

Senate Standing Committee on Rural and Regional Affairs and Transport

Inquiry into the Administration of CASA and related matters

Submission by Eugene Holzapfel

This submission will respond to the third item of related matters in the Terms of Reference for the inquiry, *to consider ways to strengthen CASA's relations with industry and ensure CASA meets community expectations of a firm safety regulator*. Relations with the nascent but potentially substantial aviation design and manufacturing industry will be the prime focus.

In this regard we should note that Australia is batting substantially below our weight internationally in aviation manufacturing. Compared to Canada and Brazil we have a minuscule aviation manufacturing industry.

IMPORTANCE OF AVIATION MANUFACTURING INDUSTRY

Australia has large spaces depending on aviation for the basic necessities of life, which would often benefit by unique Australian solutions. However, the vast proportion of aviation products used in Australia are designed and built overseas. This is quite understandable for large aircraft, where the cost of development mitigates against multiple manufacturers. However, why this also applies to small aircraft where development costs are modest is quite bewildering.

Aviation has immense potential for economic output. A comparison of the development of aircraft in Brazil and Australia is informative.

The prototype Nomad aircraft developed at the Government Aircraft Factories (VH-SUP) flew on 23 July 1971. However, only 170 Nomad aircraft were manufactured. The Embraer EMB 110 Bandeirante made in Brazil was a similar twin turboprop aircraft. The passenger model Bandeirante first flew on August 9, 1972. Over 21 years Embraer built 494 Bandeirante aircraft. Embraer was privatized in 1994, and has become one of the largest aircraft manufacturers in the world. Embraer is one of Brazil's largest exporters, and directly employs over 21,000 people. Embraer has delivered more than 900 jet aircraft, and Virgin Blue Airlines has ordered 20 EMBRAER aircraft.

Hence Australia and Brazil started with about the same product in the early 1970s. Brazil chose to continue to invest in the industry, and is today a world leader. Australia chose to let the industry atrophy, and today has a remarkably small aviation manufacturing industry.

It is difficult to find an aviation industry anywhere which has started without sustained government support. For example, Brazil, Canada, and China all received, or are receiving, substantial government assistance. However, once established, the economic benefits are substantial.

Not only are the economic benefits substantial, but aviation is a leader of technology change. The applications of aviation engineering can result in improvements to other areas of high technology.

The industry is not only involved with manufacturing of complete aircraft, but is also involved in modifying existing equipment to Australian conditions. A critical factor in deciding whether to develop a change is the number of aircraft to be modified. In many cases the cost of a desirable modification is only justified by including the potential market of overseas aircraft. Hence, the overseas acceptance of Australian design is a crucial factor in determining if desirable modifications will be incorporated into Australian aircraft.

Despite the overall poor picture, we have examples of Australian ingenuity producing internationally recognised products. Some examples are:

- Jabiru, based in Bundaberg, which produces aircraft, engines, and propellers. Well over 1,000 aircraft have been sold in Australia and internationally.
- Gippsland Aeronautics developed and continues to produce the GA8 Airvan, which has sold well in Australia and internationally, especially into the USA.
- Kavanagh Balloons produces a large range of conventional hot-air balloons specifically designed for the carriage of passengers. They have sold balloons in Australia and overseas, and have patents on major improvements in balloon design.
- Airborne Edge has sold a large number of Ultra Light Aircraft in Australia and overseas, and has a Trike that is Type Certificated by CASA.

There are a number of other examples where Australian innovation has been successful, but the commercial result is not substantial, and, in comparison to similar industrialised countries, is appalling.

IMPORTANT ISSUES FOR INDUSTRY

Australian industry requires a number of conditions to assist in the establishment of a commercial aviation manufacturing industry.

- **Approval of Australian designs and products to an agreed schedule.** Aviation designs are typically faced with high development costs, and production cannot commence until a regulatory approval has been issued. Thus, substantial funds are expended early, and loan funding is often only available if a realistic development schedule is available. Keeping to the schedule is important.
- **CASA to have a strong technical base and sufficient resources available to service industry requirements in a timely manner.** A recent CASA re-organisation resulted in almost all experienced field engineers departing. Also, there are shortages of specialist engineers in central office. In a number of areas of aviation engineering, CASA is short of expertise and capacity in ensuring that industry is serviced.
- **A substantial body of industry advisory material to ensure work is done in a manner that will be approved by CASA.** CASA has issued a range of advisory material, but most is very dated, and there is a need for industry update courses, as conducted by the FAA and Canada, and other leading aviation regulatory authorities.
- **Delegation to industry persons who have sufficient expertise to ensure timely progression of projects.** CASA initiated a project to develop new regulations to facilitate engineering representatives. The new regulations, called CASR 146, were first drafted in 2003, after extensive consultation that went back many years. Unfortunately, the regulations are still not available, and there does not appear to be any schedule for issue of these important regulations.

