



**Australian Government**

**Civil Aviation Safety Authority**

## **Civil Aviation Safety Authority (CASA)**

**Comparison of cost of training aircraft maintenance engineers in Australia, New Zealand, the United Kingdom and the USA.**



# 1 General

## 1.1 Introduction

The Aviation Regulation Review Task Force sought advice from CASA as to the relative costs of training aircraft maintenance engineers in Australia compared to NZ, UK and USA. To assist with the background research, CASA engaged APIS Consulting who undertook a desktop analysis of the key issues involved in the training of engineers across the four States.

This comparative report comprises:

- a comparison of the total cost (money and time) of maintenance training leading to the issue of a maintenance engineer licence (certification privileges) in Australia (under both current and under proposed regulations) against the USA, the United Kingdom and New Zealand.
- identification of major differences between these jurisdictions in regards to their maintenance licensing systems both current and under proposed regulations.
- identification of compliance or differences with ICAO requirements for each jurisdiction.
- a commentary on identified regulatory system differences and estimation of the cost impact of such differences<sup>1</sup>.

The report identifies the cost of training aircraft maintenance personnel to a level where they could certify for work. This includes where possible, the basic engine airframe licence, and applicable type ratings for the J41/42 and the 737 NG. Where a parallel course is chosen for avionics, the cost difference from the basic engine/airframe course is added.

### 1.1.1 Scope

Aircraft maintenance personnel who are licensed in Australia, the UK and New Zealand are known as Licensed Aircraft Maintenance Engineers (LAMEs). Aircraft maintenance personnel who are licensed in the US are known as Airframe and Powerplant Mechanics (A&Ps).

The aircraft maintenance personnel licensing system has four essential elements:

- The first is **People** who choose to become aircraft maintenance personnel and are required to apply and meet eligibility requirements.
- The second element is a system of **training** that is undertaken by the applicants to give them the knowledge and skills required to effectively undertake aircraft maintenance. Note – it is possible to self study for examinations in some countries without completing formal training of any kind. However, this report only examines the cost of obtaining a licence having completed formal training.
- The third part of the system is an authorisation framework consisting of regulators and in some instances employers who ensure the person is competent through **examinations** and tests or demonstration of competency standards.
- The fourth part of the system is a licensing or **certification** process that documents the proficiency of a person to carry out and certify for maintenance.

This report does not seek to address issues of safety or differences in quality of maintenance between the countries in the study.

## 1.2 Methodology

Telephone interviews and baseline research was conducted across the key organisations in Australia, UK, USA and NZ. The organisations operating the defined aircraft types were identified and where possible, maintenance training specialists were contacted and interviewed for information on training and delivery.

For the comparison of maintenance personnel training systems and International Civil Aviation Organisation (ICAO) Differences, the Standards Recommended Practices (SARPS) from ICAO were consulted along with a range of documents from the National Aviation Administrations (NAA) of Australia, New Zealand, the United Kingdom and the USA.

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<sup>1</sup> All costs are quoted in Australian dollars. The following exchange rates are used:

- 1 AUD = 1.166 NZD 1 NZD = 0.857368 AUD
- 1 AUD = 0.445 UK pounds or 1 UK pound = 2.246 AUD
- 1 AUD = 0.897 USD or 1 USD = 1.114 AUD

## **1.3 Documentary References**

The following documents from ICAO have been consulted in the development of the report:

- ICAO Annex 1 Chapter 4
- Supplement to ICAO Annex 1 (Eight Edition) – for notified differences

### **1.3.1 Australia**

The following documents from Civil Aviation Safety Authority (CASA) were consulted.

