems this seminal concept was often forgotten. Eventually, it reached a crisis point that forced revolutionary change.

The history of military aviation began in France in 1794 with the establishment of the French Aerostatic Corps. The Corps was charged with using balloons for reconnaissance and observation purposes during the French Revolutionary wars. Kept afloat by hydrogen supplied by portable units this cutting-edge new capability was used during the Siege of Maubeuge, and subsequently at the Battle of Fleurus on 26 June 1794, where the Army of the First French Republic confronted a combined army of soldiers from Hanover, the Dutch Republic and the Hapsburg Monarchy. The French won the day, and it is said that the corps and their balloon “L'Entreprenant” played an influential role spotting enemy positions. The Corps became celebrities and appeared on postcards which were equivalent to the social media of the day.

On 24 September 1861 a notable first was achieved in the American Civil War – considered to be the first modern war of the industrial age - when the balloon “The Union” ascended higher than 300 metres at Fort Corcoran, Arlington Virginia and began telegraphing information about the position of Confederate troops some 4.8 kilometres away. Union guns were aimed and fired accurately at the Confederate positions with no direct visual contact being made by the gunners. This feat had never been accomplished before, and signalled a world of new possibilities for inflicting carnage upon an enemy. The American Civil War may also have seen the first military aviation incident when Confederate balloonist Captain John Randolph Bryan found himself on a free flight after his tether had been cut to free an entangled crew member. He was shot at by his own troops who thought he was an enemy, but eventually returned to earth safely having made accurate notes of enemy positions despite a fast rotational spin.

From the Australian experience, military aviation began in earnest when the 1909 Imperial Conference in London decided the British Empire should develop a military aviation capability.

The decision had been largely prompted by Louis Blériot's crossing of the Channel that year, putting the Empire on notice that the world's most powerful navy may no longer be the final word in protecting the mother country. France had been inspired by the flight of Alberto Santos-Dumont in 1906 and the nation's well-developed cycle and car manufacturing industries lent themselves to the development of aircraft. It is fair to say that, by the start of the second decade of the 20th century, France had a distinct advantage in this new capability. By 1911, France had some 200 operational aircraft; the British had around 20.

The Australian Government offered the considerable prize of A£5,000 for a locally designed aircraft that could be used for military observation purposes and set a deadline of March 1910. When this deadline was not met, it was extended but, ultimately, no one collected the prize. Two brothers from Victoria did succeed in building a biplane that successfully flew but that was not until October. March was, however, a pivotal month with legendary escapologist Harry Houdini laying claim to the first powered flight in Australia. This feat spurred even greater public interest in flight and in 1911 Joseph Hammond flew a Bristol Boxkite at a number of locations across Australia. This showed a wide range of Australians that heavier-than-air flying was viable and inspired many to travel to Britain to get a flying licence – the Royal Aero Club had been issuing Aviator's Certificates since 1910. One of these adventurous young men, Harry Hawker, was to play a significant role in promoting aviation in Australia. It also convinced the government that aviation should form a part of Defence policy and, after the Imperial conference of 1911, which supported this, an advertisement was run in the Commonwealth Gazette of 30 December 1911 calling for two aviators to provide guidance and the management of a proposed military flying school. It was envisaged the fledgling capability, which would be a corps within the Army, would initially consist of four aircraft and four officer pilots, as well as a complement of mechanics and support personnel. The pilots would be paid a wage three times the national average and it was anticipated flying would commence in January 1913. The problem was that the advertisement for the two aviators required to put this in motion received no positive responses; budding aviators had gone to Europe where flying culture was far more established.

The positions were advertised in England in March 1912 and this time there was over 100 applications. Of these Henry Petre and Harry Busteed were selected and the government went ahead with the purchase of four aircraft – two Deperdussin monoplanes and two B.E.2a biplanes on 27 June 1912. Petre had learned to fly in 1910 and been engaged by the Deperdussin company as a flying instructor which no doubt contributed to his selection. Busteed was the second Australian to be awarded his pilot's 'license' by the Royal Aero Club and was by all accounts a well-regarded flyer and mechanic. He was employed by the British and Colonial Aeroplane Company which made the Bristol Boxkite – the aircraft which would make the first military aviation flight in Australia.

However Busteed decided in September 1912 that he wished to continue with his civilian employer, and he subsequently joined the Royal Flying Corps. Samuel Cody was then offered the position but when he couldn't get the terms he was seeking he also declined.

His replacement was Eric Harrison who joined in October 1912. He was a mechanic who had learned to fly in England and had been working as a flying instructor with Boxkites in Germany where he qualified a number of flyers who would later fight against the Allies in the forthcoming war. His contract commenced in December 1912; it was also this month that the decision was made to purchase the Boxkite as an initial trainer, mainly due to Harrison's and Busteed's experiences with the type. Mechanics and other support personnel were also contracted and a suitable location for the envisaged Central Flying School was the next step. Eventually, a location on the outskirts of Melbourne at Point Cook was chosen and purchased in October 1913. There had been some pressure to find a location near Canberra but altitude and the lack of a body of water, which was deemed necessary for the possible operation of floatplanes in the future, saw the decision made in favour of the Melbourne site. The location of buildings was pegged out in December 1913 with construction due to commence in January 1914. The government had always envisaged a four-year period for the establishment of a military aviation capability, but considerable pressure was mounting from the media and some segments of the general public. Harry Hawker had arrived in Australia with a Sopwith Tabloid biplane, on what was essentially a sales promotion for the company, and conducted numerous flying displays. A year after purchasing the first aircraft, there still had not been any military aviation flights and there was no shortage of critics asking why such high wages were being paid to men who did no flying. In February 1914, Hawker stated the aircraft were out of date and could only be used for introductory training purposes. He held demonstration flights at Caulfield racecourse which further underscored the reliability of heavier-than-air flight and created greater public awareness. He even took the Governor-General for a flight over Sydney on the 22nd. His Sopwith Tabloid was clearly more advanced than the types purchased by the military. With the infrastructure works still in progress, the aviators and their support personnel were living in tents with the main hangar also a large tent, and one that leaked at that. It was against this backdrop that the first flight occurred. It was kept secret and only announced to the media afterwards. Later that day, the unrestrained dog caused the first military aviation incident. March 1 was certainly a day of firsts. The first official flight was on 5 March and at last the general public and media had what they had been demanding – a military flying capability that could actually get airborne.

### ***Crashing back to earth***

On 9 March, Petre also made history when he crashed the Deperdussin monoplane, making him the first person to be involved in a military aviation accident in Australia. The consequences for the fledgling Corps were fairly dire as it reduced the number of serviceable aircraft at the time to just the Boxkite since the B.E.2as had only just arrived, and were not yet ready to fly, and the other monoplane was for ground taxiing training

only. Despite this shaky start, military aviation had begun and progress would now gain momentum. Four prospective pilots and six mechanics were sought. George Merz, Richard Williams, Tom White and David Manwell were the successful applicants for the pilot positions. All four were already serving officers although Williams was the only member of the permanent forces, the others being what we would now term a “reservist”. The selection of White meant that Petre was promoted to Captain so he matched the recruit's rank. This was something that would irk Williams who as the only professional military man in the new formation, may have been bothered by Petre's lack of military experience. Training began on 18 August as, during the following months, infrastructure works continued. Williams was officially the first to graduate on 12 November, and had also been the first trainee pilot to damage an aircraft in an incident when he was taxiing under Petre's instruction on 3 September. Tom White however has the distinction of the first military aviation accident involving a trainee when he crashed the Boxkite into a newly built hangar on 11 September. Some have suggested the accident occurred because White was trying to be competitive with the other trainees, but a more likely explanation was that he was simply trying to land as close as possible to the hangar since the ground personnel had complained they had to push the Boxkite long distances at the end of each flight. He emerged unscathed but the dent on the hangar remains to this day. Maintenance on the aircraft was carried out energetically with engines serviced every 12 flying hours and airframes every 50.

### ***Beginning operations and the loss of innocence***

The Australian Flying Corps' first military operation involved two aircraft – a B.E.2a and a Maurice Farman Hydroplane donated to the Department of Defence by Mr Lebbeus Hordern of Sydney – being sent to Papua to assist in dislodging colonial German forces. By the time the contingent arrived, the operation was over and the aircraft never unpacked. Harrison, Merz and the others who had deployed returned with malaria but little else to show for their efforts. This was followed by a Half Flight being sent to Mesopotamia (now Iraq) in 1915 to help defend British oil assets. A British and Indian combined force was driving towards Baghdad and it was decided an aerial reconnaissance capability would be of great assistance. This was validated by the almost instant impact made by the Half Flight when reconnaissance flights enabled the first advance in months. Petre believed the presence of aircraft also had a psychological impact upon the Turks who had no such capability at that point.

The Mesopotamian Half Flight saw another military aviation accident first, this time fatal. Petre took White, Merz and another officer, Treloar, with him, plus the necessary ground personnel. They were initially supplied with two Maurice Farman Shorthorn biplanes which were underpowered and unreliable. On occasion, they were known to be blown backwards in

flight by the strong winds that often sprang up in the region. Merz had been dux of the first flying course and his short life was to be defined by high achievements and several significant firsts. He had graduated with a medical degree shortly after flight training had begun and, when he reached the Middle East, his expertise was in high demand as there were virtually no medical facilities, supplies or infrastructure. His tireless dedication to treating the many illnesses afflicting the Commonwealth forces, often at night after flying operations during the day, rightly deserves him being described as the first Australian military aviation medical officer, as well as a skilled and brave pilot.

On 4 July, two French Caudron aircraft arrived and, although better aircraft than the Maurice Farmans, they still suffered from engine problems in the tough conditions. Mechanics working on the aircraft during the campaign faced a daunting set of challenges. They were plagued by unfamiliar illnesses and the sweltering heat was compounded by it being the wet season. Dust, mud and sand were a constant problem. During the Battle for Nasiriyah, in which the Commonwealth eventually prevailed, Merz distinguished himself and was subsequently mentioned in despatches. On 30 July, he and an observer, a New Zealander called William Burns, went missing on a flight to Basra following the battle. A subsequent search located the aircraft but no trace of the men was ever found. An official enquiry found they had been forced down by engine trouble and had subsequently been killed while fighting against some local Arabs. Merz was just 23 years old.

The fate of Merz marked the end of the age of innocence in the Australian Flying Corps (AFC), which went on to deploy one squadron to the Middle East and three squadrons on the Western Front. Australia provided 410 pilots and 153 observers to serve with the AFC, destroying 527 enemy aircraft, and producing 57 ‘aces’ (five victories or more) in the process, with the highest scoring being Harry Cobby with 29 victories. A further 200 pilots served in British formations, including Australia’s highest scoring ace, Robert Little, who accrued 47 victories serving with the Royal Naval Air Service. The cost, however, was high. The AFC lost 178 aircrew, with 111 being wounded, 6 gassed and 40 captured. The casualty rate for aircrew was around 44%, only slightly less than ground-based infantry formations. And there was an attrition rate of around 10% during training.

There is no way of accurately assessing how many fatalities were due to aircraft failure, but at least some were due to operator culture, an issue that would plague military aviation for decades to come. The attributes that make effective military aircrew, such as a kind of reckless bravery, sometimes contributed to accidents. For example, on 12 November 1917, an observer at No 1 Squadron – Fred Harvey – convinced new pilot Len Taplin to go on what might be described as a ‘joy flight’. They took off around 4 pm after refusing to let a mechanic check their fuel levels. Perhaps this was due to youthful exuberance, but the result was the engine stopped mid-flight, the aircraft crashed and Harvey died. Non-combat losses for the year were seven, the same number as had been killed in combat. On 29 November, C Flight commander Ross Smith crashed into telegraph wires when his engine failed. Accidents like this were considered part and parcel of military aviation during the First World War; it was just the cost of doing business.

Despite a proactive approach to engine and airframe maintenance, the technology was inherently unreliable, and procedures and doctrine were in a state of constant development. The AFC flew British aircraft types and was reliant upon British expertise in terms of quality assurance and design acceptance. The British Aeronautical Inspection Directorate (AID) provided these services and developed approaches that were world leading at the time. As we shall see, it would be Harrison’s immersion in technical detail, and his study of the approaches employed by AID, that would form an integral component of an emerging and congruent approach to military airworthiness that would prove vital when Australia faced its greatest threat in the 1940s.

## ***A Force to be reckoned with***

By Armistice Day on 11 November 1918, the AFC had four operational squadrons and four training squadrons located overseas, as well as a training squadron at Point Cook. There were 480 officers and 2,234 other ranks. Over 30 different types of aircraft had been flown and, despite some contestation of the statistics, there is little doubt the AFC performed well, destroying more enemy aircraft than what it lost. Compared to the Royal Air Force, which had 291,175 uniformed members at the close of hostilities, the AFC was still a small force and by 1919 it had effectively almost ceased to exist.

In keeping with the belief the ‘Great War’ had been the ‘war to end all wars’, the squadrons returned home and were disbanded while most aircraft were returned to Britain. The Central Flying School was handed to the ‘Citizen Forces’ for use as a depot. Williams and Harrison remained in London along with some personnel who took part in the great victory parade in July 1919, part of which included an AFC flypast that soon degenerated into wild stunt flying much to Williams’ horror. While Williams’s career during the war had included operational and command roles, Harrison had worked in areas that would form the basis of a skill set that would see him take a pivotal role in the development of airworthiness and aviation safety. We now turn our attention to how he acquired and applied this knowledge.

It was Harrison who most likely instigated the purchase of the Bristol Boxkite as the lead-in trainer for the new Australian military aviation capability; he was very familiar with the type. This set a precedent for his career whereby he immersed himself in the technical and mechanical aspects of flying. He was, for example, extremely interested in power-to-weight ratios and had wondered how range could be extended when this would require more fuel, and hence add more weight. In 1913, he had pondered this issue in an interview with the *Mount Alexander Mail*:

Flying is not very successful in warm climates. On a hot day the air does not give nearly sufficient support to the machine. It is much easier to fly on a cold day than on a hot day.



Of course, with plenty of power it wouldn't matter whether the flight was at the Equator or South Pole, but it is this question of power which is puzzling the minds of the aviation world. The more power, the more petrol to carry, therefore the more weight, and it is the weight which is the stumbling block.

During the course of the war, engine power would increase by approximately a factor of five; Harrison made it his business to remain on the cutting edge.

A shortage of aircraft led Harrison to decide in April 1915 that a locally made aircraft, based on the Boxkite, was required. He oversaw the selection of materials, eventually settling on a Canadian wood for the airframe, and an Australian walnut for the propeller. On 10 August 1915, the first flight was successfully conducted and, during 1916, aircraft engines were being manufactured locally. Harrison would periodically leave his instructing role at the Central Flying School to inspect and accept aviation materiel from manufacturers. During this time, he occupied multiple roles as instructor, chief test pilot, engineer, inspector, and officer commanding a flying unit. He was described as Australia's first military aeronautical inspector. There is no precedent for one man occupying so many varied roles at once. For most of the war he continued to command the Central Flying School and managed to balance these multiple roles by appointing the most talented graduates of each flying course as instructors.

By July 1918, a decision was made to disband the Central Flying School and reform it along the line of the four overseas-based training squadrons. This entailed the now Major Harrison being finally sent to Britain where he hoped to gain operational experience. However, this was not to be as he arrived shortly after the cessation of hostilities. He was initially attached to the Air Ministry and, six months later, to AID. Harrison was on his way to being Australia's airworthiness pioneer.

The British wartime AID had been an organisation of around 10,000 personnel, mostly civilians, and was charged with the inspection of aircraft being introduced into service. It had three main goals: ensuring the reliability of British aircraft by the maintenance of quality standards, fostering increased production, and improving equipment. Harrison had some experience of how stringent this inspection regime was, having been involved when the first aircraft was accepted by Australia. He'd also had the disconcerting experience of the Deperdussin twice suffering structural failures in the fuselage while he was taxiing for take-off during the acceptance testing of the type in the UK in 1913 which had underscored the importance of rigorous inspections. Initially, the inspections were conducted and supervised by the Royal Aircraft Factory but, as private companies began sub-contracting, there was considerable opposition to this model and a decision was made to form the AID as a completely independent body. The largely civilian workforce reinforced this independence. By February 1914, AID had been given responsibility for not only inspecting aircraft and engines, but also all the infrastructure required (such as hangars and other specialised equipment). The fledgling aviation industry in Britain still had a long way to go with much aviation expertise in French hands and the entire magneto industry controlled by German firm Bosch. AID's role therefore expanded to

providing guidance and instruction to assist companies in building the required materiel and achieving quality and production targets. It also began testing and inspecting raw materials, such as the timber used in construction, and a test facility was established. It is noteworthy that, from 1916 until the end of the war, more than half of the staff was female, providing an early precedent for the role of women in technical roles. By war's end, the British aviation industry had evolved almost beyond recognition, producing hundreds of aircraft every month. Aircraft had, in general, progressed markedly. Engines were now far more powerful and speeds had more than doubled; research and development was highly efficient. Harrison immersed himself in the technical aspects of aviation, especially the well-developed approaches to inspection and quality control the British had achieved with AID. In the immediate post-war period, his interest, dedication and diplomacy built relationships which would prove invaluable for the Australian experience of military aviation.

By January 1919 the idea for a military aviation capability independent to the Army and Navy was already taking shape in Australian government circles. In June of that year the British government stated that it would provide a gift of aircraft to any Dominion that would form an Air Force with the intention of assisting in any future military action that might affect the Empire. Australia accepted the offer and Williams and Harrison would be charged with implementing it. The decision to form an Air Force had been made by Senator George Pearce in 1918-19 while Williams was still overseas. As late as June 1919 Williams was recommending that Australia didn't need an Air Force - just a Corps in the regular forces. By the time Williams returned to Australia all the decisions about forming the Air Force were done. While he was the senior member of the Air Board, he answered to the Air Council which had the Minister, a General and an Admiral presiding. Williams fronted the Air Board in January 1920 and history records that he was tasked with implementing a plan to create a force along the lines of the RAF, whilst Harrison had the job of acceptance and inspection of the materiel. The formation of the Australian Air Force formally occurred on 31 March 1921, with Australia becoming only the second country in the world to have an independent Air Force. Harrison would be successful in his much less publicly visible task.

In 1922, Williams, a Wing Commander, was appointed Chief of the Air Staff, giving him effective command of the new force. He held this position three times over the next 17 years but, as we shall see later, it was an airworthiness and safety issue which was used as the pretext to effectively end his career as the organisation's leader. His continual advocacy that the force remain independent, and his pursuit of greater resources, doubtlessly attracted some powerful enemies, but it would be a series of crashes that proved his undoing.

Australia was gifted a fairly complete and sizeable air force of 128 aircraft (35 S.E.5a fighters, 28 D.H.9 bombers, 30 D.H.9A reconnaissance bombers and 35 Avro 504K trainers), swelling the total number of machines the organisation had at its disposal to 153. As well as the aircraft, there was a considerable amount of materiel: spares for engines and airframes; motorised transport, including trucks; portable hangars; tools;

and machine guns, ammunition and bombs. Harrison supervised the unpacking and undertook the now familiar role of inspector. For a singular moment in history, Australia's military aviation capability had more aircraft than officer pilots and troops! When the Royal Australian Air Force (RAAF) officially came into being on 31 March 1921, it had just 21 officers and 151 personnel in total. Ominously, a fatal crash occurred at Point Cook barely a week after the RAAF's official formation.