These conditions are therefore universally deficient at present, resulting in major hurdles for Australian companies to enter or expand in the international aviation market.

OVERSEAS ACCEPTANCE OF AUSTRALIAN APPROVALS

Australia accepts without further examination aviation approvals from a wide range of overseas countries. This is an excellent means of ensuring that products approved overseas are quickly available in Australia, at minimum cost and delay. However, those countries do not accept Australian products without detailed review. Australia has a limited range of agreements with overseas countries to expedite the necessary reviews.

Enclosed is a review of the issue. In general, there is a fine balance to ensure that new products can readily come into Australia, balancing the need to ensure that the complementary Australian industry is not disadvantaged by their products not being accepted overseas. Australia has operated for a number of years with the balance heavily tipped in favour of importing products, with little consideration of how Australian products can be accepted overseas.

Australia rightly imports all large (Transport Category) aircraft. In almost all other ICAO member states this would require the National Airworthiness Authority to review the aircraft certification. Australia allows such aircraft to come into Australia with minimal review. Hence, CASA's expertise in standards that pertain to Transport Category aircraft has lapsed, to the extent that overseas regulatory authorities, such as the FAA, have doubted the ability of CASA to supervise changes to these aircraft. CASA will need to develop and demonstrate greater expertise with such large aircraft before overseas regulatory authorities will agree to accept Australian approved changes to Transport Category aircraft.

PROPOSALS

Ensure CASA has a suitable industry reference group that speaks for the Australian aviation design and manufacturing industry. Department of Industry, now Innovation, Science, Industry and Research, initiated in 2004 the Aerospace Industry Action Agenda. The vision of the Action Agenda was....*to develop and sustain world competitive capabilities in the Australian aerospace industry and increase annual exports five-fold to \$3.5 billion by 2012.* One outcome of the Action Agenda was to form the Aerospace Industry Regulatory Certification Advisory Panel (AIRCAP) to advise CASA. Unfortunately the industry members of this panel are very busy with their own business, and the panel has not been able to assist CASA in many practical areas. The panel needs to be invigorated, or another group formed to provide expert industry views to CASA.

Advance glacial pace of improving delegations to industry (CASR 146). The project for development of new regulations expanding the roles of industry in issuing approvals has stalled, partly because of mixed industry inputs and partly because of limited resources within CASA. This is an important issue that needs to be advanced.

Allocate priority to progression of agreements with overseas regulators regarding acceptance of Australian approvals and products. Australia has remarkably few agreements for overseas acceptance of Australian products. Work to expand the existing few agreements appears to be delayed due to resource constraints within CASA International Agreements area. This work should be expedited by allowing other areas of CASA to conclude such agreements, or by other means of obtaining suitable specialist resources.

Ensure enhanced acceptance of overseas products is not concluded prior to consideration of reciprocal acceptance of Australian aviation products. Australian recognised countries should be increased to include Brazil, and possibly other countries. However, these countries should not be designated "Recognised Countries" without a substantial effort to obtain reciprocal rights of entry to those countries. Once a country is a "Recognised Country" the country has no incentive to offer any reciprocal acceptance of Australian products, hence all negotiation must be initiated early.

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30th June 2008

Enclosure: Overseas Acceptance of Australian Aviation Approvals

OVERSEAS ACCEPTANCE OF AUSTRALIAN AVIATION APPROVALS

A critical factor in facilitating the overseas sales of Australian aviation products is the acceptance of aviation approvals issued by CASA. The time and cost to duplicate approvals already achieved in Australia, possibly in multiple countries, is a substantial burden on industry, and in the vast majority of cases does not add to the technical justification for the Australian approval.

The cost of an Australian (CASA) approval can be substantial, and the added cost of overseas approvals can be a substantial impediment to overseas sales. The delay of obtaining such approvals can prevent commercial sales.