- Civil Aviation Act 1988 as amended
- Civil Aviation Regulations (CAR) 1988
- Civil Aviation Orders (CAO) Part 100
- Airworthiness Advisory Circulars (AAC) Part 9
- CASA website information pertaining to Proposed Civil Aviation Safety Regulation (CASR) Part 66
- Civil Aviation Advisory Publication 30-5(0)
- CASA Publication, “Maintenance Guide for Engineers”
- Notice of Proposed Rule Making (NPRM) 0604MS (CASR Parts 42, 66, 145, and 147).
- Civil Aviation Fees Regulations
- CASA Cost Recovery Impact Statement dated 29 May 2007

### **1.3.2 New Zealand**

The following documents from the New Zealand Civil Aviation Authority (CAA) were consulted.

- CAA Part 66
- CAA Part 141
- Advisory Circular (AC) - 66 series.
- Part 66 AMEL Examination Information sheet.
- CAA Booklet “How to be a Maintenance Engineer”
- CAA ICAO SARPs Compliance Statement (Annex 1)
- CAA “Fit and Proper Person Process”
- CAA Schedule of Fees and Charges

### **1.3.3 United Kingdom**

The following documents from the UK Civil Aviation Authority (CAA) were consulted.

- Part 66
- UK CAA Airworthiness Notice (AN) 46 – “General Licensing Information”
- UK CAA CAP BCAR 468
- UK CAA ORS 5 Chapter 10 “Fees and Charges”
- UK CAA Engineering Licensing Guidance Document (ELGD)

### **1.3.4 United States**

The following documents from the Federal Aviation Administration (FAA) were consulted.

- FAR Part 65 subpart D and E
- FAA Advisory Circular 65-30A “Overview of the Aviation Maintenance Profession”
- FAA Web “Basic Requirements to become an Aircraft Mechanic”
- Fees – FAR Part 187, 14 CFR part 187, and 49 CFR Part 7.

### **1.3.5 Organisations interviewed**

Several major airlines in USA and the UK were interviewed. Major airlines in Australia and New Zealand were contacted for information about the cost of training. Two Australian general aviation organisations who have trained LAMEs recently were interviewed at length. Three training providers were contacted in each country included in the study.

## **1.4 Discussion on findings**

Quantifying the cost and time differences in training maintenance personnel between the regulatory regimes is extremely difficult because of structural differences in each system.

The UK and the USA have degree courses followed by practical experience as one route for an individual to become licensed. The US also has a trade qualification as does New Zealand. In the New Zealand case, an individual must complete further study after they have finished their trade qualification to become a licensed aircraft maintenance engineer. Australia has a trade qualification and a parallel system of exams and experience records required to become a LAME.

Costs to individuals are very closely related to the level of government funding available for training and indeed the level of government funding for the aviation industry. The USA and the UK have significantly lower direct funding to people entering the aircraft maintenance industry than Australia and New Zealand. The USA has substantial other aviation infrastructure funding which significantly lowers the cost burden to industry participants.

With or without government funding, the USA is the most expensive place to train aircraft maintenance personnel.

The training and licensing system for aviation maintenance personnel in each of the countries in the study is different. Australia (Part 66 proposed), New Zealand and the UK share a relatively system. The New Zealand system has some common features with the current Australian system in terms of training outcomes from the technical colleges and an exam system leading to licensing administered by the National Aviation Authority.

The Australian CAO 100.66 has some of the features of the UK system and given that it is a forerunner to the proposed EASA maintenance system in Australia, this is to be expected. The US system stands alone as being uncommon to the other three.

Each country presents various routes to a level of qualification which allows individuals to certify for aircraft maintenance. The definitive UK document is 110 pages in addition to the regulation. The Australian advisory documents are a series of 12 AACs. The US document is extensive with substantial supporting material. The New Zealand system is detailed in Part 66 and is supported by seven advisory circulars.

## 2 State training systems

### 2.1 Australia

#### 2.1.1 Background

The basic requirement to obtain a LAME qualification in Australia is to complete the CASA subjects required for the category of licence and to submit a Schedule of Experience (SOE) which meets requirements of the licence categories sought. There are a range of methods of preparing for the CASA exams which include self-study, TAFE courses oriented towards the CASA exams or other relevant industry experience.

