PATHFINDER
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DEFENCE AIRWORTHINESS

Airworthiness is about ensuring that safe aircraft operate in a safe system.

Airworthiness in Defence is, at times, regarded as a fairly modern construct, although that is not the complete picture. In the 1930s, there were some tentative steps to incorporate consideration of airworthiness as part of the engineering management process of the Royal Australian Air Force (RAAF) aircraft fleet. Later, in both the 1950s and 1970s, there were attempts to integrate airworthiness into RAAF engineering. However, these were essentially ad-hoc arrangements that did not take hold. So while there were earlier forays in airworthiness, there was no lasting unified approach to the evaluation of the technical and operational risks for military aircraft in Australia.

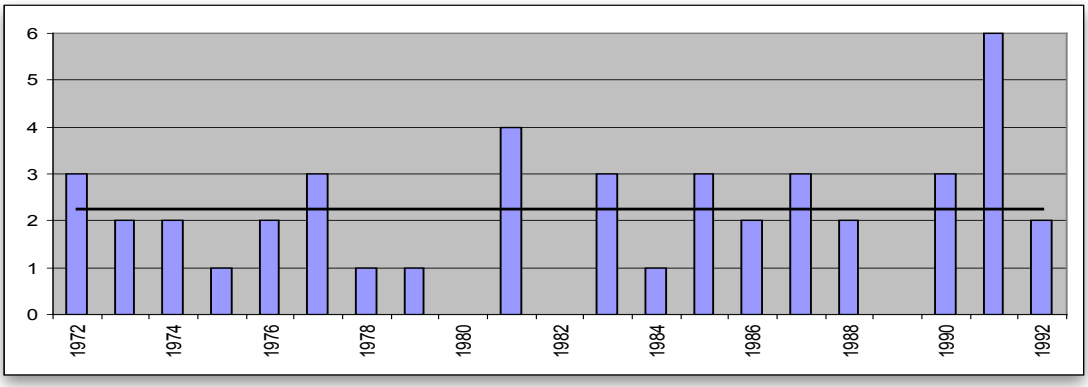
Since World War II, the long-term fatal accident rates in the RAAF had some lows during the periods of peace, but increased markedly during wartime. There were improvements in safety as the RAAF fleet retired its older piston-engine aircraft, and inducted jet and turboprop aircraft, however, even in the peacetime environment that existed from 1972 to 1992, the number of fatal crashes exceeded two per year. It was as though crashes and fatalities were bound to occur in military aviation, and although there were years in which there were no crashes, these years were the exception to the rule.

Alongside the gradual trend away from operating the less-safe, piston-engine military aircraft, there was also a trend toward inducting more complex aircraft that employed advanced systems. An example of this increasing complexity in aircraft systems is the comparison of the Mustang fighter of late World War II and the 1950s to the software-enabled F/A-18 Hornet fighter that the RAAF has been operating from the mid-1980s to the present day. Besides the differences in the engines of these two aircraft, there is also a distinct difference between them in the complexity of their avionics and other operating systems. So far there have only been four fatal accidents for the Hornets in RAAF service, meaning that the enhanced capability has been delivered more safely than it was 50-60 years ago.

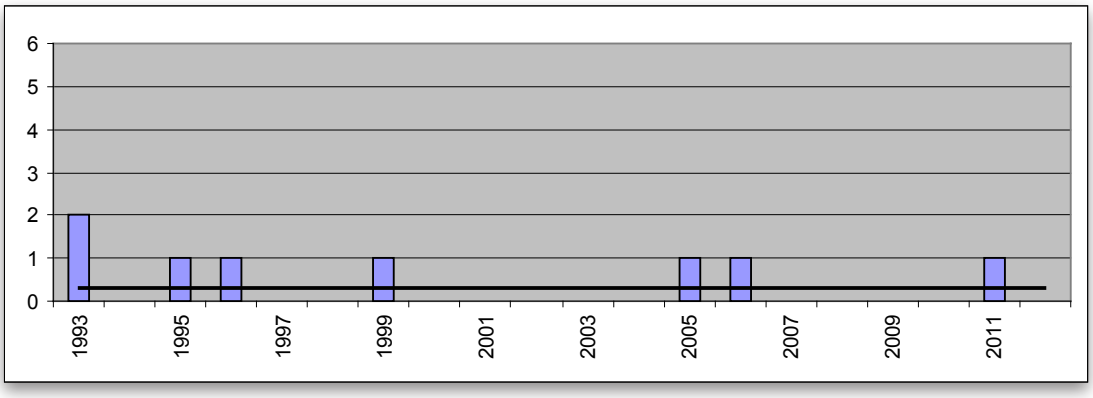
Another set of factors related to airworthiness emerged during the 1980s, as the RAAF had begun to acquire aircraft that already had civil-type certification. This new development was combined with the gradual transition to contracted engineering and maintenance functions. These two factors prompted the RAAF leadership to propose an airworthiness framework that retained the civil-type certification of these aircraft, while permitting the RAAF to operate the aircraft safely in the military environment. In 1989, a proposal was made to the RAAF Chief of Staff Committee to adopt a airworthiness model that included Airworthiness Boards (AwBs) for the various fleets of Defence aircraft.