As the Australian aviation market is relatively small, many approvals are only justified on the basis of potential overseas sales. Hence, impediments to overseas sales deter the development of many desirable products, and raise the cost of those products produced.

A summary table of how Australian approvals are accepted overseas is enclosed. A number of issues are highlighted by this table, as follows:

- Very few overseas countries accept Australian aviation approvals, or accept approvals of Australian products issued by other countries (None theoretically, but NZ and PNG requirements are readily satisfied).
- There are very few agreements between Australia and overseas countries expediting the acceptance of Australian approvals. There is a major and very useful agreement with the USA, a very minor agreement with Israel, and a modest agreement with the UK.
- A number of countries will not start evaluating an Australian approval until there is an agreement between their country and Australia. These countries include; Russia, China, Japan and Brazil. There is currently no agreement between these countries and Australia, resulting in a substantial barrier to any sales of Australian products into these countries.

Annexes: 1. Summary – Acceptance of Australian Aviation Certificates
 2. Amplification regarding Selected Countries

SUMMARY – ACCEPTANCE OF AUSTRALIAN AVIATION CERTIFICATES

Country	Accept Type Certificates	Accept STCs	Accept Repair Design Data
Argentina, Canada, EU, Israel, India, Indonesia, Malaysia, Pakistan, Papua New Guinea, Singapore, South Africa	No Note, 3	No Note, 3	No Note, 3
Brazil	No Notes, 1, 3	No Notes, 1, 3	No
China	No Note, 1	No	No
Japan	No Notes, 1, 3	No	No
NZ	No Note, 3	Yes, + APMA & ATSO	No
Russia	No Note, 1	No	No
USA	No Note, 3	No	No
UK	No Note, 3 for ultra lights	No, EASA role	No, EASA role

Notes:

1. Foreign NAA will not review application without a bilateral agreement between the NAA and CASA.
2. Foreign NAAs will process requests for APMA and ATSO in a similar manner as for a TC or an STC. Refer to specific country for more information.
3. Foreign NAA review is reduced by CASA approval.
4. Supplementary Type Certificate (STC)
5. Ultra light aircraft have a Maximum Take off Weight of less than 450 kg.
6. Australian Parts manufacturing Approval (APMA), spare parts.
7. Australian Technical Standard orders (ATSO), approved products.

Brazil – National Agency of Civil Aviation (ANAC)

Before any validation of an overseas aviation approval is conducted, there must be an agreement in place between Brazil and the NAA of the State of Design. Staff from CASA visited Brazil in 2003, and staff from Brazil had previously visited Australia. The conclusion of these visits is that Brazil has a high level of expertise in aviation regulations, and Australia could readily conclude an agreement with Brazil. However, action has stalled.

Canada – Transport Canada (TC)

Canada has approximately 31,000 aircraft on their register, and is also a substantial manufacturer of aviation products, including aircraft (Bombardier manufactures Bombardier and De Havilland) and engines (Pratt and Whitney manufacture the PT6 in Canada).

TC has a comprehensive BASA with the FAA. However, TC does not recognise third party approvals. The possession of an FAA or EASA approval by an Australian company therefore does not contribute to the acceptance of these approvals in Canada.

TC has three levels of airworthiness review. A level 1 review is an administrative process and usually applies to less complex products or products already certificated by a country in the TC group 1 list of countries. A level 2 review is performed for more complex products and requires an on-site review. A level 3 review is performed where TC has little knowledge of the regulatory process of the country of design, and requires a detailed review of both the product and the foreign airworthiness authority. Australia is currently a Group 2 country. All Group 1 countries have a reciprocal bilateral agreement with TC.

China (CAAC)

General and private aviation in China is relatively unknown, but commercial aviation is growing quickly.

In 1999, China established Aviation Industry of China (AVIC I and II). They operate as a state holding company under the direct supervision of the Central Government. AVIC I mainly focuses on large and medium size aircraft while AVIC II gives priority to feeder aircraft and helicopters.

AVIC I has nearly 240,000 staff in industrial enterprises, and 45,000 staff in research institutes. AVIC II has more than 222,000 employees in 79 enterprises, including 3 research centres.

China has a BASA with the FAA and a working arrangement with EASA.

China will not initiate a validation process unless there is an agreement in place between China and the country of design.