### ***Applying lessons learned***

For the next four years the now Squadron Leader Harrison served as a liaison officer to the British Air Ministry and he became a conduit for communications between Australia and Britain concerning military aviation. He became well known in European aviation circles and, at the conclusion of this posting, was granted an 18-month extension with AID. Since 1918, the organisation had contracted in size considerably but had implemented some new approaches which were highly effective. One of these was allowing industry partners, who had established a certain level of trust in their quality of output, to essentially self-inspect, with only periodic inspection visits from AID. The Directorate's own laboratory testing facilities were in turn verified by independent contractors, providing a secondary level of quality assurance.

Upon returning to Australia and promotion to Wing Commander, Harrison lobbied for a new position which he took up in March 1928, namely Director of the Aeronautical Inspection Service (AIS). In this role he could start to implement what he had learned from AID, but an Australian equivalent was not to come into being until 1940. The idea of 'approved' industry contractors, who could be relied upon to inspect their products and provide materiel of a high standard, had traction in Britain but the Australian industry lacked maturity and what would follow was over a decade in which Harrison's organisation would have to nurture local industry and provide guidance and expertise along with inspection and acceptance. There were some positive signs, however, with a number of companies emerging from the tentative period of the 1920s with a solid basis, and new companies emerging in the 1930s.

A notable example was the Commonwealth Aircraft Corporation (CAC) which was set up in 1936 primarily based upon the notion that, with Hitler re-arming Germany, Britain may not be able to supply Australia with aircraft in the event of a wider war. Ably led by former Squadron Leader, later Sir, Lawrence Wackett, the company got its start building, under licence, a modified version of an American-designed aircraft, what became known as the Wirraway. In 1939, it was recommended the Bristol Beaufort be manufactured in Australia, overseen by the newly formed Aircraft Construction Branch of the Department of Supply and Development. This project allowed Air Force inspectors and technical personnel to gain considerable experience and proved to be a huge achievement for the local aviation

industry with some 700 Beauforts being built. It was also to provide an unexpected challenge in terms of airworthiness at the height of hostilities when a manufacturing flaw threatened the type; we will look at that shortly.

### ***Safety centre stage and a command ends***

In 1926, Williams had mandated the use of parachutes by all aircrew. While Flying Officer Ellis Wackett – who would later lead the post-war Technical Branch and contribute a great deal to the cause of airworthiness and military aviation safety during the war as the organisation's most senior engineer – is credited with making the first parachute descent in Australia, Williams decided to lead by example and jumped over Point Cook on 5 August, apparently narrowly missing the water tank and a power substation!

The safety record of the RAAF in the 1920s and 30s was dismal. Initially, this was partly due to the ageing 'Imperial Gift' fleet. It should be noted that aircraft of this period were not made from materials that have the longevity of contemporary equivalents. There were no Configuration Management Systems to record maintenance and modifications so there was no way of knowing how many times a strut may have been replaced and what impacts that may have had on structural integrity and other factors of airworthiness. Also, aircraft designed during the First World War were often rushed into service with little expectation they would operate for more than a few months, or even weeks. Some were obsolete as soon as they became operational. Every one of the S.E.5a airframes in RAAF service crashed at some point, some multiple times, such as A2-13 which seemed to live up to the superstition of its number and crashed in 1922, 1924, 1925 and 1926 before it was retired.

Examples of the terrible safety record of the fledgling RAAF are numerous. At a practice session for an airshow at Flemington racecourse in December 1924, four aircraft were damaged in quick succession and the derisive laughter of onlookers led to a frustrated Flight Lieutenant Arthur Hempel challenging any takers to a fight. Six months later four of ten aircraft were damaged during crashes when No 3 Squadron deployed to Point Cook. In April and May 1927, there were two RAAF flypasts to mark the visit by the Duke of York – one in Melbourne and one in Canberra.

The flypast in Melbourne on 21 April saw two aircraft from a formation of five collide. Four airmen lost their lives. The Air Force launched an internal investigation which exonerated all involved despite rumours of alcohol consumption, but the Government established an independent Air Accidents Investigation Committee in response. This organisation was the first official air safety organisation tasked with investigating accidents and promoting air safety in Australia. Ironically, in 1929, the secretary was a Flight Lieutenant Thomas Swinbourne who crashed a Cirrus Moth (A7-19), killing a fellow officer and receiving severe burns as he attempted to rescue his colleague.



At times the carnage took on almost surreal qualities. Another Moth (A7-8), flown by Sergeant Robert Somerville, hit and killed his future father-in-law. He was initially charged with manslaughter, but this was subsequently rescinded and he regained his wings, only to die in yet another crash. The distress of his fiancée can only be imagined.

The second flypast to mark the Duke of York's visit involved 24 aircraft at the opening of Parliament House in Canberra in May 1927. On this occasion, S.E.5a A2-24 dived into the ground approximately 600 metres from the assembled dignitaries. The crash sent a cascade of dust some 15 metres into the air and the pilot, Flying Officer Francis Ewen, later died. This sad and very public tragedy was in many ways emblematic of the troubles plaguing the RAAF. The flypast saw almost all available RAAF aircraft assembled, including five S.E.5as from Point Cook. One of these ground-looped at Cootamundra and was rendered unserviceable, and three others suffered crashes during practice sessions which put them out of action. Fortunately, five from RAAF Base Richmond were available for the flypast. The District Coroner, Mr John Gale, found the crash of A2-24 'inexplicable' and no blame was apportioned. Flying Officers Sydney Moir and Howard Fletcher were also both in the formation and observed what happened. Ewen left the formation in what appeared to be a stalling turn and, according to Moir, if he had engine trouble, he had ample time to rectify the problem. Ellis Wackett, who was now a flight lieutenant, inspected the wreckage and found no evidence of any defects in the controls. The machine had been overhauled just a week earlier. The tragedy prompted a condolence letter from King George V.

The last remaining operational S.E.5a from Point Cook (A2-11) was then tasked with flying the official photographs to Melbourne; this aircraft also crashed. The pilot, Sergeant Orm Denny, recounts that he ran into a storm which he tried to bypass. His official pilot's report of the incident, now held by the RAAF Museum, states:

I was detailed to fly the one and only Point Cook S.E.5a back to Point Cook and set off from Canberra around 0900 hrs with the important cargo of the official photographs of the Canberra ceremony which were to be included in an album for presentation to the Duke of York before he left Australia.

...

I refuelled at Cootamundra and not long after take-off saw a heavy storm coming up so decided to fly around it. I should perhaps say here that our training ... for instrument flying was almost nil.

Denny found himself off course and in the vicinity of Mount Buffalo when he noticed his oil pressure dropping. 'It was not long before it failed and my engine seized ...' With no clearings in sight, he brought the aircraft down in 'the heaviest foliated tress' he could see and hoped for the best. After being knocked unconscious, he recovered and made his way out on foot. Although the wreckage was eventually discovered 36 years later in April 1963, the photographs were never recovered.

Richard Williams was acutely aware of the problems facing the RAAF and wanted to advocate for a major upgrade to equipment and expansion of the service. He still faced considerable resistance from the Army and Navy and reasoned that if he had the support of a very senior RAF officer his plans would gain traction with the Government. He anticipated a suitably experienced and respected senior RAF officer would reach similar conclusions to his own and report accordingly. In March 1927, it was confirmed that Air Marshal Sir John Salmond would undertake a review of the RAAF, including its safety record. He arrived at Fremantle in Western Australia on 26 June 1928 where Williams was on hand to greet him. He remained in Australia for almost three months and left on 20 September after providing a report in two parts. The first looked at the equipment, training, organisation, administration and development policy of the RAAF while the second remained secret and provided advice on potential deployment of the RAAF in defence of the Commonwealth. The first part was made public and presented a picture of the RAAF that was predictably unflattering. Salmond assessed the new force as being unfit for warfighting with a low standard of training, obsolete and worn-out equipment, and poor conditions of service which had seen 15% of personnel leave in the preceding two years alone. Salmond's proposals were, however, less than what Williams had hoped for, advocating for only a fairly modest scheme of growth and improvement. This included three permanent squadrons and one Citizen Air Force squadron, two coastal-reconnaissance flights, two flights of fighters, another stores depot, and a training wing at the Royal Military College.

The media seized upon the report with an article in Queensland's The Telegraph newspaper on 8 October citing detailed quotations from the report concluding the RAAF was 'totally unfit to undertake war'. The Sydney Morning Herald also quoted Salmond's report on 8 October in which he stated:

Due to the obsolete type of service machines in use throughout the Air Force, to the entire absence of any reserve equipment, and to the low standard of training in these operational units, I have to report that I consider that the RAAF would be totally unfit to undertake war operations.

Melbourne newspaper The Age also editorialised on 9 October that Salmond's report revealed a disturbing lack of operational readiness with major deficiencies in training and equipment. However, reportage was quick to exclude the regular officers and men of the RAAF from blame.

As leader of the RAAF, Williams was very much responsible and quickly went on the defensive. On 11 October, he wrote a minute to the secretary of the Defence Department addressing the media criticism, stating that he felt it was necessarily selective. Salmond had, however, included a caveat in the covering letter of his report which conceded the criticisms that it contained but acknowledged the immense challenges of creating a new force from scratch in a constrained environment. He provided praise for those who had worked to establish the force and observed a firm basis had been established. It provided Williams with a level of support for his agenda but fell short of what he had hoped for.

It also provided a precedent for another review by a senior RAF officer which would effectively end Williams's command a decade later.

Another factor contributing to the RAAF's poor safety record seems to have been operator culture. Between 1921 and 1936, the average number of officers was only slightly above 80, creating a very intimate environment that historian Chris Coulthard-Clark likened more to a 'social organisation' than a military formation. Of the 18 officers who were squadron leaders or higher in 1927, 13 had won at least one award for valour, putting them, in some senses, beyond criticism. As historian Alan Stephens notes in his history of the RAAF:

... The ethos of the pilot as the omnipotent arbiter of anything to do with Air Force became an article of faith. The main casualty of that narrow attitude was flight safety. Members of a club are disinclined to criticise each other professionally and it seems probable that a causal relationship existed between that comfortable atmosphere and the RAAF's disturbing accident record.

Fred Scherger, who later became a senior leader of the RAAF, was one of the organisation's top pilots in the 1930s and apparently had a penchant for low-level inverted flying, sometimes over large crowds. He was skilful enough to get away with it, but not everyone did. On 5 January 1930, a Flying Officer Ryan crashed his Cirrus Moth (A7-10) doing unauthorised low-level flying and died of his injuries. According to Stephens, all too often 'senior officers almost invariably turned a blind eye or more commonly tacitly endorsed such tactics.'

Despite the formation of the Air Accidents Investigation Committee, the safety record of the RAAF during the inter-war period did not improve. Between 1921 and 1937, the RAAF suffered 56 flying fatalities. In 1937, there were a series of crashes involving Hawker Demons that resulted in one death and four injuries. The media continued with scathing attacks upon the Air Force. Williams's leadership was subsequently severely damaged by a report on safety written by Marshal of the Royal Air Force, Sir Edward Ellington. This report was commissioned by the Government and undertaken with no consultation with the Air Board, the controlling body of the Air Force, reflecting the cool nature of the relationship with the Government which had developed by that time. This report was used to effectively banish Williams to Britain where he became Air Officer Administration at Coastal Command under the command of Sir Frederick Bowhill. He was later promoted to the rank of Air Marshal – the first Australian to achieve this rank – and continued to serve with distinction until 1946 when he was forced to retire. Williams never again led the Air Force. Many commentators and historians agree it seemed a shabby way to treat a man who had done so much to develop the RAAF from its early origins and contributed so strongly to Australia's security.

Ellington's report was in fact fairly positive in many regards according to Shaft of the Spear by Gregory Grantham and Edward Bushell, a detailed analysis of RAAF technical capability in the period leading up to and including the Second World War. This was especially true in his assessment of the RAAF's engineering and maintenance capability. In support of this, Grantham and Bushell cite his report which partially stated:

I have paid particular attention to the maintenance of aircraft during my inspection. I consider the maintenance good and I have been much impressed by the quality of the tradesmen in the Royal Australian Air Force. The majority of tradesmen have done a five year apprenticeship before enlistment. This and the training they undergo after joining seem calculated to ensure a high standard of workmanship in their part.

However, it was clear the RAAF was lagging in terms of its overall approach to aviation safety, continuing with RAF practices prior to 1936 and residual experiences from the First World War.

### ***Mired in the past***

While operator culture was a very real factor in the crashes that plagued the RAAF during the inter-war period, approaches to airworthiness and safety were also a factor and drew heavily from wartime experiences. Maintenance capabilities were fully integrated with squadrons and there was essentially a two-tier approach. Pilots were expected to be responsible for overseeing technical maintenance work on their own unit's aircraft, undertaken by suitably qualified tradesmen. Squadron flight commanders were responsible to the commanding officer to ensure maintenance was undertaken. Usually this involved an overhaul every 180–240 flying hours. Periodic inspections were also undertaken at this level. Beyond this was deeper maintenance which involved sending the aircraft to one of two depots established for such purposes. However, there was no clear and generally accepted definition of when this deeper level of maintenance would be applied.

This approach flowed from wartime practice and had some advantages. It created a good sense of morale as pilots and technical personnel had to work closely together. It also fostered a strong sense of personal responsibility as a failure could result in injury or the death of a pilot with whom technical personnel had a close relationship. While it worked to some extent with older aircraft types, the increasing complexity of aircraft exposed its weaknesses. It relied upon pilots paying close attention to detail and accurately recording flying hours. In the generally relaxed post-war period, when some described the Air Force as a 'Gentlemen's Flying Club', it would be fair to say this kind of attention to detail was not always present; this general vagueness around requirements for the second level of deeper maintenance would prove to be a major problem. In short, by the late 1930s, the RAAF's approach to airworthiness had not kept pace with best practice and, despite the high level of expertise demonstrated by technical personnel, it was Williams who was ultimately held accountable.



## Rapid growth

The Government had envisaged a fairly gradual increase in Air Force capability in the late 1930s but with the outbreak of war it was clear the predictions of Britain's inability to supply a great deal of aviation hardware would be confirmed. A US arms embargo further compounded issues and almost immediately it became clear Australia would have to be able to defend itself and be as self-sufficient as possible. The stern test of war showed that the technical elements of the RAAF would be up to the challenge and a large part of its success must be attributed to the leadership and lateral thinking of Ellis Wackett, a Wing Commander by 1939.

As we've seen, Wackett was the first Australian military aviator to make a parachute descent and subsequently established parachute training in the RAAF in the latter half of the 1920s. In 1928, he became Director of Technical Services within the Supply Branch and thus became the organisation's senior engineer. When war broke out, faced by a critical shortage of aviation materiel, especially spares, he showed typical Australian ingenuity and set up facilities to retrieve parts from damaged aircraft and also drew heavily upon civilian repair capabilities. His brother Lawrence – a former squadron leader who now headed the Commonwealth Aircraft Corporation – provided an important civilian counterpoint. The relationship between the two brothers was pivotal not only for sustainment but also the local production of aircraft and was emblematic of the close relationship between military and civilian capabilities that proved vital in Australia's successful prosecution of the war effort.

With the establishment of Eric Harrison's vision of an Australian AID, and a major reorganisation of RAAF technical services to cater for an Air Force expanding at an unimagined rate, 1940 would prove a pivotal year. By late 1940, Ellis Wackett was a group captain and part of the Flying Personnel Research Committee, a multi-disciplinary body dedicated to studying a range of factors influencing aircrew safety. In 1941, he joined the Government's Aircraft Advisory Committee, set up to assist the Director General of Aircraft Production, as the RAAF representative. The committee also included his brother Lawrence as Chief Technical Advisor. The two then teamed up to advise the government on progress in aviation technology as part of the Australian Council for Aeronautics. Promoted to air commodore, Ellis was appointed Air Member for Engineering and Maintenance in June 1942 and sat on the Air Board – the controlling body of the RAAF – in that role. This role had come into being as a result of the reorganisation that created some jurisdictional ambiguities around different aspects of airworthiness. It provided a vital voice for all aspects of airworthiness, maintenance and sustainment at the most senior organisational level. Ellis would continue being a member of the Board for around 17 years, providing an almost unprecedented continuity of technical expertise and overseeing a period of vast and rapid expansion.





## ***Getting organised***

By the late 1930s it was accepted Britain would not be able to supply all, or even much, of the materiel needed to defend Australia from attack. A Home Defence Force was envisaged but, as it turned out, this had to be balanced against the demands of the Empire Air Training Scheme which was intended to quickly train aircrew needed by Britain in all theatres of war, principally Europe. There was even a flirtation with the idea of sending six squadrons to Europe. Deeper maintenance capabilities were established within civilian contractors. As organisational change proceeded, technical policies and procedures were revised and this change, which had started at headquarters level, started to be felt in the squadrons.

Planning for the expansion had begun in 1938. By November 1939, junior ministerial portfolios were created for each of the services. The Air Board consisted of four heads of branches with technical and inspection services located within the branch of the Air Member for Supply.

In March 1940, the Air Board was expanded to include a fifth member, the Director General of Supply and Production. The position of Air Member for Supply was abolished and a new position created – the Air Member for Organisation and Equipment. The technical capabilities were now to be shared between these two positions. This resulted in some ambiguities over responsibility for different aspects of technical and sustainment capabilities. This issue would persist until June 1942 when Ellis Wackett assumed overall control of the technical capability as the Air Member for Engineering and Maintenance.

Integral to these challenges was a critical shortage of suitably qualified and experienced technical personnel. More positions had been created for technical officers and, by September 1940, recruitment efforts had begun to pay off. Technical positions were divided into specialisations, such as armaments and engines, expanding from five to more than a dozen. A sharp distinction had emerged between the engineering functions within Technical Services which focused on what we would now term design approval, inspection, evaluation, development and modification of aircraft, and maintenance.

In June 1942, with Ellis Wackett as the Air Member for Engineering and Maintenance, a separate Directorate of Aircraft Maintenance was established; this worked closely with civilian contractors. The supply of spares was an ongoing problem, compounded by the nature of the mixed fleet operated by Australia, sourced from Britain, the US and locally. A close relationship with industry and the ingenuity of Ellis Wackett went some way towards mitigating this issue but it remained problematic for the duration of the war. Technical specifications and maintenance plans were also developed that defined precise timings for maintenance activities for different aircraft types. Technical personnel now had specific guidelines and time frames to work from in contrast to the somewhat ad hoc pre-war approach. It was fortunate Australia did not face a direct threat during the 1939–41 period as the Home Defence Force was nowhere near ready. This time was used productively to build a credible technical capability that could deal with a massive

expansion and the impact of wartime attrition. Recruitment of technical personnel was so successful the Air Force had a very temporary oversupply in mid-1941 which resulted in a transfer to civilian industry.