Although the long-term accident rate for the years 1972 to 1992 averaged over two per year, there was an unusual spike in the accident rate during 1990 and the first five months of 1991 when there was a total of five fatal and one non-fatal accidents: ARDU Nomad (12 Mar 1990), No 75 Squadron Hornet (2 Aug 1990), No 76 Squadron Macchi (19 Nov 1990), Army Kiowa (25 Feb 1991), No 10 Squadron P-3C (26 Apr 1991), and the non-fatal accident, 2FTS Macchi (16 Oct 1990). It was hardly surprising that in late 1990, the Chief of Air Force (CAF) was appointed as the RAAF Airworthiness Authority, and a system of AwBs was established.

The general concept of the AwBs, made up of senior RAAF officers, was that they conducted a structured review process that examined the technical and operational airworthiness of the military aircraft. The first AwB was held on 9 May 1991.



Defence Fatal Crashes, 1972-1992. The line indicates the average number per year.



Defence Fatal Crashes, 1993-2012. The line indicates the average number per year.

The Boeing 707 was selected for review, as there was considerable interest in the engineering and civil-type certification of the large aircraft. There was also complex issues with the tanker modification project that was then underway. The AwB had two serving RAAF board members as the technical and operational members.

In the four months between the first and second AwBs (the second AwB was held October 1991), there was a further three fatal accidents: No 75 Squadron Hornet (5 Jun 1991), CFS PC-9 (5 Aug 1991), and Army Nomad (9 Sep 1991). There was also a serious incident involving a No 75 Squadron Nomad (17 Sep 1991). The Nomad was selected for review as it had civil-type certification, and there was also a high level of public interest in the safety of the Nomad following the crash of the ARDU Nomad in March 1990. The date for this AwB had already been notified before the fatal crash of another Nomad and the subsequent serious incident in September 1991. Six days after the second AwB, on 29 October 1991, a Boeing 707 of No 33 Squadron was involved in a fatal accident. Subsequently, on 12 December 1991, a civil-registered RAAF Museum Tiger Moth was also involved in a fatal accident.

In late 1993, another major review of RAAF engineering functions was undertaken, resulting in BluePrint 2020, which eventually led to the creation of the Directorate General of Technical Airworthiness and the development of a new technical airworthiness framework. The first version of the Technical Airworthiness Management Manual, incorporating the Technical Airworthiness Regulations, was issued in November 1994.

In 1998, as a combined response to the Defence Reform Program and recommendations from the June 1996 Black Hawk accident inquiry, CAF was appointed as the Australian Defence Force (ADF) Airworthiness Authority. The AwB board members thereafter reported to CAF. In 1999, the composition of AwB members commenced a transition from serving ADF senior officers to retired senior officers, increasing the independence of the review process. In 2011, CAF's appointment was changed to the Defence Aviation Authority coincident with the reissue of DI(G) OPS 02–2—Defence Aviation Safety Program.

The RAAF Airworthiness Manual was issued in 1991, but in 2001 it was reissued as the ADF Airworthiness Manual under Australian Air Publication (AAP) 7001.048(AM1), incorporating both Military Aviation Regulations and Operational Airworthiness Regulations (OAREGs). In 2005, the OAREGs were issued in a separate publication, the ADF Operational Airworthiness Manual (AAP 8000.010).

The fatal accident rate since 1992 shows a marked decrease. In addition to the improved reliability of modern aircraft, the implementation of the Defence airworthiness system, and major changes to the technical and operational cultures across Defence, has resulted in a dramatic reduction in the average accident rate for the period 1993 to 2012, which now stands at 0.4 fatal crashes per year. It is also noteworthy that this 20-year period has not been without its dangers as the ADF was involved in operations in Iraq and Afghanistan. The focus on airworthiness has resulted in the ADF continuing to operate in these challenging theatres, while also achieving a safety record throughout this period that is the safest in Australian military history.

Key Points

- *Airworthiness is about ensuring that safe aircraft operate in a safe system*
- *There was an unusual spike of accidents in 1990-91 that prompted the creation of a system of AwBs to oversee the technical and operational aspects of airworthiness*
- *CAF is the Defence Aviation Authority*

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