CASA and CAAC have examined each others aviation regulatory systems with a view to establishing a form of mutual recognition of certification. However, until such an agreement is in place, China will not validate any approvals issued by Australia. Unfortunately, China does not require their aviation industry to be economically viable, and any agreement that accepts approvals could result in China putting pressure on the nascent Australian aviation manufacturing industry.

European Union (EASA)

The European Aviation Safety Agency (EASA) has jurisdiction over new Type Certificates and other design-related airworthiness approvals for aircraft, engines, propellers and parts. The EU is a major manufacturer of aircraft, engines, and all aviation products.

Manufacturing approvals issued by EASA differ from those issued by the FAA and by Australia. CASA and the FAA issue an approval to manufacture each item, eg, each APMA has a separate approval. The EASA system is to issue a manufacturing approval, and any item within the scope of that approval can be manufactured, but must be manufactured to approved data.

Another difference is that EASA only allows an organisation with a Design Approval or links to an organisation with a Design Approval to apply for some approvals, especially a Type Certificate or an STC. This is different from the situation in Australia where anyone can apply for such approvals.

Australia does not have an agreement with EASA, but UK CAA and EASA visits to Australia have enabled EASA to accept a few Australian approvals. In particular, EASA accepts that an organisation with a CASA Design Approval (CAR 30) can apply for an EASA approval.

A working arrangement between EASA and CASA is under negotiation.

The EC will not accept third party approvals even if other countries/authorities with whom they have agreements, accept them.

A visit to Australia in 2005 allows EASA to enter into a Working Arrangement for Part 23 aircraft and hot-air balloons, recognising the Australian certification system, and give maximum practical credit for technical evaluations issued by CASA. However, EASA must certify Australian STCs.

EASA started to develop an agreement with CASA, but action appears to have stalled due to lack of resources within CASA.

Israel - CAAI

There is an agreement between Australia and Israel regarding the acceptance in Israel of Trike aircraft manufactured in Australia by Edge. Also, The Australian Jabiru engine is used in some aviation applications in Israel.

Israel has sought to expand this agreement, but no action is known.

New Zealand – New Zealand Civil Aviation Authority (NZ CAA)

Australian and NZ made commitments for mutual recognition under the Australia NZ Closer Economic Relations Trade Agreement of 1983, and the subsequent Trans-Tasman Mutual Recognition Arrangement signed in 1996. There are also commitments in the Australia and NZ MOU on Open Skies signed in 2000 in respect of mutual recognition of aviation-related certification.

Both countries also have APEC commitments through the Bogor Declaration of Common Resolve to eliminate impediments to economic cooperation and integration and to achieve free and open trade and investment before 2010.

The Australian-NZ Single Aviation Market Arrangements, signed on 19th September 1996, includes para 9 (1). Mutual Recognition of Aviation-related Certification. Which states that the; *Aviation safety authorities of the two countries will establish, before the end of 1996, a timeframe intended to achieve the adoption of mutual recognition of all aviation-related certification not covered by the Trans-Tasman Mutual Recognition Arrangement, and a work programme to achieve mutual recognition.*

Arrangements for mutual recognition of aviation related certification were enacted on 13th February 2007.

Currently, Australian Type Certificates for aircraft, engines and propellers go through a Type Acceptance process, but this is largely a data supply exercise (the same as FAA or EASA Type Certificates). Australian STC's are acceptable technical data in NZ, but, Australian modification approvals and data for aircraft repairs do not have any status in NZ.

Hence, despite the many intentions of mutual recognition, Australian modification approvals and data for aircraft repairs are not recognised by NZ (and vice versa), resulting in unnecessary duplication of approvals. This is an especial problem during transfer of aircraft between Australia and NZ.

UK Civil Aviation Authority (UK CAA)

An agreement was implemented between Australia and the UK in 2004 to facilitate UK acceptance of small aircraft (less than 450 Kg) with a Type Certificate issued by Australia. All other aircraft, products and approvals are accepted into the UK via EASA; however, the agreement notes that the UK CAA will only accept APMA parts for Australian products.

The Airborne Edge and the Jabiru UL-D have been issued with a UK CAA Airworthiness Approval Notes using the arrangements in this agreement.

United States of America (FAA)

The USA represents the world's largest market for aircraft of all types and sizes. The aircraft register lists over 200,000 aircraft, including 7,500 helicopters and 170,000 piston engine aircraft.