Several employers indicated that they preferred people to complete one year of vocational training prior to commencing an apprenticeship. During this one year for vocational training, some of the CASA subjects can be completed as an addition to the course requirements. The vocational course has no bearing on the requirement or otherwise to complete the CASA exams and scheduled experience before issue of the LAME qualification.

The CASA exams and the SOE provide a regulatory control system of knowledge and experience before a person becomes a LAME.

The minimum time in which a person entering the aviation industry can obtain an aircraft maintenance engineer licence is four years. After meeting the pre-requisite examination requirements, a type rating course on the 737 NG takes between four and six weeks. Typically, industry entrants spend between five and six years in the industry prior to meeting the requirements for issue of the licensed maintenance engineer qualifications.

An individual can go through the TAFE system and with the appropriate experience gain a trade qualification. The qualification is as an Aircraft Maintenance Engineer (AME). This qualification does not confer any privileges in terms of certifying for maintenance.

The subjects required for the issue of a LAME airframes and engine qualification are set out in AACs 9.91 and 9.92 and are available on the CASA website. An amalgamation of information from each of the AACs gives a picture of the subjects required to complete an airframe and engines licence in various categories. This is available at Table 1.

In addition to the requirements of the trade qualification, individuals need to complete all the CASA subjects required for their particular licence and demonstrate that they have sufficient practical experience to qualify for the LAME qualification. The trade qualification provides background study for the CASA exams but is not currently required for the LAME qualification.

For the purposes of comparison in the Australian context, the contents of Table 1 can be compared with the contents of Table 2 in terms of the number of subjects required for an individual to obtain an airworthiness certification authority. The complexity of the current basic LAME qualification is substantially similar to that of the B level qualification of CAO 100.66. The subject material required for an airworthiness authority under CAO 100.66 is detailed at Table 2. Given that the number of subjects is similar and the complexity of each subject is likely to be similar, it is reasonable to conclude that the price of the basic qualification will also be similar. The level of government funding for the training of aircraft maintenance personnel will determine the cost to individuals who entered industry in the future. It is also reasonable to conclude that individuals would normally use government funded training organisations to complete their study.

**Table 1 Subject requirements for engine and airframes licences in Australia.**

Examination	Code	Licence groups											
		1	2	3	4	5	6	7	10	19	20	21	22
Airworthiness Administration	AA	X	X	X	X	X	X	X	X	X	X	X	X
Maintenance Practices and Materials*	BA	X	X	X								X	X
Maintenance Practices and Materials	BB	X	X	X	X	X	X	X	X	X	X	X	X
Electrical and Instrument Systems	BC	X	X	X	X	X	X	X	X	X	X	X	X
Auxiliaries System Principles	FA	X	X	X	X	X	X	X	X	X	X		
Piston Engine Theory and Construction	GA	X	X	X								#	#
Piston Engine Systems	GB												
Propellers	GC	X										#	
Gas Turbine Engine Theory and Construction	GG											#	#
Gas Turbine Engine Systems	GH											#	#
<b>Specific group subjects</b>													
Wooden Structures	FD			X								#	
Fabric and Doping	FE				X							#	
Power Fluid Systems	FF					X						#	
Aeroplane Structures and Ancillary Systems	FG	X										#	
Helicopter Aerodynamics Structures and Controls	FI		X									#	
Air Conditioning	FM						X					#	
Structural Composites	FP							X					
Aeroplane piston engine installation, operation and maintenance	GD	X											
Helicopter piston engine installation, operation and maintenance	GE		X										
Supercharging Systems	GF			X								#	#
Pressurisation	IM								X		#		
Helicopter Powered Controls and Systems	FR									X	#		
<b>Specific type</b>													
Written	FS										#	#	#
Oral	FO										#	#	#

An alternative method of maintenance authority in Australia can be obtained through CAO 100.66 which provides equivalent to the EASA categories of aircraft maintenance licence A, B1 and B2 as a

transitional arrangement pending the introduction of these categories of licence into the *Civil Aviation Safety Regulations 1998*. X denotes subjects which are required and # denotes those which are required if applicable to the type applied for or the situation.