The close relationship of the Air Force with industry meant these personnel were not lost to the war effort. In 1939, the RAAF had less than 250 obsolete aircraft. By 1945, it briefly became the world's fourth largest air force with 5,627 aircraft, most of which were contemporary technology for their time. During this period, the RAAF had trained over 18,000 technical personnel from scratch and provided additional education for some 35,000 who had initially come from outside the Service. Ellis Wackett's leadership of the technical capability of the RAAF cannot be underestimated; a very good example of this was the locally built Beaufort bomber.

## ***A Beau-tiful aircraft***

The Beaufort project demonstrated how well the military and civilian contractor relationship worked, but it also presented a technical challenge of the highest order; it is a credit to the RAAF's capabilities that the problems were addressed. Against the standards of the European theatre the Beaufort was not the most capable aircraft in its class, but operations in the Pacific were a very different proposition. Air to air combat was often carrier based and the US Navy was able to fight these battles effectively, progressively degrading Japanese carrier based capability. The US Army Air Force and RAAF efforts also contributed to an increasingly favourable outcome in the air war in the Pacific with a strategy of pushing fighter bases forward as part of advances, which combined with a low density of Japanese anti-aircraft artillery and fighters, made for generally favourable conditions for an aircraft like the Beaufort. The vast distances in the Pacific also meant that air to air contact was more intermittent. Against this backdrop the Beaufort proved to be a very successful long-range reconnaissance bomber, able to inflict effective damage on Japanese ground and seaborne forces. Australia was to eventually build around 700 examples. It required about 40,000 separate parts and manufacture was distributed to some 700 contractors. The local version, however, featured a modification to the rudder and, soon after its introduction, it became apparent there was a fault with a component in the rudder and elevator trim tab actuator.

Maintenance of the Beaufort was always problematic at an operational level. There was a continuing shortage of suitable trestles and jigs so 44-gallon drums were often used, adding considerably to the time taken for routine maintenance. Typically, engine changes required four days while the mandated 240-hour airframe inspections could take from three days to as much as 20 depending on the extent of the work required and availability of spares. However, it was the loss of nine aircraft and all aircrew in quick succession that drew attention to a fundamental fault which was later determined to be the cause of eight of the losses, the ninth being due to weather conditions. Faulty maintenance and



inspection procedures were blamed for not detecting the problem sooner. During the investigation process, it was ascertained the Breeze Actuator design was faulty and that extant inspection procedures had been inadequate. It also became clear some technical personnel at squadron level were not heeding mandated procedures, which is perhaps not surprising in a wartime context. It was also determined there were other issues with the Breeze Control Units and these faults were identified and rectified with new inspection and maintenance procedures, and improved components introduced to the entire fleet. The unnecessary loss of aircraft and lives is a terrible thing but, with the organisation under tremendous pressure from the demands of war, and the local manufacturing capability still very much finding its way, it is testimony to the competence of the Technical Services in general that the Beaufort program was such a success and played a significant role in winning the war.

### ***Ugly but ours***

The story of the only fighter aircraft to be designed and built in Australia to date – the CAC Boomerang – is further testimony to the adaptability and success of the local design and manufacturing capability in wartime. Lawrence Wackett, the head of CAC, envisaged a locally made fighter aircraft taking the place of British and American aircraft committed to theatres in the northern hemisphere. The whole process of conceptualisation, design, testing and manufacture ran from December 1941 to July 1942, with the aircraft being ordered prior to any prototype test flight – effectively straight off the drawing board. The fact that it entered service in the latter half of 1942 speaks volumes for the effectiveness of the design, technical acceptance process and local manufacturing capability. It was not a great fighter by any standards but, as the Japanese were progressively driven from the skies, it found success as a ground-attack aircraft. It certainly was not that beautiful to look at either, but it got the job done and it was ours. Perhaps more than anything else, it symbolised the success of the Wackett brothers in bringing together the military with civilian contractors in the nation's time of greatest need, and the success of their vision for a mature military aviation engineering and technical capability.

### ***Technical excellence, sobering losses***

During the Second World War, the Air Force had grown rapidly, and by war's end some 37,000 aircrew had served, and 5,627 aircraft were in its inventory. The Technical Services

Branch oversaw engineering and maintenance activities and is generally regarded as having performed very well. In *Shaft of the Spear*, Grantham and Bushell conclude that:

... Whatever its shortcomings, the Technical Services Branch, in its de facto wartime guise as the Technical List, did a remarkable job during the Second World War. It expanded successfully to provide the essential maintenance effort needed to support aircraft operations on a worldwide scale ... technical excellence and a readiness to adopt advances in military aviation technology, was one of the hallmarks of wartime RAAF success.

It is a sobering reminder, however, that 2,832 aircrew were killed during training in Australia with a further 724 killed training in Britain. This is a similar rate of loss to the First World War – roughly 10% – and it is likewise difficult to assess how many combat losses may have resulted from aircraft failure as well. The sheer carnage of the war made these sorts of losses evade the kind of scrutiny Williams came under during peacetime; however, with the onset of the jet age and improved levels of technology per capita, non-operational losses actually increased substantially. This was not an experience unique to Australia. As we shall see, losses of around a quarter of a fleet became an accepted norm globally. Against this backdrop it took a sharp rise in accidents decades later to trigger much needed change and usher in a period of safer military aviation.

### ***A sad coda***

The end of the war brought finality in more ways than one. The man described by the Chief of the Air Staff, Air Marshal Sir George Jones, as being overbearing, Eric Harrison, died at the age of 59 three weeks after the cessation of hostilities in the Pacific. He had been unwell for some time, but it was still a shock to his colleagues. His contribution to military aviation and Australia's security is incalculable. He was the first military aviator in Australia, the first chief engineer, commanding officer of the inaugural flying school, and the first officer to lead an operational deployment, albeit one that saw no 'action'. Harrison accumulated so many pioneering firsts – including the first ever military aviation incident – it is almost impossible to imagine in the present day. He was integral to the growth of Australian military aviation capability from a sole functioning Boxxkite to a force of 5,627 mostly contemporary aircraft. To this day his legacy is debated; some maintain he is the more deserving of the title of 'father' of the Air Force than Richard Williams. The media certainly portrayed him that way at the time with *The Argus* running an article on 7 September 1945 simply titled 'Father of RAAF dies'.

There is still conjecture about whether he retained the airworthiness certification delegation at the time of his death, something most people assumed was held by Ellis Wackett, as the organisation's most senior engineer, but this may not have been

the case. However, there can be little argument Harrison single-handedly took control of Australia's earliest attempts to grapple with airworthiness. He ensured a steady supply of high-quality pilots while fulfilling multiple engineering, design, acceptance and test roles. When the Second World War came, he played a vital role in establishing an organisation that provided the design, quality assurance and acceptance services essential to wartime success. The AID continued until 1960 when it became the Directorate of Quality Control, before changing its name once more in 1963 to the Quality Control Branch. Harrison's legacy towers over the organisation and his untimely demise provides a sad coda to the RAAF's successful prosecution of the war effort.

## ***New beginnings***

The end of the war marked a time of new beginnings with both the Army and Navy building significant aviation capabilities. The post-war period saw the establishment of the Navy's Fleet Air Arm and a carrier-borne capability that continued into the 1980s. The cost was high, however, with half of the A-4 Skyhawk fleet and well over half of the earlier de Havilland Sea Venoms lost in accidents. The Army's aviation capability gradually developed from just five pilots involved in the Korean War to the establishment of the Army Aviation Corps in 1968, and the transfer of rotary wing capability from the RAAF in the mid-1980s. As we shall see, however, military aviation reached a crisis point, which it had been building to for at least two decades, in the late 1980s and while the RAAF had the lead role as the primary aviation capability, the eventual solution would have to involve all three Services and look to global best practice.

## ***The path to a crisis***

The immediate post-war period saw some significant changes which would have relevance to the safety crisis that afflicted the Australian Defence Force (ADF) decades later, and the subsequent response. In 1945, the Directorate of Flying Safety – Air Force was established and its lineage can be directly traced to current organisational constructs. The Directorate was established by Group Captain John Lerew, a qualified engineer and a Distinguished Flying Cross recipient known for his personal bravery in combat. He earned some notoriety when he responded to an order in January 1942 in which he was instructed to hold Rabaul and keep the airfield open against overwhelming Japanese forces. Lerew had signalled headquarters *Morituri vos salutamus*, which required an officer conversant in Latin to translate as 'We who are about to die salute you!' It was a

defiant attempt to recall the phrase reportedly used by gladiators about to fight in front of the Roman emperor. The implications of his dark humour were not lost on his superiors, but he managed to save most of his personnel and live to fight another day. In February 1942, he led a raid in New Guinea, was shot down, and survived nine days before making his way to safety.

In March 1944, Lerew took part in an investigation into the crash of a Hudson light bomber carrying a senior Army officer, Major General George Vasey. His findings suggested the pilot's inexperience in instrument flying had been a factor and he recommended more training in this skill for pilots. He was promoted to group captain and established the Directorate of Flying Safety in June 1945, serving as its inaugural director. He was all too aware of the feud between the two most senior officers, Air Vice-Marshal George Jones and Bill Bostock, and hence argued for the new directorate to be placed directly under Jones's control as Chief of the Air Staff. Importantly, Lerew believed aviation safety should be approached holistically with consideration of technical, administrative, and operational factors; hence the new directorate would have access to information from all other directorates.

In 1946, Lerew applied for a position with the recently established Provisional International Civil Aviation Organization (PICAO) while still Director of Flying Safety in the RAAF. PICAO offered him the position of Technical Officer, which he accepted, leaving the RAAF on 8 November. He emigrated to Canada and went on to hold a number of senior roles with the organisation, which became the International Civil Aviation Organization (ICAO) in 1947.

In 1948, Technical Services was recognised as a separate branch of the RAAF and Ellis Wackett assumed control of the new entity. One of his first priorities was to initiate an apprentice scheme that would develop the technical personnel the organisation would need as the jet age dawned. Whatever issues the Air Force may have faced in terms of policy and organisation in the following decades, there is little doubt the quality of its technical personnel continued to be of a high standard; much of this can be attributed to Wackett's foresight. He was the senior engineer on the Air Board from 1942 until 1959, with his position being retitled 'Air Member for Technical Services' when the Technical Branch was formed in 1948. His 17 years on the Air Board was not only a record but provided valuable continuity as the organisation transitioned into the jet age. The title of the most senior RAAF engineer changed in 1979 to 'Chief Air Force Technical Services' and the Technical Branch continued until 1989 when the position was disestablished as part of the Sanderson Review which ushered in significant organisational changes. As we shall see, the late 1980s and early 1990s saw the emergence of high losses which prompted further organisational change and new approaches to managing military airworthiness. However, we must now turn our attention to the lead up to this crisis point.





## *A dangerous business*

Post-war military aviation continued to be a dangerous business in the 1950s and 1960s with the introduction of the first and second generations of jet-powered military aircraft. The notion of military aviation airworthiness and safety remained firmly mired in the past. Post-war, the RAAF decreased in size rapidly and considerable technical expertise gained during the massive wartime build up atrophied. The Government decreed that the Air Force had to shrink considerably but guidance was limited, hence a slightly chaotic period ensued until the formulation of policy for an 'Interim Air Force'. It can be argued some important careers were ended prematurely, and experience levels diminished through poor management of resources, but this needs to be balanced against the enormous strain placed upon the nation by a truly global conflict that threatened its sovereignty, and the need to restructure and progress combat-experienced officers to more senior roles. The effectiveness of aircraft carrier-based capabilities as used by the United States, Great Britain and Japan were also a salient lesson of the war and resources were being directed towards establishing a carrier-based task force in the Navy, leading to the purchase of two light carriers from the British and the establishment of the Fleet Air Arm in 1947. The first carrier – HMAS Sydney – was handed over to the Navy on 16 December 1948 and, in May of the following year, it arrived in Australia, complete with embarked squadrons of Hawker Sea Fury fighters and Fairey Firefly reconnaissance/strike aircraft. A memorandum from the Department of Navy dated 4 February 1949 stated, in part that 'The Naval Board have had under consideration the question of the provision of an Aeronautical Inspectorate to cover the survey, repair and manufacturing work carried out in respect of Naval aircraft, components, stores and materials.' A Navy specific capability was not considered viable due to resource constraints and advice was sought as to whether a joint capability or some other arrangements would be organised. A joint approach was apparently not seriously considered and Minister for Navy Len Heathcote advised Wackett to allocate AID personnel to cater for the Navy's requirements. This was confirmed on 21 April 1949 and the AID thus took on responsibility for the inspection, acceptance, design issues and airworthiness of Navy aircraft. Interestingly, the authority for the airworthiness of Navy aircraft never resided with Wackett, despite the AID providing the technical expertise. Heathcote retained this authority as minister.

By the time of the Korean War in 1950, the Navy was able to deploy air power in the conflict in the ground attack and escort roles, while the Army now had five pilots assisting with artillery spotting and reconnaissance. The Air Force, however, was in a similar position to the pre-war period with obsolete aircraft, not enough personnel and pilots, and a technical capability that was severely stretched. Nonetheless, the RAAF performed admirably with US General Douglas MacArthur making special mention of the efforts of No 77 Squadron who relentlessly threw their Second World War-vintage Mustang fighters into the fray in the ground-attack role. He credited them with playing a significant part in turning back the Communist tide. The squadron completed its last combat sortie with the Mustang on 6 April 1951 before converting to the British-made Gloster Meteor jet, returning to operations with the new type on 29 July. However, the Meteor lacked the swept wings of the North American Aviation Sabre or the Russian-built MiG-15, or even



its Second World War contemporary, the Messerschmitt 262, and was judged by aircrew to lack the necessary combat performance of a credible fighter when pitted against the MiGs. As a result, it was essentially deemed an obsolete design. The squadron saw out the war flying escorts or ground attack, but still managed to claim five MiG-15 kills with Flying Officer Les Reading making the squadron's first confirmed kill of an enemy jet fighter on 27 October 1951. The squadron's impact was significant enough to earn a South Korean Presidential Unit Citation for 'exceptionally meritorious service and heroism'. With the majority of RAAF losses due to ground fire rather than any technical issues, it can be argued that Technical Branch delivered in terms of maintenance, technical support and sustainment during the conflict.

### ***Mired in the past again***

In the following decades, despite significant increases in aircraft capability and complexity, the Air Force's approach to management of airworthiness and safety did not change much beyond wartime attitudes and the acceptance of high accident rates. To provide some context, it is worth noting the global situation was not much better and in some cases was much worse. Tom Wolfe, author of *The Right Stuff*, cited US Navy statistics indicating that, across a 20-year career in the post-war period, a US Navy pilot had a 23% chance of dying because of an accident; this did not include combat deaths. The 'Military Aviation News' section of *Air Pictorial* magazine for December 1959 quotes the US Air Force's Deputy Inspector-General for Safety of the Air Force, Major General Caldara, as saying that, in the previous five years, '... the USAF had lost 3,471 pilots and 7,062 aircraft in accidents ...', of which two-thirds 'should never have happened'. That amounts to approximately 700 pilots and 1,400 aircraft lost each year, or two pilots and four aircraft each and every day! To give an example of an individual aircraft type used by Australia, of the 3,947 Gloster Meteors produced and operated globally, 890 were lost in crashes that resulted in 444 aircrew deaths. Another example is the Royal Canadian Air Force's fleet of Lockheed Starfighters which experienced 110 crashes and 37 pilot deaths. An attrition rate of around 25% of a fleet was fairly standard for the first two generations of jet-powered military aircraft, although the Supermarine Scimitar had the distinction of an attrition rate slightly above 50%. Indian MiG-21s built between 1966 and 1984 also had a more than 50% attrition rate. More than half the 840-strong fleet crashed and, since 1970, 170 Indian pilots and 40 civilians have been killed. It could be argued that military aviation had never been so dangerous.

The Australian experience was every bit as confronting as the global one when it came to jet-powered military aviation. Of the 113 Meteors delivered to Australia, around 60 were destroyed in combat and accidents. As mentioned briefly earlier, 21 of the 39 de Havilland Sea Venoms flown by Australia's Fleet Air Arm were involved in crashes, as were ten of the Navy's 20 Douglas A-4 Skyhawks. Of the 116 Dassault/Government Aircraft Factories

Mirage IIIs operated by Australia, over 40 crashed, resulting in the loss of 15 aircrew and one civilian. Since 1980, the ADF has lost 89 aircraft, although the McDonnell Douglas F/A-18A/B fleet had a far better record with four crashes out of 75 aircraft during the type's 35 years of operation. However, the ADF reached its crisis point in 1991, with the loss of six aircraft, and more than 65 lost between 1980 and 1993. During this time, accidents were not the exception, they had become the norm.

What was the reason for this?

### ***Multiple factors***

The factors that contributed to this crisis are varied and at times enigmatic by contemporary standards. While approaches to military aviation airworthiness and safety during the 1950s might be described as 'business as usual' based upon the lessons learned during the Second World War, it was becoming very obvious that jet aircraft presented a different range of challenges. Part of the problem was operator culture. There was an expectation pilots would push the envelope and accept levels of risk to achieve operational readiness that seem foolhardy by today's standards.

This attitude had been a part of Air Force culture, to varying degrees, from the earliest days of the Australian Flying Corps. Wing Commander Roger Preston, formerly of the Defence Aviation Safety Authority, is one of a now rare breed – he is both an engineer and a pilot. His view is that:

It was a culture of 'can do' rather than risk management ... it was accepted that the more you pushed the boundaries the greater the risk, but pushing the boundaries was the accepted way of operating ...

He opines that this was simply considered 'the cost of doing business' and losses part of that 'cost'. A considerable attrition rate during training, and a non-combat loss rate thereafter, was a part of the experience of the world wars but, as we have seen, expectations during peacetime are significantly different. The 'father' of the Air Force lost his leadership role largely because of a series of crashes in the late 1930s; it seemed the Air Force was reaching another time of reckoning by the early 1990s.



## *An unfolding crisis*

In Australia, there were deeper organisational and structural issues which also contributed.

Air Vice-Marshal Ernie Hey had taken over the reins from Ellis Wackett as the RAAF's top engineer, holding the position of Air Member for Technical Services (AMTS) from 1960 to 1972. He focussed on creating new engineering policy, which included promulgation of some technical instructions, and took on the de-facto role of the RAAF 'Airworthiness Authority', albeit without an official delegation. There was no formally agreed definition of 'airworthiness' at this stage and the personal notes of Air Commodore John MacNaughtan suggest he believed it was 'common gossip' that any such definition was 'whatever Hey said it was'! This may be a little unfair. Airworthiness policy was based upon the British model and also drew on the technical expertise of the Aeronautical Research Laboratories, but it was clear the organisation was still grappling with a congruent definition. In the early 1970s, the majority of technical capability was located within Headquarters Support Command, later changed to HQ Logistics Command. The Air Board itself ceased to exist in 1976, replaced by a new Chief of the Air Staff Advisory Committee (CASAC) which was set up to develop policy and oversee administration. The title of AMTS was replaced by the Chief of Air Force Technical Services (CAFTS) but there was no requirement for the Chief of the Air Staff to accept either CASAC or CAFTS advice.