An agreement has been implemented between Australia and the USA to facilitate mutual acceptance of each other's approvals, called a Bilateral Aviation Safety Agreement (BASA).

CASA regulations declare the USA to be a recognised country, and FAA approved STCs are approved data in Australia. Also, if an aircraft has an FAA Type Certificate, a CASA Type Acceptance Certificate can be issued on presentation of defined documentation. These provisions allow Australians rapid access to products and approvals found acceptable by the FAA.

Australia therefore accepts many US products and FAA approvals. The BASA provides some acceptance of Australian approvals by the FAA.

Unfortunately, FAA regulations do not allow the FAA to accept automatically an approval issued by another country (unlike Australian). Hence, FAA expects to conduct a validation exercise before issue of an FAA approval. However, the depth of an FAA validation process can be varied depending on the product and FAA familiarity with the State of design.

The BASA also has a number of aspects which should be included, such as USA acceptance of Australian APMA and ATSO, and data relating to large (Transport Category) aircraft and helicopters. However, this is a treaty level agreement, which tends to inhibit changes.

RÉSUMÉ

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Qualifications **Diploma of Electrical Engineering - Caulfield Institute of
Technology**

Bachelor of Engineering (Electrical) - Melbourne University

Bachelor of Arts (Economics) - ANU

Master of Management - University of NSW

Summary

I spent 31 years in the RAAF and ten years with the Civil Aviation Safety Authority (CASA). My career has embraced national and international participation in Aircraft Engineering, Quality Assurance, and risk management, at increasing levels of responsibility.

During my time at CASA I managed the full range of engineering issues related to regulation of aviation. This included;

- Review of defect reports.
- Consideration of manufacturer's service bulletins.
- Consideration of recommendations by Air Safety Investigators.
- Review of Airworthiness Directives from the State of Design, including Alternative Means of Compliance.
- Issue of Airworthiness Directives.
- Review and approval of requests for exemptions from Airworthiness Directives.
- Drafting and approval of information and recommendations for industry.
- Drafting and approval of design standards.
- Issue of Type Certificates.
- Issue of Manufacturing Approvals.
- Review and approval of Supplementary Type Certificates.
- As Australian representative on the ICAO Airworthiness Panel, had responsibility for managing a review of ICAO advisory material on aircraft certification activities.

EMPLOYMENT HISTORY

Current from Nov 2006

Consultant in aviation engineering.

Projects undertaken include:

- Technical support for issue of all approvals necessary for operation of an Unmanned Airborne Vehicle in Australia.
- Investigate how Australian aviation approvals are accepted in various countries, which provided insight into the approval processes of these countries.
- Assist The Institute of Engineers in accrediting an engineering degree in aviation avionics.
- Reviewed design basis for aircraft in Antarctica.

2001 until Nov 2006

Civil Aviation Safety Authority (CASA)

Manager, Manufacturing and Certification

In this position I was responsible for:

- policy for the manufacture of aviation products
- issue of type acceptance certificates for overseas aircraft
- issue of type certificates for Australian aircraft
- policy and management of aircraft flight manuals
- flight test policy and testing of aircraft

I was the Australian member of the ICAO Airworthiness Panel, allocated responsibility for rewriting the certification procedures in the ICAO Airworthiness Manual. I conducted a survey of persons authorised by CASA to approve designs, and approved avionic modifications.

Special interests included:

- project management of cockpit security doors
- development of unique design standards
- monitoring cabin air quality issues
- agreements with foreign countries for acceptance of Australian certification approvals
- member of editorial board of Flight Safety Australia.

1999 until 2001

CASA, Section Head - Systems

In this position I was responsible for direction of technical staff:

- Establishing technical standards for aircraft, engines, propellers, mechanical systems, and aviation components.
- Review of aircraft designs for certification.
- Monitoring airworthiness of aircraft in Australia.
- Investigating defects and instigating corrective action.
- Development of policies and procedures relevant to design and manufacture of aircraft, engines and propellers.
- Providing technical support to all areas of CASA.
- Issue of Airworthiness Directives.

EMPLOYMENT HISTORY (Continued)

1997 until 1999

CASA, Manager Technical Specialists

In this position I was responsible for monitoring the airworthiness of aircraft in Australia and instigating necessary corrective action. I led the CASA approval of a design standard for primary category aircraft.