Table 2 sets out the basic subject requirements for an EASA like airworthiness authority. The detail of the qualification is outlined in Annex 2 as the proposed Part 66 regulation. The 'A' qualification provides certification privileges for a more limited range of tasks than the 'B' level qualifications and given that both of them are competency-based, more technical training is required for the 'B' levels. CAO 100.66 sets out the level required to attain competency in categories 'A' and 'B'.

**Table 2 Subject requirements for an airworthiness authority issued under CAO 100.66**

	Subject modules	A or B1 aeroplane with:		A or B1 helicopter with		B2
		Turbine engine(s)	Piston engine(s)	Turbine engine(s)	Piston engine(s)	
1	Mathematics	X	X	X	X	X
2	Physics	X	X	X	X	X
3	Electrical Fundamentals	X	X	X	X	X
4	Electronic fundamentals	X	X	X	X	X
5	Digital techniques electronic instrument systems	X	X	X	X	X
6	Materials and hardware	X	X	X	X	X
7	Maintenance practices	X	X	X	X	X
8	Basic aerodynamics	X	X	X	X	X
9	Human factors	X	X	X	X	X
10	Aviation legislation	X	X	X	X	X
11	Aeroplane aerodynamics, structures and systems	X	X			
12	Helicopter aerodynamics, structures and systems			X	X	
13	Aircraft structures and systems					X
14	Propulsion avionics systems					X
15	Gas turbine engine	X		X		
16	Piston engine		X		X	
17	Propeller	X	X			

### 2.1.2 Funding

Funding for services and training is generally delivered on the following basis:

- TAFE courses are generally free or have minimal cost to individuals.
- for the training of an AME, the Government contributes up to \$50,000 per student over the three-year training program. Because the AME qualification is increasingly relevant to the LAME qualification, the government funding to the TAFEs provides significant input into LAME training.
- employers pay individuals while they attend trade school and this is the principal reason why many employers prefer people who have done some of the pre-vocational training before commencing the

apprenticeship. In return for the investment, most employers expect the employees to complete their CASA exams and complete their SOE so that they can obtain a LAME qualification.

- The Commonwealth Government also contributes a \$1000 tool allowance for each apprentice in an aviation apprenticeship program along with an annual \$2000 apprentice allowance as a salary top up from the government.

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**Comment:** *One organisation indicated that the AME qualification was almost unrecognized in the aviation industry and everyone who intended to work in industry should complete a LAME qualification for recognition purposes.*

*An observation noted from the industry discussions was that the key to apprentices undertaking the CASA exams appeared to be related to the level of mentoring and encouragement from the employer. It was pointed out that very few apprentices appreciated the importance of the qualification in terms of career development and job opportunities.*

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### 2.1.3 Training system

The training system is diverse and consists of the TAFE system which helps prepare individuals for the CASA exams, a wide range of on-the-job experience, self-study and documentation through SOE requirements. The choice of route that individuals take to become a LAME is very much related to their location, previous experience, age, requirements of the employer, cost and access to training providers.

- There are 12 subjects to be completed to become a LAME. This puts the total cost of exams at approximately \$1560 to obtain an airframe and engine licence.
- The AME four-year apprenticeship program provides structure to the training process and assists employers cover the areas which fall outside their CAR 30 workshop approvals.
- Specific type training required for the 737NG is the type rating course for each discipline. The only maintenance type rating course available in Australia takes 30 days for the instrument and electrical course and 42 days for the airframe and engine course. The cost for both courses is \$7,500 per participant. Alternative providers sell engine and airframe courses for as low as \$4,800 with extensive prerequisite requirements.
- There is currently only one provider of the Boeing 737 NG course in Australia who is authorised by Boeing to distribute the copyright material from the manufacturer. Other course providers have developed their information from maintenance manuals. Neither of the major airlines currently utilising the Boeing 737 NG are authorised by Boeing to sell training beyond their own organisation.
- There are a range of foreign providers who have a CAR 30 approval for Boeing 737 NG courses but these are delivered

overseas.