Wing Commander Stuart Nicol, formerly of the Defence Aviation Safety Authority, recalled problems in the 1970s of 'stovepiping' and a lack of a coordinated and overarching approach to how the knowledge base was managed. It is difficult to imagine a time when technical personnel had to seek permission from a superior to make a telephone call to discuss technical issues with a colleague, and even had to write a summary of what they wanted to discuss before they got approval. The sharing and comparing of technical information and experience was minimal at best. There was no formal process of 'type certification' and the technical information was often sparse, when an aircraft was delivered from the manufacturer, with maintenance schedules subsequently developed in consultation with industry. Aircraft were often serviced based upon a fairly minimal instruction set. Technical policy emanated from headquarters in Canberra while the implementation was the domain of Support Command or, later, Logistics Command. High-level Defence instructions were not matched by prescriptive material at a squadron level, meaning there was some subjectivity in how respective commanders interpreted and implemented them. Overall, it could be argued the approach to airworthiness was somewhat ad hoc and relied heavily on administrative processes, the quality of engineering and technical training, and local corporate knowledge. In the 1970s, with no agreed definition of military airworthiness, and technical roles spread across a number of specialisations that sometimes operated in isolation, it is perhaps unsurprising the organisation, and associated management system, was more susceptible to a potential disaster, despite daily safety contributions from individual engineers at the time.

## *Airworthiness defined and an emerging divide*

When Air-Vice Marshal "Tony" Dietz assumed the role of Chief Air Force Technical Services in the early 1980s, he set in train a series of actions designed to improve and better formalise the way that airworthiness was managed. Under his leadership a working party of two – Group Captain Greg Grantham and Wing Commander Ron Christie - plus two co-opted members developed a formal system for Configuration Management drawing on principles and procedures used by the RAF. The system functioned through the introduction of Configuration Management Plans (CMPs) for each aircraft type. An aircraft type is a constantly evolving entity in terms of replacement parts and modifications. Most importantly, the CMP defines how the aircraft configuration should be managed, including procedures to approve and track what aeronautical products and modifications have been used on it. Through a system of audits, it requires that the design is regularly checked against the specification, that the build standard reflects the approved design, and that in-service aircraft accurately reflect the approved configuration. Even non engineers should understand why this was important, especially in an age when some parts were still being machined by hand and in-service modifications were fairly common. This was at a time in the early 1980s when the Australian aircraft Industry was planning to design and produce a basic flying trainer aircraft, intended as a crossover trainer between the CT-4 and Maachi MB-326 jet aircraft. With the support of the RAAF, work began on the New Basic Trainer (NBT) project aimed producing a replacement aircraft called the Wamira. The initial Industry proposal essentially just envisaged a re-design of the earlier Commonwealth Aircraft Corporation (CAC) Winjeel aircraft to some rather dated Design Standards. However Dietz was very keen for it to be designed to the latest standards, both for aircraft systems and particularly structural design, thereby establishing an Australian Industry capability well setup to design and produce a future replacement for the Macchi jet trainer aircraft under the New Advanced Trainer (NAT) project. He had tasked his staff to define contemporary design standards to be applied to all future RAAF aircraft acquisitions in a document titled 'PD13 – Aircraft Design Criteria'. Although full development of this document stalled and was only further pursued in the mid-1990's during major reforms (which we will discuss later), nevertheless a significant change to proposed structural design standards and the need for a detailed Design Specification and a CMP challenged Industry's planned approach. The impact of Dietz' approach was immediate, confronting Industry with the need to lift its game to re-organise its design and development effort to ensure eventual airworthiness certification to updated design and certification standards.

In 1984, Dietz challenged the engineering cadre to develop and agree upon a formal definition of military airworthiness. He had in fact been championing this for well over a decade and had posted a draft definition on a board in his office in the early 1970s. According to Air Commodore MacNaughtan, this early attempt was viewed as somewhat esoteric – an aircraft had to be 'designed, constructed and maintained by competent people from a competent organisation'. MacNaughtan wondered about provisions for setting standards and measuring them, let alone other issues such as the operational aspects of an aircraft's use by the military. It was, however, an improvement on the simple

statement of just being ‘fit for safe flight’ – an expression that had been well used, most likely for about as long as aircraft had been flying. Sadly, Dietz died in service in early 1985 soon after issuing his challenge, but his proactive approach provided an important impetus.

A definition of around 70 words was formally agreed and issued in 1986. It evolved slightly over the next few years and by 1990 it read:

Airworthiness is a concept, the application of which defines the condition of an aircraft and provides the basis for judgement of its suitability for flight in that it has been designed, constructed, maintained and expected to be operated to approved standards and limitations by competent and approved individuals, who are acting as members of an approved organisation and whose work is certified as correct and accepted on behalf of the RAAF.

Air-Vice Marshal Noel Schmidt, who would become the first Director of Technical Airworthiness in November 1993, recalls a very different definition being used by some cynics during the 80’s. “Airworthiness is a thirteen letter dirty word used by engineers to promote the pre-eminence of the Engineering Branch in the RAAF”. This highlighted some deep tension and suspicion particularly among some senior operational staff over the perceived motivations by senior engineers to better define and codify the term “airworthiness” in a military context. Some no doubt were concerned they could lose control of when and how aircraft could be operated. Schmidt was a Wing Commander at the time and building a reputation as a “go to” person for emerging thinking on airworthiness. He recalls working closely with his two bosses at the time, Group Captain (later Air-Vice Marshal) Mac Weller and Air Commodore MacNaughtan, developing updated airworthiness policy. AVM Weller later reflected that it was only in 1987/88 that “serious airworthiness policy development started” which would provide some foundational principles that would guide the significant changes in RAAF airworthiness and engineering management in the early 1990s.

These included formal appointment of a RAAF Airworthiness Authority and the establishment of a new entity called an Airworthiness Board (AwB), with the first AwB considering the Boeing 707 aircraft (recently modified as a tanker) being held on 9th May 1991. Policy and processes for formal Type Certification of all aircraft types were also established.

Schmidt was also well aware of a divide between engineers and operators with the latter mistrusting the technical side of the organisation in some instances. He believes that this was due to the perception by operators that, if engineers were given too much power, they could ground aircraft for reasons that operators might be prepared to accept as risks necessary to achieve operational outcomes. In other words, operators could lose control of how and when aircraft could be used. It was in this context that the idea of “mission readiness” was initially debated – an aircraft had to be technically ready to fly but the aircrew and mission imperatives also were a function of “airworthiness” according to this thinking. Schmidt was aware that while he could provide expertise in terms of

the technical elements of airworthiness, but the kind of actions operators might want to do with aircraft was a different issue. The seeds were being sown for a divide in how airworthiness would be managed with regard to technical and operational aspects. This proved to be unique to Australia and would pose considerable challenges in the second decade of the new century when an international approach based on European standards that had no such distinction would be adopted. However as we have seen this was not a new challenge. In 1917 a pilot took off with insufficient fuel in his aircraft, ignoring warnings from ground crew resulting in a crash and his observer’s death. The divide between operators and the technical personnel was still deeply entrenched.

The crash of an RAAF Boeing 707 on 29 October 1991, with five fatalities, provided a good example of how operator culture could lead to an accident. It also underscored to some the need for a more disciplined approach to airworthiness that also took account of operational aspects. The B707 Board of Inquiry concluded that ‘... the instructor devised a demonstration of asymmetric flight that was “inherently dangerous and that was certain to lead to a sudden departure from controlled flight” and that he did not appreciate this.’ The Board noted there were deficiencies in the acquisition and documentation of B707 operational knowledge within the RAAF, combined with the absence of effective mechanisms to prevent the erosion of operational knowledge at a time when large numbers of pilots were resigning. There were deficiencies in the documented procedures and limitations pertaining to asymmetric flight in the B707 and a lack of fidelity in the RAAF B707 simulator in the flight regime in which the accident occurred, which, assuming such a requirement existed, required actual practice in flight. The Board found that ‘The captain acted with the best of intentions but without sufficient professional knowledge or understanding of the consequences of the situation in which he placed the aircraft.’ For some, this illustrated the need for an operationally focused element to airworthiness and that went beyond what technical personnel could offer. The reforms of the 1990s would embody this in two separate organisations – one dedicated to the technical aspects and the other for the operational aspects of airworthiness.

Wing Commander Preston had a useful perspective on the apparent divide between operators and engineers. He said that, during the 1980s, when concepts and definitions of airworthiness were being refined:

... There was a growing realisation that something was amiss ... that there was a safer way of doing business. The orders and instructions on airworthiness were at a reasonably high level with not a great deal of standardisation of procedures and approaches beneath that.

It was largely up to the judgement and common sense of commanders as to how they were implemented.

There was not an entirely congruent approach that would harmonise technical and operational elements, and this problem was becoming increasingly apparent.



## ***Impact on families***

An outcome often overlooked during the period of high losses that defined the late 1980s and early 1990s was the impact on families. On Friday 13 September 1993, an F-111 crashed at Guyra, killing Flight Lieutenants Jeremy McNess and Mark Cairns-Cowan from No 1 Squadron. The accident reinforced the fact that, in some cases, a definitive cause would prove elusive, and there could well be a combination of factors leading to a tragic outcome. Jeremy's mother, Jan, wrote a book – The Thirteenth Night: A mother's story of the life and death of her son – which was partly a catharsis and partly an attempt to hold the Air Force accountable for what she saw as multiple systemic failures. Writing about the book in The Age newspaper, Kathryn McNess described the circumstances that led to her brother's death:

Jeremy and his navigator died when their F-111 crashed 'at one thousand feet per second' in a simulated bombing raid over Guyra, NSW. Theirs was the first of three aircraft in the manoeuvre. It was a bleak night of gusting winds, rain and low cloud. They were flying low, at just over 120 metres. Jeremy was to pull the plane up at a certain spot but the manoeuvre was aborted. As the aircraft left the target area, it banked to the right, nose dipping until there was 'no way out'.

She added that the 'family's grief was aggravated by media coverage blaming "pilot error".' Her mother felt there were systemic problems the Air Force was not acknowledging and cited 'alleged RAAF failure to properly advise of a procedural change for night flight; lack of rapport with Cairns-Cowan on their second flight together; and that Jeremy had not flown the aircraft before that night' (by which she meant the specific aircraft, not the type itself).

Twenty years later, Jan McNess recalled in an Air Force alumni publication what it had been like visiting the crash site a week after she had lost her son:

It was a bleak windswept place.

... The sight of small orange ribbons as far as the eye could see noting anywhere a piece of aircraft had been discovered and covering an area of several square kilometres, or an enormous hole in the ground, of huge lumps of baked mud strewn about ... and of shattered trees and nothing but nothing that bore any resemblance to an aircraft.

The pain of her grief has never lost its immediacy. Jeremy had told her that 'If there is a God, I'll find him for you because, without doubt, I'm flying in His space.'

No parent should have to bury a child, but Jan especially struggled with losing Jeremy in peacetime circumstances that may well have been avoidable. In the Age article, Kathryn stated:

She has formed strong bonds with families of other pilots killed in F-111 crashes and her persistence is believed to have led to a review of procedures. In 1996, the Chief of the Air Force at the time, Air Marshal Les Fisher, wrote to the family that an inquiry had 'exposed some chinks in the systemic procedures that may have influenced the course of events'.

But it did not go far enough for Jan who stated:

I have a feeling that there will always be a discrepancy between what the Air Force thinks is enough and what the families think is enough ... It did not matter what I said or how often I said, 'We do not want your money. We want you to acknowledge the part that the system played.'

She has always maintained she was not interested in litigation; she just wanted an apology from the organisation her son loved so much.

Noel Schmidt points out that only two of the accidents of the period were determined to be solely due to technical issues, namely the crash of a Nomad utility aircraft in March 1990 (tailplane structural failure) and a Macchi jet trainer in November (wing structural failure). While a definitive explanation for the crash that took the lives of McNess and Cairns-Cowan remains elusive, the majority of the crashes of the period were a result of operator culture, and sadly it took this high attrition rate to instigate the process of major reforms. Separately, for the technical community, major change was about to come from the written equivalent of a hand grenade lobbed into the engineering organisation by a very senior engineering officer. Before we get to Air Commodore Peter Rusbridge's scathing assessment of Air Force engineering capability at that time, it is worth briefly looking at how the other two Services were situated.

## ***Army and Navy on different paths***

AAs we have seen military aviation in Australia got its start as a Corps within the Australian Military Forces (AMF), however with the creation of the Air Force in 1921 this capability was lost. By mid-way through World War Two a new impetus emerged as members of the Australian Imperial Forces (AIF) had been operating on RAAF aircraft as spotters for artillery. Towards the end of the war the government agreed that the AIF needed its own organic capability. This didn't progress during the war time period but from 1947 to 1951 a small band of Army officers trained as pilots in the UK, laying the groundwork for the establishment of an Australian Army Aviation Corps (AAAvn) in 1968.

From 1951, seconded Army pilots took part in operations in Korea, providing reconnaissance and artillery spotting duties. In 1953, seconded Army pilots deployed for the Malayan Emergency, and thereafter provided support to exercises. This experience led to the formation of the 1st Army Aviation Company at Bankstown. Defence then took the decision that the Army should have its own organic light aircraft element by 1958 but the RAAF resisted, citing concerns about the management of airworthiness. This was finally settled by 1960 with the RAAF taking responsibility for the oversight of airworthiness for Army aviation assets. On 1 December 1960, No 16 Army Light Aircraft Squadron was formed at RAAF Base Amberley, Queensland. It was equipped with the new Cessna 180A light aircraft and the Bell 47 Sioux helicopter and, on 18 November 1962, modern Army aviation's first operational deployment occurred when two Sioux and 11 personnel provided air support during a cholera outbreak in western New Guinea. In June 1965, the first training course for Army aircraft technicians was completed. In July 1965, No 161 Reconnaissance Flight was raised to deploy to South Vietnam in support of the 1st Australian Task Force. This was the first time since 1918 that an Australian Army aviation unit had been readied for war. On 1 July 1968, Australian Army aviation came of age with the formation of the Australian Army Aviation Corps, which would be based at Oakey, Queensland. After the withdrawal from South Vietnam in March 1972, the focus turned to surveying, but by the mid-1980s a strong debate had emerged concerning the Army taking control of all rotary wing aircraft. On 20 November 1986, the Chiefs of Staff Committee sitting in Canberra made the decision to transfer to Army ownership the new battlefield helicopter fleet then operated by the RAAF. This meant the 39 new Sikorsky Black Hawks were to be operated by the Army, although the RAAF continued to operate the 11 existing Boeing Chinooks until they were retired from service. Subsequently, a requirement for a heavy lift capability using Chinooks was re-identified and four were refurbished and reintroduced as Army assets. Two new Chinooks were later acquired to increase the fleet to six. Governance of airworthiness had, however, continued to be handled by the Air Force.

'Army Aviation went through a long fatality-free (in aircraft) period up to late 1983,' recalls Colonel Jeff Stark, a former Director of Operational Airworthiness at Aviation Branch, Headquarters Forces Command.

We had a fatality in a Pilatus Porter in December 1983 and then another in a Kiowa in October 1985. The root cause of the 1985 Kiowa Controlled Flight Into Terrain (CFIT) accident was never identified – an undergraduate student was low flying in a closed training area. There were many Category 4 and 5 accidents throughout the 1980s.

A 'Category 4' accident was one in which subsequent repairs would take more than a fortnight and a 'Category 5' involved the airframe being written off.

These accidents were seen as the 'cost of doing business' and in those days we weren't looking for systemic causes – just the usual old 'pilot error', 'mechanical failure' and so forth. We then had a fatality due to a wire strike in a Kiowa in 1987 but

still we did not look at 'deeper' causes. It was an accident like many others we'd had except this time someone died. For the next three years we did not have a Category 5 accident although we had seven Category 4s, but still no organisational concerns arose about our systems being weak.

At this time, the Army's aviation focus was on the imminent takeover of the Black Hawk fleet from the Air Force. 'Organisationally, Army was not "mentally" in the "space" of enhancing governance and trying to understand where we might be performing poorly,' said Stark who did a 'Standardisation' visit to No 5 Aviation Regiment in 1990 and saw some things that 'appalled' him:

There was no appetite for reflection within the command chain at that time and 5 Aviation Regiment continued on with 'business as usual' ... The lack of governance over the Black Hawk capability (we did not create a Black Hawk Standards Officer position until the early 1990s), and the budding technical problems with the Government Aircraft Factory (GAF) Nomad meant that real trouble was brewing.

In the period 1991 to 1994:

... All hell broke loose in the ADF aviation world. Army was heavily involved. We had multiple fatalities in a Nomad (accident cause unknown) then a fatal Porter accident (both in 1991) followed by a fatal Black Hawk accident in 1992. Suddenly, we'd gone from three flying fatalities in the past 20-odd years to eight in the past seven years. I believe it was at this time that Army started looking at Risk Management ... We felt that our systems approach to training was second to none. We produced very detailed Training Management Plans and Standardisation Guides for each aircraft and everyone was regularly checked that they operated within the guidelines. The issue was the rigorousness with which the checking was done, and the quality and influence of the people doing it.

Over the period of the late 80s and early 90s we did not have any system of meetings to analyse the key parts of the airworthiness puzzle. This was really the domain of the Corps Directorate and particularly of Standards Section. In 1990, the Corps Directorate was moved out of Canberra and merged with the headquarters of the Army Aviation Centre. This further eroded governance at a critical time for Army Aviation. Although we had been three years Category 5 and fatality-free when that decision was taken, when the troubles of 1991/92 occurred, the senior governance organisation was still struggling with bedding down its reorganisation remote from Canberra and was not well positioned to react.

It might be fair to say that, leading into the time of crisis for the ADF, the Army's aviation capability was not much better situated than the Air Force in terms of how airworthiness and safety was being managed. How did this compare with the Navy?

In the mid-1980s, there were three airworthiness authorities in Australia – the Civil Aviation Safety Authority, the RAAF and the Navy; all had taken their own path on airworthiness.



In June 1918 the Navy had lobbied for the formation of a Fleet Air Arm modelled on the British equivalent however this never eventuated with the RAAF taking control of all naval aviation with amphibious aircraft.

But the advent of the aircraft carrier and the successful application of carrier borne aviation in World War Two led to a decision that Australia would acquire such a capability. A post-war review by the Australian Government's Defence Committee recommended the Navy be structured around a Task Force incorporating multiple aircraft carriers. Initial plans were for three carriers, with two active and a third in reserve, although funding cuts led to the purchase of the two light fleet carriers and the establishment of the Fleet Air Arm in 1947. During the Korean War, HMAS Sydney was deployed to Korean waters in late 1951. The Fleet Air Arm operated in the strike, ground support and escort roles. During this time, three Navy pilots were killed and a fourth seriously wounded. Thirteen aircraft were lost with nine shot down by North Korean anti-aircraft fire and four lost in deck accidents or crashes because of foul weather. The Fleet Air Arm also provided rotary wing aircraft to support Australia's commitment to Vietnam, but the A-4 Skyhawk jets that formed part of the air group on HMAS Melbourne did not fly in that conflict. The ten Skyhawks destroyed as a result of equipment failures and non-combat crashes, during the type's service with the Navy, also caused the death of two pilots. Melbourne, the remaining carrier, was decommissioned in 1982 and the Navy lost its fixed-wing capability. Unlike the Army, however, it had developed its own airworthiness capability closely modelled on the Royal Navy's doctrine.