I managed the CASA defect investigation laboratory, including its successful transfer to the ATSB.

Jan 1996 – Jan 1997

Director, Communications and Information Systems, RAAF, Canberra.

I had overall responsibility for RAAF Communications and IT and chaired several Defence committees. The position involved interaction with high level management to ensure RAAF utilised these new IT tool to improve business operations.

Jul 1993 - Jan 1996

Regional Director, Defence Quality Assurance, Defence.

My responsibilities in this position embraced:

- Development of Defence Quality Assurance (QA) policy.
- Direction of QA for all Defence major projects.
- Management of international agreements.

Jan 1993 - Jul 1993

Director, Logistical Support to Major Projects, RAAF.

I led specialists in systems engineering, logistics, reliability and maintainability to support major projects.

Jan 1990 - Dec 1992

Director, Systems Engineering, RAAF.

I led engineering staff supporting projects, which included:

- F-111 Avionics Update, Test Equipment and Simulator,
- Fatigue test of the F/A-18 aircraft structure,
- Software support for the F/A-18,
- P-3C Avionics Update, and P-3C ESM Update,
- B707 Tanker Conversion.

I conducted design reviews of major projects, which involved a detailed review of the design proposed by the contractor to ensure it would satisfy RAAF requirements.

Jan 1988 – Dec 198

Commanding Officer, P-3C Maintenance, RAAF, SA.

I was responsible for maintenance and availability of these aircraft. The squadron of about 650 personnel included a complete range of avionics, engine and structural workshops with frequent deployments of aircraft around the world. I had direct responsibility for an integrated design facility which developed several major modifications for the P-3C.

EMPLOYMENT HISTORY (Continued)

- Jan 1987 - Dec 1987** **Project Manager, BARRA Sonobuoys and VIP Aircraft, RAAF, Canberra.**
The BARRA Sonobuoys was Australia's most valuable defence export, and leasing the VIP aircraft required development of innovative management arrangements to provide airworthiness control of these high visibility aircraft.
- Jul 1986 - Dec 1986** **Attended Joint Services Staff College, Canberra.**
- Jan 1983 - Jul 1986** **Lead Engineer, RAAF, Canberra.**
During this time I was responsible for development of technical policy for RAAF avionics equipment, and the management of selected high visibility projects. I developed procedures to deal with software in aircraft systems, and developed outline policy for Defence risk management in major projects. Awarded certificate in risk management.
- I was responsible for the RAAF Calibration system with about 120 staff around Australia, and directed the construction of a new central laboratory and a training program for all services.
- I represented Australia on international standards bodies for Integrated Avionics Systems and for Electrical Systems.
- Jan 1982 - Dec 1982** **Attended RAAF Staff College, Canberra.**
- Nov 1978 - Dec 1981** **RAAF Liaison Officer- USAF, F-111 Avionics, Ohio, USA.**
I was a project manager with the USAF aircraft development organisation, in Ohio, USA. I prepared the negotiating position for several contracts (over \$1B in current value) and was a member of the negotiating team. I supervised contracts by Defence contractors to study aircraft modifications and decided the technical acceptability of the resultant reports.
- Jan 1966 - Oct 1978** **Various Engineering Positions, RAAF.**
My postings during this time involved the development of engineering standards for the maintenance of aircraft and aircraft components. The assignments included two years managing the maintenance of aircraft components by Australian and overseas contractors. Two assignments included hands on responsibility for maintenance of aircraft and aircraft components, investigation of problems, and development of appropriate corrective action.

PERSONAL DETAILS

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DATE OF BIRTH : **20 February 1945**

MARITAL STATUS : **Married to Helen Holzapfel
Three adult children.**

QUALIFICATIONS : **Master of Management - University of NSW**
**Bachelor of Engineering - Melbourne
University**
Bachelor of Arts (Economics) - ANU
**Diploma of Electrical Engineering -
Caulfield Institute of Technology**
**Extensive personal and professional
development courses, including completion
of two Defence staff colleges, a one year
study of the Australian aviation industry and
a Certificate of Risk Management from the
University of NSW.**
**Trained auditor of engineering design
facilities.**

HEALTH : **Sound.**

**SECURITY
CLEARANCE** : **Held Top Secret + during service in RAAF.**