'In the late 1980's and early 1990's I was the Assistant Director Airworthiness Control (ADAC) as a Commander in the Directorate of Navy Air Engineering (DNAE)', explains Captain Daniel Reilly.

'This position, assisted by a staff of two, was the sole person responsible for Technical Airworthiness and associated policy, with assurance provided by the Fleet Air Engineer at HMAS Albatross. Navy managed Operational Airworthiness at the time in a similar directorate, Director Navy Aviation Policy (DNAP)'. Reilly was therefore in a good position to comment on how Navy was travelling with regards to aviation airworthiness issues. :

My recollections are that the Chief of Navy exercised his autonomy under the Defence Act to maintain regulatory authorities; as opposed to Air Force where they were specifically assigned authority for State Aircraft. This had always been a grey area but until the early 1990s had not been tested. Before you show amazement at the lack of resources assigned to Navy's Airworthiness policy oversight, it should be understood that Navy's Air Engineering (now called 'aviation' – one of my legacies) activity relied explicitly on the Royal Navy's Air Engineering doctrine – Royal Navy Books of Reference covering training, maintenance, design and so forth. One of my roles was to ensure any variations that were thought necessary for Royal Australian Navy operation were added as supplements to the manuals. Essentially, we leveraged off the work being undertaken by the Royal Navy and followed it pretty slavishly with strong liaison maintained with engineering (and operational) equivalents in the UK.

The Navy was in essence following the lead of what many would have considered world's best practice at the time.

This instruction set exceeded 70 predominantly Royal Navy books of reference or instructions; some of which we unashamedly re-printed as 'Australian Books of Reference'. Naturally since the RAN Fleet Air Arm's inception in the late 1940s, there had been a degree of divergence in operational practice and policy, also reflected in the engineering domain, so amendment action and compliance were increasingly problematic. Nevertheless, the RAN prided itself on its professional application of the airworthiness concept, essentially the 'fitness for purpose' definition. However, in late 1980, working within DNAE as a lieutenant commander, I initiated a program to capture our Navy's experience by producing Australian operational level guidelines for aviation engineering that would ensure practical application of airworthiness principles. These instructions were worked on through to the early 1990s and distilled the various reference books into the Naval Aviation Maintenance Instructions [NAMIs] volumes 1 and 2. These manuals were predominantly written and eventually edited by me (across two postings and a promotion) during my tenure as Assistant Director Airworthiness Control and successfully adopted by the RAN. This was the first time that our Fleet Air Arm had developed an entirely Royal Australian Navy framework for aviation engineering. It was a big jump from 70-plus books of reference – predominantly Royal Navy – to a two-volume set which was absolutely reflective of the Australian Fleet Air Arm experience. These manuals encompassed policy and definitions through quality assurance and working level practices.

At this point it is probably not unfair to say the Navy was ahead of the game in terms of the Australian experience of managing military airworthiness. At least it had agreed definitions and doctrine which were based on the considerable experience of a much larger and mature organisation.

The Navy was confident of its approaches and continued to operate completely independently until 1998. On 15 April 1997, the Government's Defence Efficiency Review concluded with the issue of its 'Defence Reform Program' report which recommended setting up a single organisation for the integration and management of military airworthiness. Noel Schmidt was promoted to air commodore on 8 December 1997 and became the inaugural Director General of the new organisation which came into being in January 1998. The Directorate General Technical Airworthiness – ADF (DGTA-ADF) would begin the process of consolidating airworthiness approaches across the three Services; one of Schmidt's first tasks was the integration of Navy staff and the transfer of responsibilities, which occurred from 1 July 1998.

The quality of the Navy system, albeit nowhere near as extensive as the eventual suite of regulations developed to cover the airworthiness domain, found itself largely copied into the maintenance regulations that would be used by DGTA. I've always found it amusing that in later years some previous Air Force staff would point out to Navy that the regulations required this or that to be done ... if we cared to read it! Little did they know, Navy had written a good portion of it, or in fact me personally!

Harmonisation with the other Services was years away when the time of crisis for the Air Force arrived in the early 1990s. The Navy had been forging its own path and, given the work that had been put into its approach to airworthiness, it is understandable it may not have seen a sound reason to change until the 1997 Defence Reform Program's recommendations forced its hand. It may have been a different situation if the Air Force had been doing a credible job but, as Air Commodore Peter Rusbridge was about to point out, that was far from the case. However, the crisis that would engulf Defence aviation was much more than deeply entrenched problems with the regulation of airworthiness, or even operator culture. What Colonel Stark described as 'the implosion of our systems in the early 1990s' should not be attributed to just one factor and needs to be contextualised within the economic and political circumstances of the time. Operator culture and the regulation and implementation of airworthiness approaches were part of the puzzle, as was the materiel itself, but this was happening against a backdrop of extreme resource constraint, further major organisational change within Defence, and strong political pressure to outsource some aviation support functions to industry.

In the late 1980s and early 1990s, Defence was losing a lot of experienced pilots and technical personnel. It was a period of extensive cuts to Defence budgets and the so-called 'recession we had to have' as former Prime Minister Paul Keating once put it. Despite the nation's economic woes and high unemployment, the commercial pilots' strike of 1989 created many opportunities for those who were looking to move on from a Defence aviation career. Domestic carriers had fired pilots en masse and there were plenty of opportunities for aviation personnel from the ADF and overseas. There can be little doubt the organisation lost a lot of valuable people and this impacted capability.

Colonel Stark said it was important to understand how the cuts to Defence resources also played a part in the crisis period of the early 1990s:

The situation in which we found ourselves was not due entirely to a risk-taking culture. As in most accidents or disasters it had many influences, some overt but many insidious. In this period we had the Force Structure Review (FSR) in 1991. The Defence Logistics Redevelopment Program ..., the Defence Regional Support Review ... and the Commercial Support Program ... quickly followed; and together they recommended gutting large parts of the Defence organisation. The following quote is from FSR 1991:

'A number of significant capital equipment initiatives approved recently has reduced the amount of discretionary expenditure within the next few years. This in turn has reduced much of the traditional flexibility in Defence planning. Defence's forward commitment to capital equipment expenditure is currently at its highest level ever, leaving little flexibility to balance competing resource demands.'

People who had good options left in droves and experience levels declined steeply. The RAAF B707 accident is a case in point and can't be separated from the external political and economic situation.

It should also be noted that the tempo of flying for Army's Black Hawk fleet was said to be over extending logistical and maintenance capability according to some sources, with insufficient resources available to adequately address these emerging shortfalls. It might be fair to state that it was a "perfect storm" in terms of the confluence of factors that led to the crisis period but there is no getting around the fact that the RAAF's chief engineer was not happy at all.

### ***"We have lost our way" - a written hand grenade from the senior engineer***

Peter Rusbridge was born in England. He started his military career in the Royal Navy as a pilot but after 'an early personal review of likely career prospects in a rapidly diminishing Royal Navy, whose strike capability was going beneath the surface', he requested a transfer to the Engineer Branch. After initial training and some sea time, he attended the 'Royal Naval Engineering College Manadon and also studied for a master's degree in aircraft design at Cranfield University', an institution also attended by John MacNaughtan and Noel Schmidt.

Fifteen years later, he resigned from the Royal Navy and, in January 1972, he began a new life in Australia, joining the RAAF. He brought with him impeccable engineering knowledge and a well-honed English sense of humour which he would employ to underscore important points.

He maintained the Air Force was extremely kind to him and was perhaps even a little 'generous' with the rank bestowed upon him, at least initially. In 1981, he wrote a piece for the ADF Journal – the peak publication of the Australian profession of arms – which analysed the problems with an Australian aviation manufacturing capability. He demonstrated a deep understanding of the issues the industry had faced historically and essentially painted a picture of wheels being reinvented then destroyed endlessly. In the 1980s, he was the first Air Force engineer to write a Configuration Management Plan for the Wamira and subsequently the F/A-18 Hornet. By 1992, he had achieved the rank of air commodore and was appointed Director General Engineering and Logistics Systems (DGELS) within HQ Logistic Command – in other words, the Command's top engineer. In his view, the RAAF's engineering capability had been in a state of decline for at least two decades.

It seemed to him that the last glimmer of hope had died with Air Vice-Marshal Tony Dietz in 1985. Aircraft had been falling out of the skies with monotonous regularity and the death toll was more in keeping with a decent-size war rather than peacetime. It was time to deliver the mother of all military posterior kickings.

Rusbridge's letter dated March 1992 from his position as DGELS, which had responsibility for implementing engineering policy, contained some of the most scathing language imaginable. Rusbridge explained:



Although it survives as a letter, it was actually the text of a presentation I gave to them all in an auditorium somewhere down Albert Street. There they all were, waiting to see what the new boss had to say, and looking forward to what someone had leaked to be a funny movie. We showed the movie, and they all laughed a lot. When the lights went up, I could see them relaxed and expectant – what was I going to say next? As my message unfolded, I saw quite marked changes in the demeanour of the audience. They fell into three groups. Firstly, there were those who were plainly embarrassed. Then there were those who showed rejection in their body language. Finally, there were those, mainly younger, who seemed to be urging me on.

He employed an almost poetically descriptive style at times, occasionally underpinned by a sense of humour that served to highlight how completely unacceptable he found the whole situation. Reading the letter today, there is still a palpable sense of the dread and impending doom its intended recipients must have felt. He stated:

... We have lost our way.

... There are many ghosts haunting this organisation. The trouble is that most of them are not dead ... most people would not relish being part of an organisation which is regarded as a management basket case ... this headquarters has had a poor reputation for years.

In seeking to uncover underlying problems, he listed many issues including ‘sloppy contracting, with contracts that are technically un-executable without amendments ...’; ‘lack of knowledge, let alone understanding of the seminal data bases ...’; ‘serious mistakes in fatigue life calculation ...’; ‘no idea of a coherent and defensible modification policy ...’; ‘mindless modification of weapons systems ...’ (yes, he said that!); ‘an almost complete lack of configuration management ...’; and ‘confusion over what should be clear lines of airworthiness authority ...’.

Rusbridge concluded that the:

... Overall picture is of crisis management, together with neglect, if not abandonment of the fundamentals of engineering management. At the same time, I am encountering a truculence and a refusal to admit error which smacks of closed minds and which is very disturbing to behold.

... The days are long gone when we could operate by running to the Minister, independently of the rest of the RAAF, for money to fix our mistakes while we fight amongst ourselves in trade-based fiefdoms which resembled the last days of the Ottoman Empire ...

He was also disturbed by ‘declining experience levels’ and concluded that ‘flight safety is on the line’ and that these problems were now being ‘reflected in the accident statistics of the RAAF’.

He charged the engineering branch with being ‘ossified and moribund’, having changed little in the past four decades, and demanded it as ‘an absolute requirement’ the

organisation ‘lift our game’ and display an enthusiasm akin to a ‘Fitzroy supporter eating a meat pie’ – an Australian Rules football reference not lost on Melbourne-based personnel.

After I had finished, there weren’t many questions. Everybody seemed a bit stunned. There were many copies of my presentation because I wanted them to take away my remarks and think about them. As most of them drifted out, I was bailed up in a corner by the younger generation, strongly agreeing with me and bombarding me with supplementary points  
‘And another thing, Sir ...’ This lasted for well over an hour and a half. When I finally got back to my office, I shut the door and lay down on the carpet and went fast asleep. I was exhausted! Change management is not for the faint-hearted!

The general public’s expectation of aviation by the 1980s was that it should be consistently safe, and civilian authorities were generally delivering in this regard. As a contracting state of the ICAO Convention on International Civil Aviation, generally known as the Chicago Convention, Australia is expected to adhere to international obligations with respect to conducting safe and orderly aviation activities. While Article 3 of the ICAO convention explicitly excludes state aircraft (such as military aircraft), it was clear it was not an option for a peacetime military to sustain such losses; a proactive approach to significantly improving military airworthiness and safety was essential. Rusbridge’s presentation articulated a vast range of deep structural issues with how the Air Force approached airworthiness, safety and ‘mission readiness’.

Change on a massive scale was no longer optional.





***“Blueprint 2020” points the way forward***

In July 1993 a major report titled ‘Blueprint 2020’ was published. This report was prepared by the RAAF Engineering Planning Team led by Air Commodore MacNaughtan which had been formed in early 1993. This followed a briefing to CASAC by the Air Officer Commanding (AOC) Logistics Command that ‘engineering in the RAAF is broken’ and needed a major review. The review was to examine the issues facing Air Force engineering and propose a comprehensive strategy to ‘deliver world class engineering support’ in a future decentralised environment. It should be noted that it had been developed independently of Rusbridge’s scathing public address and was not a response to it.

To quote from Blueprint 2020:

Australian defence policy is to maintain a technological edge. In employing air power, the commander needs to have at his disposal the technical ability to overcome equipment deficiencies and exploit technological opportunities. Throughout the history of the RAAF, its commanders have enjoyed the advantages that technical independence brings. ‘Blueprint 2020 – Engineering the Future’ examines the nature of this independence, and explores what is needed to ensure continuation of its essential features in the face of constant change both now and into the future.

The report called for a great deal of change but needed to be mindful of ongoing resource constraints. Some of the strategies outlined included the ‘establishment of an integrated technology support organisation’, greater co-operation with industry partners and de-centralisation of some engineering and logistics management functions to what was termed Logistics Management Squadrons (LMSQNs) in the early-mid 1990s. These were subsequently expanded to System Program Offices (SPOs) in 2000 following the centralisation of all Defence acquisition and sustainment support into the one organisation. Canberra based SPOs support new capability acquisitions, whereas regionally based SPOs are often geographically located and aligned with the Capability Manager operating squadrons - the organisations delivering core capabilities such as air combat, air mobility, combat support, or flying training. The SPO is a contracting and enabling agency to the relevant capability manager and in concert with industry, provides engineering and logistical support to the operational requirements of the operational squadrons and units.

However, a core recommendation was the creation of a new Directorate of Technical Airworthiness (DTA). Its responsibility was to develop and implement the new technical airworthiness regulatory framework to manage the delivery of all engineering services by internal and external industry organisations to support military aircraft operations. Blueprint 2020 was a comprehensive document that provided a framework to address some of the deep organisational and cultural limitations that had plagued and constrained development of a more flexible approach for the conduct and delivery of military aviation engineering in Australia.



Noel Schmidt, on being promoted to group captain, became the first Director of Technical Airworthiness in November 1993 and his organisation was charged with implementing the Blueprint 2020 agenda. Schmidt described the task of creating a regulatory framework to allow decentralising the engineering function as a huge challenge. He was Commanding Officer Engineering Squadron at the Aircraft Research and Development Unit (ARDU) at the time Blueprint 2020 was being debated and remembers getting the news about his new posting.

I recall that my posting order had me posted to the new position of ‘DTA’ [Director of Technical Airworthiness]... it was issued in early July 93 ... At the time, no one knew what this new term ‘DTA’ meant ... after all there were four dedicated Group Captain Engineer positions managing engineering in HQ Logistics Command, all about to be removed as offset for some new Chief Engineer positions at wing commander level.

Schmidt had been closely monitoring what was being debated around Blueprint 2020 principles at the time from his position at ARDU. ‘I was well aware of what were considered radical plans at that time for a totally “decentralised engineering organisational solution” with a “central regulator”,’ he stated. He was a strong advocate of it being named the ‘Director(ate) Technical Airworthiness’ focusing on the last two words while ‘some others simply wanted “Director Aviation Regulation” or similar waffle words!’ Schmidt recalled being briefed in by the AOC Logistics Command with several clear messages, including:

... ‘Your job is to sort out what real Engineers do ... [and] to make Engineering no longer an impediment to RAAF aircraft operations!’ Quite simple, really! Hence, I recall being most happy to get clear direction from the top on what I was expected to do ... and our journey started.

### ***Exit stage left***

By June 1993, Rusbridge’s proposed direction was clearly at odds with the final recommendations of Blueprint 2020. His view was that, in order to fix the deep problems with the engineering capability, engineers had to return to the proper and continued implementation of the Configuration Management Plans that were then official RAAF technical policy. On this point, he believed the current system had to be followed, not replaced. He also advocated much greater reliance on the original overseas manufacturers known as ‘Design Authorities’. Written comments in the margins of the record of his presentation to the effect that ‘no CMPs have been approved’ provide insight into one of his central criticisms. He regarded the replacement system proposed by Blueprint 2020 as possibly less effective and not entirely appropriate in a military aviation environment. Most importantly, he deplored what he saw as the lack of professional

guidance and mentoring for engineers that he felt was impacting the quality of their work and would be exacerbated in the new distributed or decentralised environment. He considered the system he had been introducing would provide that guidance and provide a clear categorisation for experience and qualification levels, but his approach was rejected.

Many of Rusbridge’s views, although considered instructive, were not shared by other Engineers, including senior officers in Air Force Office (AFO) in Canberra. Importantly Rusbridge’s challenges to a number of the major recommendations made by the Blueprint 2020 team were never endorsed by AFO and were rejected at the CASAC meeting when the Blueprint 2020 report was considered, and subsequently approved for release and implementation in June 1993. Rusbridge departed soon after for a long-term career in Defence industry. The ball was now, as they say, very much in Noel Schmidt’s court.

### ***A new era.....and a word of caution***

Work within the new Directorate of Technical Airworthiness (DTA) under Schmidt got underway very quickly with the issue of a number of new draft Instructions to the six new Chief Engineer (CENGR) positions that had been created under Blueprint 2020 and located in the new Weapon System Logistics Management Squadrons / System Program Offices (SPOs) at major bases.

These instructions were consolidated in the first version of the new Technical Airworthiness Management Manual (TAMM) that was issued in November 1994. The content of the TAMM was progressively expanded and refined that, by late 1998, it contained a suite of Technical Airworthiness Regulations (TAREGs) that arguably represented a world leading approach to managing technical aspects of military airworthiness. They proved very successful and, according to some, ushered in an era of vastly safer military flying.

Captain Reilly adds a cautionary note, however:

One should be very careful claiming that the introduction of the formal Airworthiness Regulatory System was the predominant reason that the aircraft accident rate reduced so dramatically. I suspect – in fact I have investigated this – that new technology aircraft which were more inherently airworthy, were introduced in parallel, and also add to much of the decrease ... It has always taken these two factors – better technology and regulation – ‘to tango’ in the airworthiness arena, and we should not forget it ... however the wholesale fleet renewals were also a response to this accident-prone period and have had an important contribution to safety statistics. It would be disingenuous not to recognise a general industry move towards safety and the associated consequential development of technology, which in my

opinion has radically reduced materiel failure and done more to prevent fatalities than any other factor since the 1980s. This has been spurred on by changes in social expectations and competition. This is not to say regulatory reform had little bearing, on the contrary. Regulation arises from and feeds into industry's failures and improvement in design and technology adaptation and finds its own genesis and maturation in the changing social expectations of the day. Consequently, this mix is inseparable, but unlike some pundits espouse, regulation is not solely or separately responsible for improving or indeed maintaining safety. It is the combined effect of these factors that has delivered our comparatively increased physical and philosophical safety levels and awareness. Indeed, this polymorphous stimuli of society driven expectation, competitive pressures and other stimuli like regulations (one amongst many) define their competitive response which has invariably led to the adaption of new safer technology. It is this process in maturation that now allows the less-prescriptive regulatory environment we now wish to usher in. And we can do so with some confidence. What I am saying is new technology has delivered most of the safety dividend we now see since the pre 90s era, not regulation per se. Society has demanded safer operations and industry has responded to that as one of the many competitive pressures; one of which has been regulation. Arguably, regulation has provided a mechanism to formalise aspects of society's expectations and as such has facilitated aspects of improvement which may not have been as rapid nor as effective. It however is not the predominant factor that those in the industry would like to think.

Another contributing factor was a change in operator culture and the adoption of Aviation Risk Management (AVRM). Wing Commander Preston described AVRM as being a structured way to assess, eliminate or mitigate risks associated with flying.

For a long time, aircrew have assessed and managed risk, but AVRM brought it into a structured form. In engineering, it was often taken from a subjective standpoint, looking at history and trying not to repeat it, rather than approaching it in a systematic way.

With the rollout of the Blueprint 2020 recommendations and the implementation of TAREGs, it became an important component of airworthiness. 'The TAREGs were the first time that AVRM was formalised from an engineering and maintenance perspective – aircrew had implemented AVRM (for operations) many years beforehand.' As noted earlier, the rollout of TAREGs was also happening at a time when significant organisational changes impacting engineering was occurring. Weapon System Logistic Management (WSLM) Squadrons were being established to handle logistics and engineering for the various aircraft platforms. Within each WSLM, the new Chief Engineer position had ultimate responsibility for all engineering activity within that WSLM. The decentralised WSLM model, later expanding into SPOs, was also to prove a successful component of the changes in management of engineering capability.

As the 1990s progressed, additional elements were added. While Schmidt had governance and regulatory coverage for delivery of all engineering services provided internally by WSLMs/SPOs or externally by industry, similar responsibility for governance and management of maintenance capability was held within Air Command. Around 75% of maintenance conducted internally resided in operational squadrons, with the remainder in training units. Along with the ever-increasing outsourcing of maintenance activity to industry, the divide between regulatory coverage of engineering and that of the maintenance capability was something that needed to be addressed to ensure a congruent approach. However, Schmidt recalled some reluctance by individuals at HQ Air Command to relinquish their control and supervision of internally conducted RAAF maintenance capability.

## ***Harmonising the services***

The election of the Liberal Government in 1996 led to another major review, the Defence Efficiency Review, being conducted which resulted in the issue of the Defence Reform Program (DRP) in April 1997. The DRP forced many major changes across the entire Defence Department, including moves towards greater harmonisation of functions between the three ADF Services. This included formation of the Directorate General Technical Airworthiness – ADF which brought the Navy into the fold and, as we have seen, was led by Noel Schmidt who had been promoted to Air Commodore. Decisions at the time were also informed by the Army Black Hawk disaster in June 1996, which claimed 18 lives. We will look at that shortly.

Schmidt started building on the earlier achievements of DTA which had focused on regulating and managing engineering services. As a tri-Service organisation with Army, Navy and civilian staff, DGTA-ADF had an expanded responsibility to create a regulatory framework for management of all maintenance and production services – the latter having been previously managed by a small group called the Directorate of Quality Assurance that had moved into Defence central in an earlier reorganisation in 1990.

During the mid-1990s, with the greater focus on the concept of 'technical airworthiness' based on the work being led by DTA at the time, the concept of 'operational airworthiness' attracted great recognition. This term was being used to describe the systems and processes used by operators to make decisions regarding flight safety in an operational context. It also further reinforced a conceptual break that had been developing between engineers and operators, laying the groundwork for the emergence of a separate agency to better define and regulate 'operational airworthiness'.



## ***The big divide***

Colonel Stark remembered:

In 1995, Army was still talking about ‘Risk Management’ but now also about ‘airworthiness’. I remember seeing/hearing about Blueprint 2020 around this time and knew it was about the technical side of airworthiness. I wasn’t really aware that it was more about governance than hands-on practice. Our technical aeronautical governance had to this point always been integrated within RAAF Support Command in Melbourne. Therefore Army’s ‘Technical Airworthiness’ was always whatever RAAF’s ‘Technical Airworthiness’ was. I recall our maintenance workshops being audited by Operational Command.

...

From an aviation perspective, our ‘Operational Airworthiness’ was really tied up in our culture and led through our Standardisation and training systems.

However, as the Boeing 707 calamity in late 1991 had shown, the way an aircraft was operated was integral to safety, hence there was an increasing acceptance of the notion that ‘airworthiness’ was more than just the technical attributes of an aircraft. This message would be brought home to the Army in the form of the worst peacetime military aviation disaster to date.

## ***Black Hawks down***

“I’m sorry guys we’re dead”.

Looking back on the June 1996 accident that destroyed two Army Black Hawk helicopters and claimed 18 lives, pilot (then Captain) David Burke recounted how sad he felt as he faced what he thought would be certain death. ‘I was calm and peaceful. I was very sad and heartbroken thinking about my wife and family,’ he said in an interview with journalist and former Army member Kate Banville for a veterans’ publication. Incredibly he survived but many others did not. The tragedy remains firmly etched in Army aviation consciousness.

Burke was piloting a Black Hawk with the call sign Black 2 as part of a group of six from the Army’s 5th Aviation Regiment in a counter-terrorism exercise with the Special Air Service (SAS) on the night of 12 June 1996. Four of the aircraft were flying in a tight formation at night time and, to make the exercise as realistic as possible, lights were

extinguished, and night-vision goggles and live ammunition were being used.

When another helicopter – Black 1 – veered off course, the result was a fiery mid-air collision and, in a fraction of a second, Burke’s tail boom, tail rotor and port fuel tank had been torn apart by the other aircraft’s rotors, sending him into a flat spin towards the ground. Incredibly, he landed the burning and crippled aircraft upright, not only surviving himself but saving others.

The subsequent Board of Inquiry did not apportion blame to an individual or group. Instead, it concluded a series of issues with planning, procedures and communication were to blame, making this shocking outcome, or something like it, very nearly inevitable. It praised the professionalism and bravery of the soldiers involved and those who attended the scene of the disaster, with 14 medals subsequently being awarded. The Board of Inquiry recommended a wide range of changes to the Army’s counter-terrorism training, including choice of equipment and flight safety procedures. Tellingly, the Defence Minister at the time, Ian McLachlan, said the Australian Defence Force would establish a centralised flight safety authority as a key response to the disaster. The authority would have responsibility for supervision of all Defence flying safety issues, across all three Services. In 1997, the Directorate of Flying Safety – Air Force, which had its origins with Group Captain Lerew in 1945, was expanded into a tri-Service organisation and became the Directorate of Flying Safety – ADF (DFS-ADF). In 1998, continuing this trajectory towards greater harmonisation of the three Services, the Chief of the Defence Force appointed the Chief of Air Force as the sole ADF Airworthiness Authority.

## ***Another review***

With the formation of DGTA-ADF in January 1998, the Chief of the Defence Force, General John Baker, directed a further internal review titled the ‘Review of ADF Aviation Safety Management’ (RAASM). This review was led by a senior operator, Air Vice-Marshal BG ‘Beege’ Weston, with assistance from several other members including Air Vice-Marshal Mac Weller who had taken over from Rusbridge in HQ Logistic Command in 1993. He had been Schmidt’s boss when DTA began, and a strong supporter of the Blueprint 2020 changes and the new Technical Airworthiness Regulations system.

The RAASM highlighted both strengths and weaknesses in the ADF’s approach to aviation safety. In terms of the latter, there was still a lack of a coordinated ADF flight safety program and an overarching flight safety policy. It identified that aviation safety was overly dependent on a small core of experienced personnel and that there were still conspicuous cultural differences between the Services. On the plus side of the equation, there was recognition that a great deal of improvements had already been implemented and these should continue with further minor change. In early 1999, the Chiefs of Staff Committee

advocated for an agreed definition of Aviation Safety Management, considering this important for continued improvement. The ADF Airworthiness Authority therefore proposed it be defined as ‘encompassing all aspects of technical and operational airworthiness management, and flying safety management’.

The final RAASM report noted the success of the new DGTA organisation in taking a joint approach to regulation of ‘technical airworthiness’ and proposed similar for ‘operational airworthiness’.

This led to the creation of the Airworthiness Co ordination and Policy Agency with a new focus on development of regulations to address operational aspects of airworthiness.

The new Directorate was headed up by an RAAF group captain operator, with the inaugural Director, Mick Maher, taking up the position in July 1999. This provided a voice for operators and underscored the reality that at times military aircraft were operated in very different ways to civilian ones, with decisions being made based upon risks inherent in operational environments.

The RAASM recommendations also included the development of a single ADF Airworthiness Manual. The initial version was titled ‘ADF Airworthiness Manual’, and issued in 2001, while approximately a decade later it was updated and renamed the ‘Defence Aviation Safety Program Manual’. It also stated that continued development of a regulatory framework encompassing both technical and operational elements was required, that aviation activities be conducted in compliance with this framework, and there should be an independent safety and investigation body. Management of flying safety would continue to be conducted by DFS-ADF and include all elements of aviation including flight testing, cargo loading and handling, air traffic control, aerodromes, and even simulators.

The RAASM noted that the technical airworthiness framework for design and engineering was quite mature, however the regulatory basis for maintenance, production and modification was still in early development. It did note the technical framework could provide a model for operational airworthiness and, in 2004, the Operational Airworthiness Policy Review Committee endorsed a structure for ADF airworthiness regulations. In 2005, draft Operational Airworthiness Regulations (OAREGs) were approved and initially issued as part of the ADF Airworthiness Manual, although it is important to note that, like their technical counterparts, they were subservient to the over-arching Military Aviation Regulations (MILAVREGs). In 2011, the OAREGs were removed from this manual and published as a standalone document which would be re-named the ADF Operational Airworthiness Manual. In 2003, a 12-element Aviation Safety Management System (ASMS) was introduced and the Defence Aviation Safety Manual was issued in March 2004 based upon inputs from Canada, the US, UK, and the Civil Aviation Safety Authority (CASA). Also that month, following a report on occupational health and safety (OH&S), DFS-ADF was combined with the Directorate of Air Force Safety into a single Directorate, albeit with the dual roles of ADF aviation safety and Air Force OH&S. The appointment of a single director with dual titles resulted in some confusion so, in April 2006, it was renamed the Directorate of Defence Aviation and Air Force Safety.

The creation of a separate organisation for ‘operational airworthiness’ provided a platform for operators to contribute to safer aviation, based upon the unique experiences of aircrew and operational requirements. But it also embedded an apparent division that was uniquely Australian. In global military aviation, the criteria for aircraft airworthiness focused primarily on being safe and ‘fit for purpose’ – what an operator does beyond that is another matter. Hence, differences between the global approach and our bespoke approach to military airworthiness and safety meant Australia would have to grapple with this and evolve once more.





### ***A sobering loss and renewed scrutiny***

On 2 April 2005, Australia's much-improved military aviation safety record took a massive hit when a Navy Sea King helicopter crashed, killing nine Navy and Air Force personnel and seriously injuring two more. The flight crew and medical personnel were providing humanitarian assistance as part of Operation Sumatra Assist II following the Nias earthquake in Indonesia several days earlier.

A Board of Inquiry was set up to not only examine the factors that directly contributed to the accident, but also examine many other areas including operations, flight safety, logistics support and personnel management. The report was issued in June 2007. In responding to its release, Chief of Navy, Vice-Admiral Russ Shalders, stated that:

After a meticulous examination of the evidence presented during the inquiry, the Board concluded that the primary cause of the accident was a failure of the flight control system. A key component of the flight control system was not properly secured during maintenance, which resulted in the pilots losing ability to control the aircraft. This was the result of a series of errors and non-compliances with Maintenance Regulations.

The report included several far-reaching recommendations for cultural and organisational change to enhance naval aviation safety performance and to make improvements in some wider areas of ADF aviation. The Chief of the Defence Force at the time, Air Chief Marshal Angus Houston, stated:

The ADF Airworthiness System is a robust system but we must learn from the mistakes of the Sea King tragedy. A review of the airworthiness system ... will look at, among other things, the need to improve and strengthen the auditing, compliance and intervention aspects of the system.

The recommendations of the Board of Inquiry also triggered a broader strategic review of the ADF Airworthiness Management System (AMS) in 2007 which revealed considerable confusion between the objectives of the AMS and the Aviation Safety Management System. Although closely aligned, it was not sufficiently clear if airworthiness was part of the ASMS or the other way around and it was concluded that airworthiness and aviation safety were not well coordinated in the ADF. The review also recommended adoption of a revised objective for the AMS of ensuring aircraft were operated 'at an acceptable level of risk' which aligned with the International Civil Aviation Organization's concepts. This was similar but slightly different to the published ASMS objective of 'reducing the risks of accidents and dangerous occurrences to as low as possible'. The review concluded the AMS was overly complicated, excluded wider elements of aviation safety and failed to adequately clarify responsibilities.

Importantly, the Board of Inquiry made the recommendation that the three existing organisations involved with aviation safety be merged into a single entity to achieve greater coherence.



The impetus to amalgamate DGTA-ADF, the Airworthiness Co ordination and Policy Agency and the Directorate of Defence Aviation and Air Force Safety (now the Defence Flight Safety Bureau) had begun. The period that followed also saw a greater clarification of accountabilities through the chain of command, but there was no avoiding the fact that the ADF's aircraft, maintenance and operational activities were internationally focussed and, as such, more change would be required to achieve best practice in aviation safety. In the period following the Sea King tragedy, the argument for further major change would become varied and irresistible.

### *Tindal takes over*

In 2005, Air Commodore David Tindal took over from Noel Schmidt as Director General of DGTA-ADF, a position he was to hold until 2011. It was a period that was to present some stern challenges but would also lay the groundwork for much needed reform.

When I started the DGTA role, the incumbent CAF [Chief of Air Force] stated quite clearly that he didn't know exactly what DGTA did, but he knew it was important. He stated that he had no ability to supervise me, so his sole advice was 'Don't fuck up!'

This kind of blunt language may surprise foreign readers but it typifies the Australian ethos that you can be trusted to get the job done, but you'd better get it right. As one senior operator said "when I strap on a Hornet I just want to know it will work". Tindal added:

In hindsight I think the period I spent as DGTA could be best characterised as a transition between the old and the new aviation safety arrangements.

Of immediate impact was the fallout from the Sea King accident and subsequent Board of Inquiry. 'The Sea King accident and its fallout challenged the way that maintenance safety was assured by a regulator, leading to a marked rethink of maintenance assurance requirements and practices.' During Tindal's tenure, the organisation underwent a significant reorganisation to:

... Convert from the traditional engineering versus maintenance structure to a structure based on 'regulation' versus 'assurance'. This structure also removed the longstanding Directorate of Quality Assurance with its staff amalgamated into the compliance assurance organisation.

It was also a period where initial consideration was given to international models to replace the bespoke Australian regulatory system with its distinction between technical and operational regulations. The decision at the time was that international models lacked

maturity and should be revisited a few years hence. Consideration was also given to one of the recommendations of the Sea King Board of Inquiry, namely amalgamating the three existing safety organisations into one new entity:

Some preparatory work was performed but the initiative was not pursued given that CAF considered such an integrated organisation could only be effective if headed by a two-star operator and he was not able to successfully make such an argument through the higher Defence processes.

Another challenge that arose during Tindal's tenure was the saga of the 11 Kaman SH-2G(A) Super Seasprite naval helicopters which ended with the type being withdrawn before seeing active service. The decision to buy the aircraft was made in January 1997 and it was envisaged the Super Seasprite would be used on the Anzac-class frigates, and potentially a new patrol vessel to be developed with Malaysia, however that country withdrew from the project later that year. The first of the Seasprites arrived in Australia during 2001 and the Navy's 805 Squadron was re-commissioned on 28 February 2001 to take possession of the new helicopter. Crewing of the aircraft, originally three personnel consisting of pilot, observer/tactical coordinator and sensor operator, was reduced to two with the latter two roles combined and the pilot given additional tasks. In 2002, the Chief of Navy refused to provisionally accept the Seasprite but this was overturned by the Defence Minister and eight were provisionally accepted in an interim training configuration. Limited training flights commenced in November 2003 with First-of-Class Flight Trials, on board Anzac-class frigates, commencing in May 2004. By late 2004, the Seasprite had been granted an Australian Military Type Certification, but this was withdrawn in May 2006 due to concerns with the helicopters' automatic flight control system. The fleet was grounded as debate continued within the Navy, and with the Minister, regarding concerns with the airframe and the type's future viability. Following a change of Government, the project was cancelled on 5 March 2008. Tindal saw the positives in the Seasprite debacle:

The decision to withdraw the Super Seasprite from operational service challenged the historical way that new aircraft acquisitions were type certificated and released into service. Lessons learned from the Seasprite saga informed marked revisions to airworthiness practices that were effectively applied in later aircraft acquisitions.

Another challenge he faced was 'one of the first major instances of the technical regulator having to deal with structural cracking found in warlike operations which concerned the Hercules C-130 aircraft deployed in the Middle East.' This led to pragmatic decisions adapting long-standing wartime risk treatments to account for wartime threats to aircraft.

During his tenure Tindal recalled:

... As part of the DGTA role I had to regularly make written arguments to CAF about various matters, including safety risk assessments. One CAF used to return my written briefs with the comment that what I had written was 'turgid engineering shit'. I didn't mind such comments given he always agreed with my assessments.



Tindal faced some challenges during his time in the role, which he was able to deal with effectively, and laid the groundwork for the period of major reform that would follow.

### ***Change needed again***

As we have seen, a series of accidents in the late 1980s and early 1990s prompted the creation of an airworthiness regulatory set that contributed to delivering a high level of safety. At the time, it was arguably world leading in military aviation, but the fact that it was unique to Australia and civil frameworks was also a major weakness. With increased outsourcing of engineering and maintenance support to industry, increasingly globalised procurement and sustainment, along with Australia's increasing involvement with a growing number of operations with Coalition partners, the system was becoming expensive and unwieldy to operate. As more issues emerged, 'band-aids' were being added and it started to be clear a bespoke system unique to Australia was becoming harder to defend. This was reinforced by accountabilities flowing from the new Commonwealth Work Health and Safety Act (WHS) of 2011 – it was fraught from the perspective of legal defensibility. The commencement of the WHS Act on 1 January 2012 required Defence to comply with legislation to eliminate or reduce risks 'So Far As Reasonably Practicable' for all activities to ensure the health and safety of its workers. Prior to the release of the new Act, a single policy document was released in September 2011 that enshrined extant WHS obligations under the new Defence Aviation Safety Program. In September 2012, the previous ADF Airworthiness Manual was reissued as the Defence Aviation Safety Program Manual.

Australia's commitment to joint Coalition operations made inter-operability vital and yet the ADF's airworthiness 'language' differed markedly from partner nations, creating 'translation' issues and impacting sustainment and maintenance options during deployed operations. Sending a rescue team halfway around the world to change a part that could otherwise be easily supplied and fitted by a partner nation in situ was not only costly, but increasingly a strain upon limited resources. With more maintenance and engineering being outsourced to industry, and increasing use of commercial derivative aircraft, this problem was worsening, creating mounting expense, and significant logistical support issues.

A rough internal calculation showed that continuing with a bespoke regulatory system could result in up to 30% higher administrative costs than by using a globally recognised civilian system. The ADF's system used terminology and constructs unfamiliar to other nations and industry partners, including the delineation between operational and technical aspects of airworthiness. In a global perspective, the term 'airworthiness' was viewed

from a more narrow perspective such that an aircraft is either 'fit to fly' or it is not, and what the operator does thereafter in terms of how they might choose to operate that aircraft is viewed as a matter of compliance with procedures, not airworthiness. As issues with interpretation, application and deficiencies emerged, it became clear the 'band-aid' approach of taking contemporary ideas and trying to apply them to the existing regulations could not continue indefinitely. It also became apparent it would be legally very hard to defend a system that operated in isolation from global best practice. By the second decade of the century, it was clear that, once again, Australia would need to undertake major change if it was to retain a credible and defensible approach to regulating military aviation safety.

### ***Regulatory reform – going global or staying local***

During the period 2011–2013, DGTA-ADF, now under the command of Air Commodore Terry Saunder, investigated the need to significantly update the regulatory framework. Saunder established working level engagements with the International Civil Aviation Safety Organization and adopted international policies to create Australia's first Defence Aviation Safety Program. He also pioneered interoperability working groups on aviation safety regulation with Australia's key allies – the United Kingdom, New Zealand, Canada and the United States.

Recognising the need for regulatory change, Saunder secured the services of Air Commodore James Hood (who was a Group Captain at the time) to head up a newly formed Directorate of Regulatory Reform. Hood had a strong reputation for his reform work on the E-7A Wedgetail program and he recalled that Saunder offered him 'ten percent of his budget and ten percent of his staff' with the offer to 'hand-pick anyone he desired to get the job done.' Over a two-year period, the Directorate of Regulatory Reform investigated different regulatory approaches, undertook futures analysis, due diligence assessments and prototyping of various regulatory options for Australia. 'The regulatory path forward was not initially obvious,' said Saunder. Given the ADF's use of many US aircraft types, consideration was given to aligning with the USA, however each US military arm had its own unique policy framework. Discussions with the International Civil Aviation Organization led to an investigation of the merits of aligning with an emerging European-based convention that was planned to be adopted by around 30 other nations. The European Defence Agency, supported by European Military Aviation Authorities, led an activity to 'militarise' European civilian airworthiness regulations for the Defence context, resulting in the European Military Airworthiness Requirements, or EMARs, which are around 95% identical to their civilian counterparts. The benefits of aligning with the EMARs were compelling. In many instances, industry partners already had experience working with them; this would allow greater interoperability with Coalition partners. This was an important consideration with the increasing ADF operational deployment tempo, and also increased supply and sustainment options. They also allowed for

international ‘traceability’ of qualifications and ‘blended workforce’ options, a reduced need to ‘translate’ regulations, and provided a benchmark for world best practice in military aviation safety.

## ***Enter DASR***

As a result of these considerations, a proposal for new Defence aviation safety regulatory framework was submitted to the Air Force Board in August 2013. Hood, who presented to the Air Force Board and would go on to implement the new Defence Aviation Safety Regulation (DASR, and yes, it is singular), recalled Air Marshal Geoff Brown AO, Chief of Air Force, being an enthusiastic supporter.

Brown was frustrated with the supposed constraints of the old regulations that required four separate maintenance signatures to fix a nose landing light on his aircraft, while the civilian equivalent regulations for aircraft maintenance only required a single signature.

The presentation to the Board that day was persuasive with Brown convinced by the argument that the new DASR would be ‘as civil as possible, as military as necessary’. This mantra drove the final design of the new DASR, with the EMAR adopted in full as ‘golden regulations’ and to be published in black text, with the Australian-unique military regulations published as supplemental requirements in green text. Several options on the timing and scope of DASR were recommended to the Air Force Board. Brown was not happy with the proposed five-year implementation timeframe and agreed to three years. Hood recalled he wanted the new regulation ‘now, tomorrow, or as soon as possible’ and that he saw the DASR as a key enabler ‘to exploit the use of new 5th generation air combat capabilities’.

When Saunder was posted to support the introduction of Australia’s F-35A Joint Strike Fighter in January 2015, Hood was promoted to Air Commodore and succeeded his good friend as the new Director General DGTA-ADF. The first DASR was subsequently published on 1 January 2016 with Defence and industry partners migrating to the new regulation by September 2016 under an initial and shallow implementation strategy. The initial implementation was designed to rapidly transition organisations, people, processes and aircraft to the new DASR and to lock in the currently high levels of aviation safety enjoyed by Defence. Organisations could then explore and exploit the flexibilities of the new DASR at a rate that was safe and sensible for different aircraft types under a follow-on implementation strategy. While the follow-on implementation strategy was projected to nominally conclude by the end of 2018, full adoption of best international and civilian practice was expected to take five to ten years.

Hood promoted the new DASR as offering substantial and future efficiencies in the management of airworthiness:

We made a conscious decision to adopt the EMAR as ‘golden regulations’ and only vary from these when absolutely necessary. International alignment provided better support for cooperative acquisitions with other militaries; common and global supply chains; increased interoperability; and the potential emergence of a single aviation sector in Australia with commensurate increases in Australia’s sovereign air power.

...

Military aviation is different to civilian aviation, and the DASR provides operational commanders with the flexibility to operate a State aircraft outside of its Type Certificate in urgent and compelling contexts, while still complying with statutory safety obligations.

The flexibility provisions built in to the new DASR are an Australian-unique improvement to the international EMAR and allow the ‘golden regulations’ to remain applicable in all military air operations, including extreme threat and combat conditions.

## ***DASA – three goes into one***

September 30 2016 marked the creation of the Defence Aviation Safety Authority (DASA) with the amalgamation of the three existing Defence aviation safety agencies into a new body that more closely aligns with other internationally recognised organisational structures. Perhaps unsurprisingly, Hood was appointed as the inaugural Director General of DASA. From October 2016, DASA became an integrated military aviation safety organisation comprising the former DGTA-ADF directorates and the other two safety agencies, namely the Airworthiness Co ordination and Policy Agency (ACPA) and the Directorate of Defence Aviation and Air Force Safety (which concurrently changed its title to the Defence Flight Safety Bureau). The previous structure, whereby DGTA-ADF had focused on ‘technical’ airworthiness and ACPA had been responsible for the ‘operational’ side, had enshrined the uniquely Australian distinction which had not been adopted anywhere else. The new organisation was now something the global military aviation community could more readily understand.

Hood said:

... As a single agency, DASA enables increased engagement across the seven directorates and provides a more integrated approach to airworthiness regulation and aviation safety outcomes. Much of the effectiveness of any approach to aviation



safety is dependent on analysis of data from common systems which will be easier within the one authority.

In short, DASA allows for a more cohesive approach. It also provides greater transparency to commercial and international organisations, and increased engagement with civil authorities such as its civilian equivalent, the Civil Aviation Safety Authority. It enhances engagement with military authorities and increases mutual recognition of other aviation authorities and frameworks. The simplification of international global recognition activities inherent in the new structure is a strong advantage as well.

### ***“A seminal moment”***

It was thus in 2016 the ADF embarked on a new journey to maintain its much-improved safety record from the previous two decades and implement world-leading standards for military aviation. In Australian Defence Magazine, the Chief of Air Force at the time, Air Marshal ‘Leo’ Davies, described it as a ‘seminal moment’ in the history of airworthiness and represented DASR as the single biggest change in Defence aviation safety in around 20 years. In a foreword to a special edition of Spotlight magazine published a year later, he stated that:

... By aligning airworthiness regulations with the international system, Defence can harness the efficiencies of global supply chains and maintenance options. Civilian partners will be able to more easily exploit ‘blended workforce’ options; increase interoperability; improve two way recognition of other militaries’ systems and regulations; leverage off best practice in aviation safety arrangements globally and drive aircraft sustainment costs down ... Fifth-generation Defence aviation demands a global best practice approach to aviation safety – the Defence Aviation Safety Authority and its DASR are delivering in this regard.

Hood also underscored the benefits of the new regulatory system:

The ADF strives for constant improvement and, as more complex aviation systems are adopted, striving for world best practice is essential to help ensure safety. The principles behind regulation management and oversight have also developed significantly since the TAREGs were introduced. It is now accepted that better practice should focus on outcome-based regulations (with built in flexibilities) to treat threats to safety, and not the means to achieving (prescribing) that outcome. The TAREGs were largely prescription based. With DASR, Defence is aligned with international best practice for both military and civilian airworthiness regulation.

Group Captain Terence Deeth, who is a pilot and was then the Director of the Airworthiness Coordination and Policy Agency (DACPA), which had become part of DASA during the transition, highlighted that the new regulations now combined technical and operational aspects. ‘Having both in the one place makes it easier for everyone,’ he said. ‘The operational regulations use the European framework but will allow Commanders the freedom of decision that is required for operations.’

The implementation of the technical aspects covering initial type certification and engineering and maintenance support progressed smoothly with organisations migrating to the DASR with minimal impact to their existing management plans, contracts and organisational structures. The airworthiness DASR was published electronically which enables easy cross-referencing between regulations and guidance material.

Hood added that:

... The current regulations have kept us safe for around twenty years, but it is no longer feasible or desirable to maintain an independent system. By aligning with global best practice we derive many benefits, and further enhance military aviation safety into the future.

While Saunder and Hood’s original proposal for DASR was to retain the long-standing distinction between technical and operational airworthiness, Hood remembered the Air Force Board in August 2013 agreeing with Group Captain Kitchner, as the current DACPA, that Defence had the necessary maturity and leadership capacity to step away from old distinctions. They directed that the new EMAR concepts, language and structures be adopted in full across the operational and technical domains. However, not all operators were remotely convinced. For some, the loss of distinction between ‘operational’ and ‘technical’ airworthiness was difficult to accept. Although this distinction is not recognised internationally, it had been a defining element of the Australian approach for some two decades and for those senior operators who had a clear memory of the carnage of the late 1980s and early 1990s, there was at times considerable uneasiness about the change. Hood was not immediately convinced either. He tells a story of having served his entire career under the previous regulations and feeling compelled to present a case to Noel Schmidt, who had been his mentor for over a decade, to retain the technical airworthiness term. Schmidt, however, disagreed. Hood recalls him saying:

... We need to step forward, build on the strengths of the past and where necessary leave the old language behind. There is no place for ‘technical airworthiness’ in the new DASR.  
Just let it go.

While the concept of ‘technical airworthiness’ was gracefully retired with the introduction of DASR, ‘operational airworthiness’ refused to die and, as we shall see, behind the scenes it was the cause of heated exchanges at a very high level; although the military no longer shoots its own members, there was a volatile exchange where the possibility of having Hood shot was presented as a desirable option by a very senior operator.

The fact this would happen in 2017 after an international convention involving over 25 foreign militaries had provided international support, and there had been considerable positive media coverage for DASR, demonstrates how deeply the unease was felt by very senior operators. We will look at the battle to retain the concept of ‘operational airworthiness’ shortly.

### ***IMARC – Australian military aviation safety gains global attention***

Hood has a reputation for enthusiastically embracing change and he knew, in order to build acceptance for DASA and the new regulations, he had a lot of convincing to do within the ADF aviation community. He therefore conceptualised a world-first event that would put the Australian approach firmly in the global spotlight. By doing this he hoped it would demonstrate to local audiences that DASA was on the right track and aligned with Coalition and internationally recognised best practice in military aviation safety. If successful, it would go a long way to reassuring those who were uneasy about such significant change.

A two-day event, the International Military Airworthiness Regulation Conference (IMARC), was held in Melbourne on 14–15 November 2016 and attracted senior officers and engineers from more than 25 global militaries and industry partners. Papers presented by many attending nations assisted in promoting the new DASR and proved Australia was not only on the right track but taking a globally recognised lead.

The conference provided a forum for international partners to better understand the considerable benefits of a global approach. This included the reasoning behind moving from the old standalone system and the lessons learned from other organisations that have adopted the European-based system. Attendees included representatives from the United States, NATO, Turkey, Germany, United Arab Emirates, Indonesia, Cambodia, Italy, Britain, and even China, as well as a wide range of industry partners. It gave international stakeholders an opportunity to compare notes and better understand the Australian experience, which has seen a world-leading level of adoption of the European system.

In his introductory speech to the conference, Hood said:

IMARC would provide a unique opportunity for international military and industry partners to come together and explore the benefits of an emerging global convention on airworthiness. It is an exciting time for Australian Defence aviation with global attention now focused on Australian recognition activities with partner nations.

Air Vice-Marshal Catherine Roberts, who was Head Aerospace Systems Division at Capability Acquisition and Sustainment Group at the time, saw the promise of a globally

based military airworthiness convention as a challenge that should be enthusiastically embraced:

By making a rational choice on regulation, we can leverage global supply chains and support, to extend our global reach. New technology is challenging our thinking ... a global regulation convention will provide a benchmark against which we can be measured.

Roberts likened the new convention to a team event and challenged attendees to embrace the considerable opportunities it afforded with a team mindset:

My challenge to you is to make a choice to be an active participant in this global Military Aviation community. I urge you to be part of the team so that we can achieve the benefits of International Military Aviation Regulation.

Stephen Hudson, who was Chief Engineer at Boeing Defence Australia (BDA), provided an industry partner perspective and described how his company has been an enthusiastic early supporter of DASR:

BDA have embraced the Defence Aviation Safety Regulations [sic], and we’re excited about the benefits of the flexible outcome-based regulation to our global business. Boeing made a decision very early on that we would take a lead role in the DASR transition. We gained an in-depth understanding of the DASR and worked in close partnership with the DASA to provide strategic industry advice and guidance on potential challenges and how we might solve them. This collaborative approach – where Defence has been able to rely on industry to provide subject matter expertise – has been a tremendous success and is helping to prepare for the continued smooth transition to the new regulations. At Boeing we believe in a world that requires more from less. That we can move towards a future in military aviation where the DASR allow us to embrace the offered flexibility and efficiency, to provide unprecedented capability enhancement and support to the ADF, while improving upon the established level of aviation safety. We can imagine that world under DASR.

The German Military Aviation Authority Major General Dr. Ansgar Rieks was also upbeat about a global approach:

There is a definite need for clear harmonised requirements during multinational procurement, delivery, operations and sustainment. A global military airworthiness convention establishes a new culture of mutual trust and transparency where nations still maintain their sovereignty. Recognition is a business card for each nation. In a century of budget constraints and limited people, a consistent global aviation military safety regulation convention is not an option, it is a must.



Major General Yom Som of the Royal Cambodian Air Force said:

For me as well as the Royal Cambodian Air Force, this conference was the chance for us to be considerably more involved in the world's Air Force affairs, mainly in the areas of rules and safety regulation. In this regard, the Cambodian Air Force found ourselves as the newcomer and we need to work harder before getting a final outcome. However, I'm maintaining a high value from the conference's outcome, because I do believe that a similar conference in either form or size will be held in the future no matter where in order to provide the world's Air Forces with sophisticated and affordable safety regulation. We have also been impressed with our Air Force's role in the International Air Force community through the IMARC. I think the Royal Cambodian Air Force has to engage in order to learn about their Military Airworthiness Regulation (MAR) which would be valuable for our future MAR. At the conference forum I found that the presentation made by the Royal New Zealand Air Force regarding their MAR impressed me because of its size and shape, and these two Air Forces having several similar points. Finally, I still hope that the common implementation of EMAR if it is possible is the key toward the future sharing between the world's military aviation community of experiences and interests in many areas such as education and training, and aviation engineering as well.

With the success of IMARC, it was clear Australia was not only on the right track with military airworthiness but was establishing a preeminent position globally. The scope for high-level international engagement between a wide range of militaries on a 'safe' topic everyone could agree on was an added bonus. The decision to have all participants in corporate attire, rather than uniform for the military attendees, played a part in creating an atmosphere that was relaxed and where the free exchange of ideas and experiences could occur. Hood is a strong leader, but he also has a reputation for being very interested in the contributions of all his staff and is known for taking an egalitarian approach wherever possible. IMARC reflected this ethos and was enthusiastically embraced by the international attendees. As one junior officer candidly observed, it was the only time he had seen a 'One Star' and a 'Two Star' hug each other – there was a lot of positivity in the room.

For the members of DASA and all the ADF personnel who had worked so hard to develop and implement the new regulations and bring the new Authority into being, the conference was a moment to savour and a huge validation of the decision to adopt the European system. The many benefits of an internationally aligned system had also attracted strong regional interest. Hood anticipated that some of Australia's regional partners would now also align with DASR, and it was anticipated the next conference would have a more regional focus.

## ***Headline news***

The formation of DASA and the success of IMARC also saw the somewhat esoteric subject of military airworthiness become headline news, primarily because the new system was expected to save money. An article in The Australian newspaper by Mitchell Bingemann described the new regulations as being the 'biggest change in aviation safety at the organisation in more than 20 years ...' The article pointed out that the new regulations promoted mutual recognition and interoperability with civilian and military design and maintenance organisations, and this was predicted to save millions. Subsequently articles appeared in Australian Aviation, ADM, Asia Pacific Defence Reporter and Defence Connect as well as a range of other specialist, industry and ADF publications. The naturally humble Air Commodore Hood was aghast when the author good naturedly suggested he was going to describe him as 'the "Jason Statham" of military aviation safety' in a specialist publication. The description never made it into print at the time, but it underscored the perception that Hood was definitely a determined man of action. There was no doubt DASA and the new regulations were now very much on the aviation community's radar. The challenge moving forward would be to build upon this and consistently deliver on safety. What the general public and wider Defence aviation community did not realise was that the possible loss of the concept of 'operational airworthiness' was still causing considerable grief at the very highest levels.

## ***Retention of 'operational airworthiness'***

Incensed at the removal of the concept of 'operational airworthiness', a group of serving and retired senior aircrew championed its retention. At a meeting of Airworthiness Board members in June 2017, Hood recalls Commodore Chris Smallhorn, the serving Commander of the Fleet Air Arm, stating something along the lines that 'operational airworthiness is a fundamental tenet of aviation safety and command, and that culture will trump strategy any day in the rollout of DASR.' The meeting erupted with DASA staff looking on aghast as operational members stood as a unified body and demanded 'operational airworthiness' be reinstated. Hood recalled statements along the lines of 'You weren't there in the 90s, you don't understand. The operational regulations were written in blood, the blood of our mates, and we are not going back to those days!' With the senior operational members hunting for someone to blame, Hood became the logical target. Notwithstanding the earlier decision of the Air Force Board, as the newly appointed Director General DASA they held him singularly responsible for the destruction of 'operational airworthiness'. Calling on his removal from the position, Hood recalled being described as 'evil personified' and even dubbed the 'Prince of Darkness'. The level of emotion is understandable from operators who had lost friends and colleagues during the carnage of the late 1980s and early 1990s and had seen much safer aviation in the years following. They no doubt saw it as tampering with a successful system that had

delivered on safety and saved lives. Hood has always been considered a very resilient man, but when somebody called from the background for him to be shot ‘like we would have in the good old days’, there was a moment when he pictured himself as a latter-day Breaker Morant facing a military firing squad. It was at this point that Air Vice-Marshal Gavin Turnbull, the serving Air Commander Australia (ACAUST), stepped into the fray. He quickly took control of the situation and calmed his agitated peers. To say he had a unique way of doing this is an understatement. Hood recalled Turnbull saying ‘If anyone is going to shoot Hoody, it will be me!’ Directing his comments to Hood, he said ‘I need you to come back to me with a DASR solution that includes the retention of operational airworthiness. Got it. Get it done!’ Hood may have been disconcerted by this if it was not for the fact Turnbull had previously made his support very clear and he knew this was his way of saying he trusted him to deliver, while reinforcing to the operators that he took their concerns seriously. Hood remembered his induction into the Air Force Leadership Team on promotion to air commodore:

They asked me to speak on the greatest challenge I expected to face over the next three years, so I outlined sheer scope of change required across Defence and Defence Industry to implement the new DASR. Gavin Turnbull quick as a whip said, ‘You won’t be doing it alone mate, we’ve got your back and we are all in this together.’ Later, in private, Gavin would say, ‘You take lead on the changes with CASG and Industry. Trust me, I’ve got Air Force. We are going to do this. It’s not a matter of “if” we implement DASR, rather it’s a matter of “how” we do it.’

The strength of Turnbull’s conviction in supporting DASR continued throughout his roles as ACAUST, Deputy Chief of Air Force, and as a retired operational member of the Airworthiness Board circuit. Brigadier Greg Lawler and Commodore Chris Smallhorn were also credited with exceptional leadership by Hood in the rollout of DASR across the Army and Navy respectively. ‘The sheer capacity of our military operators to lead change across the Defence organisation was breathtaking. We owe so much to their leadership in the rollout of DASR,’ he said.

Today, the concept of operational airworthiness is enshrined as a cornerstone of Defence aviation policy in the Air Force, Army and Navy. While operational airworthiness does not feature in the DASR, as the regulation aligns to international conventions, Defence policy provides the necessary framework of controls and learned safety culture for aviation commanders to operate aircraft in support of Australia’s national interests, often outside the aircraft’s type certification, while still satisfying statutory safety obligations. And no one had to be shot.

## ***New terminology - What is the MAO and are we safe in CAMO?***

When the DASR was released, some terminology changed and roles were clarified, particularly in regard to accountabilities for flight safety. DASR simplified the aviation safety framework by centralising accountability at the lowest level – the Military Air Operator (MAO). The introduction of the MAO clarified this accountability and gave MAO Accountable Managers – which are typically ‘One Star’ Force Element Group Commanders or Army and Navy equivalent – the control and freedom to establish fit-for-purpose, mission-capable, efficient and safe aviation operations. The central role of the MAO offered considerable leverage to ensure maintenance, design, and training organisations meet the requirements.

The Defence Aviation Authority – which is a role held by the Chief of Air Force – is responsible for assuring aviation safety through a framework for the management of aviation safety risks within the ADF established by a Joint Directive; however, commanders are accountable for ensuring aviation safety hazards and risks are eliminated or otherwise minimised ‘So Far As is Reasonably Practicable’. Historically, these obligations and accountabilities had been confused due to the appointment of an Operational Airworthiness Authority in the command chain. DASR addressed these long-standing issues and reinforced the centrality of command in discharging aviation safety responsibilities.

The introduction of DASR also saw the use of terminology and organisational concepts, such as the Continuing Airworthiness Management Organisation (CAMO), that are familiar to the global aviation community. Group Captain Jason Dean, formerly of DASA, saw considerable benefit in the new organisational approach:

... The CAMO resides within the MAO and hence works closely with operators to meet capability and operational requirements. The primary function of the CAMO is to ensure the aircraft continues to remain airworthy. This is collectively known as continuing airworthiness management. It does this by managing the fleet of aircraft, tasking and contracting maintenance organisations to conduct the required maintenance, and consulting design organisations to provide repairs and modifications. The CAMO combines the previously disparate disciplines of technical, operational, and logistics management to deliver an outcome that focuses on maintaining flight safety for an aircraft and delivering capability to the MAO.

The CAMO is another element of internationally focused airworthiness regulations that helps the ADF achieve alignment with global conventions and makes the work of maintaining aircraft simpler.



## ***Pause for thought as an expensive airframe is lost***

Airworthiness is more than just a set of regulations. As Captain Daniel Reilly pointed out, there is no doubt modern aircraft are more reliable and this contributes to safety. Operator culture is another component. But aviation has inherent risks and on Sunday 28 January 2018, an RAAF EA-18G Growler experienced an engine fire during take-off from Nellis Air Force Base in Nevada, USA.

A Defence statement officially deemed it was ‘beyond economic repair and has been withdrawn from service’. The aircraft, serial A46-311, was taking off for a familiarisation flight in preparation for Exercise Red Flag 18-1 when it suffered a catastrophic engine failure. The two crew members were able to evacuate the aircraft without injury.

DASA deployed an Accident Investigation Team, from the Directorate of Defence Aviation and Air Force Safety, headed by an experienced Navy officer, Lieutenant Commander Daryl Whitehead. Whitehead had previously completed a secondment to the Australian Transport Safety Bureau (ATSB) which allowed him to gain experience in civilian aviation accident investigation – an arena far busier than Defence. His team faced some stern timelines, not least being the need to clear the wreckage from the airfield as soon as practicable. Their work was, however, meticulous and their final report was provided to the Chief of Air Force on 30 July. An official Defence statement said:

The Directorate of Defence Aviation and Air Force Safety (DDAAFS) Accident Investigation Team (AIT), working in cooperation with the United States Navy, have carried out engineering inspections that indicate the most likely cause is an engine component failure.

The hulk was placed into storage at the 309th Aerospace Maintenance and Regeneration Group at Davis Monthan, near Tucson, Arizona, in October 2018. Lieutenant Commander Whitehead put it in perspective when he stated ‘thankfully there was no loss of life’, but the replacement cost is over \$120 million and the loss of an airframe is a timely reminder of how fraught aviation safety can be. The kind of meticulous investigation undertaken by Whitehead’s team does, however, provide the knowledge and insights needed to further reduce risks moving forward.

## ***Consolidating and a new challenge***

When Air Commodore Jason Agius took over as Director General of DASA at the start of 2019 he could not have anticipated the unique challenges posed by a global pandemic. He came into the role with the expectation he would be overseeing a period of consolidation and to that end he had several main objectives. These included consolidating and exploiting the Defence Aviation Safety Framework (DASF) within

Defence; greater alignment with civilian counterparts; a focussed DASA approach to international engagement; and building a more unified approach that emphasised ‘One DASA’ as opposed to the residual effects from merging three organisations. The overall theme for the 2019 to 2020 period was therefore expected to be one of consolidation.

Agius recalled that in his first six months in the job there were still many questions being asked about the new system and DASA’s role. To that end a discussion paper was written titled ‘How, What and Why of Aviation Safety Assurance’ which sought to provide the information the regulated community needed to better understand the changes. Regular ‘roadshows’ were also initiated which allowed Force Element Group executives to directly interact with DASA specialists. A seminal study by Air Vice-Marshal Schmidt and Skidmore was completed that confirmed the suitability of DASR for operations at elevated levels of risk but identified that DASA did not have the competence and capacity to fulfil its aviation safety assurance remit for flight operations, and that flight operations and service provider DASR be formally reviewed (noting that the flight operations DASR was largely a carryover from legacy MILAVREGs and OAREGs). A DASF governance paper also led to a significant overhaul and professionalism in how DASA and aviation safety is governed. A joint stand with CASA at the Australian International Air Show at Avalon underscored to the public the strong working relationship being built with civilian organisations. Other notable achievements at this time were DASA’s independent support to Papua New Guinea as that country re-established a Defence aviation capability, release of a blueprint and draft regulatory material to address cyber hazards in aviation safety, the beginning of work on DASA’s future role in space and cyber space, a ‘people plan’ for DASA members, the implementation of an Aviation Safety Information System, and acknowledgement of Structural Integrity as a Sovereign Industrial Capability Priority.

Agius was also determined to facilitate a follow-up to IMARC. An immediate issue was the acronym would have to change as it was identical to a mining industry event – the International Mining and Resource Conference. Luckily, Group Captain Nick ‘Fluffy’ Dyce-McGowan was on hand to devise what proved to be one of the more amusing and astute military acronyms:

I thought about what we were trying to do (aviation regulation and safety) and how we were executing it (an international convention) and came up with ICARAS – the International Convention of Aviation Regulation And Safety. That then contributed to the image used for the convention (Icarus) which I recommended because it had a direct link to design and safety: Daedalus used the wrong glue to stick the wings to his son’s arms (engineering/design) which melted when exposed to heat (structural failure) resulting in Icarus plummeting to his death (safety) ... and it stuck!

So DASA had a great name for the proposed convention but, as events unfolded, it became very clear there would be no senior officers hugging this time around.

The onset of the COVID-19 pandemic in early 2020 presented unique challenges to DASA.

The organisation, however, demonstrated rapid adaptability. Its traditional ‘in person’ oversight and educational activities were quickly restructured to comply with COVID-19 best practice using the ADF’s remote work and communication capabilities which generally continued to function effectively despite the heavily increased data loads. In Melbourne, where most of DASA’s staff were located, the onset of lockdowns meant that ‘Working From Home’ became the norm and generated yet another Defence acronym – WFH. Subsequently, as the virus swept across the country, other states experienced lockdown conditions, including the nation’s capital territory. Despite this, DASA continued to provide the oversight required of a military aviation safety organisation.

Agius was pleased with the agility shown by members during demanding times:

DASA adjusted the conduct of independent aviation safety assurance functions to account for the social distancing requirements and travel restrictions. Key functions impacted were promotion and training, oversight and enforcement, and independent boards of review.

DASA implemented movement of many training courses, oversight activities and boards of review onto remote platforms. ‘The impact of COVID-19 restrictions on independent safety assurance functions was considered manageable as a result of adaptations that were quickly implemented,’ Agius said. The next big challenge would be to host a major international event with no face-to-face contact, so planning began for a completely online format.

DASA co-hosted ICARAS on 24–25 November 2020, in conjunction with CASA and the ATSB.

The theme was ‘Safety Management Systems – Leading, Learning, Preventing’.

A number of civilian and military aviation safety experts gave keynote presentations on safety management systems, which have been shown to have a positive effect on aviation safety. The online format meant a range of stakeholders could be involved despite COVID-19 restrictions, including international delegates from the Five Eyes countries, and also Singapore, Papua New Guinea, Philippines and Malaysia.

Agius said he was pleased to be able to co-host such an important aviation safety event with CASA and the ATSB:

Engagement with equivalent civilian organisations, industry and regional partners fosters improved aviation safety outcomes overall. Working closely with CASA and the ATSB makes sense and recognises that we perform equivalent and complementary functions for aviation safety in Australia. Given the challenges posed by the COVID-19 pandemic, it has been especially satisfying to be able to co-host the convention and provide the chance to hear from experts in the field, compare notes and build knowledge bases with our industry, coalition and regional partners. This improves aviation safety outcomes for everyone.

He took a keen interest in the wellbeing of his workforce during this singular challenge and initiated a series of regular newsletters in which he updated staff on DASA’s activities and provided resources for mental and physical health. During this time, he also authored two decision briefs which went to the Defence Aviation Authority, providing a frank assessment of how DASA was managing the pandemic’s impacts and what the implications for safety were. ‘I thought we did an awesome job assuring aviation safety and looking after our people during COVID,’ he reflected. Agius’s leadership during a very challenging time provided the resolve needed for DASA to continue to build its reputation as an exemplar, globally aligned aviation safety organisation and his duty of care made challenging times a great deal more tolerable for the organisation’s people.





## 2022

When Air Commodore Joe Medved took over as Director General of DASA at the start of 2021, the ADF was still in the midst of the pandemic with quite distinct conditions and restrictions in different states. In Melbourne, where most DASA staff were located, a dubious record would be reached as the city endured the world's longest lockdown. As with his predecessor, Medved was mindful of the wellbeing of DASA members and backed a range of initiatives to support them through challenging times. The Wellbeing Team continued a daily email, senior leaders organised virtual team catchups, and 'Coffee Roulette' allowed randomly selected members to pair up for a chat each week which had the added benefit of cross-pollinating between ranks and Directorates, establishing new connections and insights.

Medved was keen to hit the ground running by executing and evolving the DASA Strategy which had been established by his predecessor. To that end there were some key themes he wanted to focus on. First, he wanted to continue consolidation of the Defence Aviation Safety Framework which was a strategic theme that went back to Air Commodore Hood's tenure. Beyond that he was intent upon finalising a DASA reorganisation, which would be more reflective of a unified Aviation Safety Authority, that would be structured and resourced so as to more effectively achieve its objectives. This 'One DASA' goal was very much in the spirit of the Sea King Board of Inquiry recommendations which provided the initial impetus for amalgamating the three predecessor agencies. As he explained, he also wanted to 'implement a new strategic theme to improve independent aviation assurance through exploiting data using advanced data analytics.'

Medved was also mindful he was inheriting some challenges but also some opportunities being afforded by the pandemic:

COVID has impacted on the ability to engage face to face due to border restrictions and geographic lockdowns. These limitations forced DASA to focus on the means to maximise the impact of our outputs on the regulated community, while simultaneously looking after the welfare of DASA personnel, many of which have endured in excess of 260 days of strict lockdown in 18 months in Melbourne.

As he explained, the impacts upon DASA functions were many and varied:

It compromised the effectiveness of oversight and enforcement – in particular maintenance oversight. DASA responded by switching from face to face to remote means, for example in the conduct of audits and Airworthiness boards. At times the switch to remote oversight was made with only one day's notice due to unpredictable changes to State and Territory border restrictions. While the responsiveness and resilience of DASA staff has been remarkable, it is acknowledged that the absence of face-to-face oversight leads to sub optimal oversight, the impact of which is difficult to quantify in the short term.



Promotional activities intended to create greater awareness of DASA and its role were also impacted by the pandemic conditions:

While attempts to maximise virtual arrangements were made, the COVID situation led to a number of key events being untenable, such as the 2021 International – and RAAF Centenary – Airshow at Avalon in the state of Victoria. This is a key CASA and DASA promotion activity.

Medved was, however, able to identify some positives to come out of the difficult circumstances, one of which was a new approach to education and training:

A silver lining of COVID was associated with forcing the transition to virtual training, which in many instances provides greater access for the wider aviation community who can undertake training at a time and location convenient to themselves. Further, the pandemic restrictions helped identify those courses where a blended solution of virtual and on-site face to face provides the optimum balance of flexibility and efficiency with educational benefits. This was evidenced with the Aviation Safety Officer training courses adapted in 2021.

In late 2020, DASA had commenced a comprehensive Function and Resource Review which identified core functions, activities, resource requirements, and some areas which would benefit from a restructure. A transition to a new organisational structure occurred as of February 2022. The outcome built upon an interim DASA reorganisation implemented in January 2019 and is reflective of a unified Aviation Safety Authority, structured and resourced so as to more effectively achieve its objectives. The reorganisation addressed weaknesses in flight operations safety assurance identified in the 2020 review by Air Vice-Marshal Schmidt and Skidmore, simplified the directorate structure (by establishing a Headquarters and five community facing directorates), and created balance by increasing the number of operator positions, both in the Authority and in the DASA senior executive. Notably, the reorganisation led to the disbandment of one of the former safety agencies, the Airworthiness Coordination and Policy Agency, thereby creating a DASA that finally discarded its legacy technical and operational divide. Medved presided over the changes:

DASA strives to be an exemplar, globally recognised military aviation safety organisation, providing trusted, credible and defensible support to the Defence aviation community and industry partners. As such we align Australia with global best practice in military aviation safety regulation and organisational structures.

DASA's transition to the new structure has now been completed, underscoring the organisation's adaptability in meeting the demands of a rapidly evolving military aviation sector. As the global strategic situation continues to provide complex challenges, DASA is well placed to provide the aviation safety framework a Defence force requires to be effective.

## *The legacy of a pioneer*

The story of military airworthiness in Australia began with Eric Harrison. From the first military aviation flight in 1914, and the first incident later that same day, to choosing the best timber for a locally made aircraft, and then studying the British AID, he realised Australia needed to learn from what was at that time world best practice. He also realised Australia was a very different case to what was then the world's pre-eminent power, and adaptations would need to be made which took account of local conditions. Until his death on 5 September 1945, Harrison worked tirelessly to build an organisation and knowledge base that would create a robust testing and acceptance process and culture, supportive of an emerging local manufacturing capability. Maintenance was, of course, another component and, with the implementation of DASR, Australia now has a system in place that seamlessly blends all elements of airworthiness and does so in a way that aligns with global best practice.

The creation of DASA gives Australia an exemplar airworthiness organisation that is well on its way to international recognition. The proactive approach taken by the Authority has led to a global focus on the Australian experience of military airworthiness with a vast range of explicit benefits, and some that were not integral but welcome nonetheless. Foremost of these is the scope for international engagement and, as IMARC showed, a diversity of international militaries have engaged at a very senior level, building bridges between countries based upon a concept that unites everyone, namely that military flying should be as safe as possible.

When Harrison died in 1945, the extremely capable Ellis Wackett built upon the technical knowledge and expertise already created with the establishment of the Technical Branch in 1948. However, as we have seen, the following decades saw a decline in a commitment to some core airworthiness principles, leading to an eventual crisis point which would have no doubt horrified such dedicated and capable men. It can be speculated, however, that Harrison would be delighted if he could see what has transpired in recent years. The Air Force he loved so much has emerged from a period of crisis and made a commitment to be a world-leading exponent of airworthiness. Physics dictates flying will always have some risks attached but Australia no longer accepts anything other than an approach that reduces them as much as possible. The Authority's motto says it all: 'Capability First – Safety Always'. As we enter the third decade of the 21st century, Australian military aviation has become a vastly safer proposition than in previous years.



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Air Vice Marshal Noel Schmidt; Colonel Jeff Stark and Captain Daniel Reilly (RAN).