- Some course providers offered a range of courses on the 737 NG which did not result in the issue of a type rating.
- Course providers tailored their courses to either the Australian CASA requirements or EASA requirements with the same institutions offering both types of course. However, there were no course providers who had plans to run an EASA course in the near future. That is, they had the capability but as yet, no demand.

### 2.1.4 Total cost

The out-of-pocket expenses for a person entering the aviation maintenance industry and qualifying as a LAME in Australia vary according to government funding available for the course they undertake and the institution they attend. Research indicated that:

- prices varied from \$2000 to \$3900 for all the subjects required for the AME qualification. All the organisations surveyed indicated that they provide the opportunity for students to complete the CASA exams at the same time as the TAFE exams.
- an opportunity cost was identified in undertaking CASA exams because some employers require apprentices to take leave in order to make the time available to undertake the exams.

**Table 3 - Anticipated charges for an individual to complete a LAME qualification**

Government funded		Fee for service	
engines/airframe or Avionics		engines/airframe or Avionics	
pre-apprenticeship training	\$2,000	pre-apprenticeship training	\$7,000-\$26,000
subjects	\$1,200	subjects	\$1,200
737NG type rating	\$7,500	737NG type rating	\$7,500
<b>Total</b>	<b>\$10,700</b>	<b>Total</b>	<b>\$15,700-\$34,700</b>

*Note: for a more comprehensive table for indicative CASA costs associated with licence issue refer to Annex C*

## 2.2 New Zealand

### 2.2.1 Background

In New Zealand, people entering the aircraft maintenance industry are expected to complete at least one year of self-funded study followed by a three-year apprenticeship program and further self-study to complete the subjects for their LAME qualifications. In particular:

- the minimum time in which a person entering the aviation industry can obtain an aircraft maintenance engineer licence is four years;
- after basic qualification a type rating course on the 737 NG would be a further six months. Typically, industry entrants spend between five and six years in the industry prior to meeting the requirements for issue of license in a maintenance engineering qualification;
- there is no formal training program in New Zealand which allows individuals to complete all theory training prior to commencing any practical work. However, there is one training school which is contemplating such a program. The course would take 2.5 years and cover all the basic subjects required for the issue of a LAME licence. Graduates would need to spend 18 months to 2 years workshop experience to obtain the necessary work experience to be issued a maintenance engineer licence.

### 2.2.2 Funding

Key funding issues in NZ include:

- funding for both training organisations require that students pay fees and these are in the order of \$6,001<sup>2</sup> per student per year;
- the New Zealand government subsidises each student in the order of \$8,565 per student per year;
- the total cost of theory training is approximately \$14,575 per year prior to entering an apprenticeship program.

### 2.2.3 Training system

Key training system issues include:

- people entering the aviation industry as maintenance engineers are expected to attend Polytech for one year and obtain at least a Level 3 Certificate, as an entry qualification to aviation maintenance organisation. There are two organisations in New Zealand which offer the training to industry entrants;
- a qualification from either training school allows graduates to enter the aviation industry as an apprentice.

One organisation in New Zealand takes graduates with a Level 3 Certificate where they enter a three-year apprenticeship program.

<sup>2</sup> 1 NZD = 0.857368 AUD

At the end of the three-year apprenticeship program, they are qualified as “tradesman” and do not have a licence unless they have undertaken substantial self-study and completed the subjects;

- there are various requirements to be completed in the three-year apprenticeship program with one key issue that students must complete 18 months on airframes and a further 18 months on engines;
- there are 13 subjects required for electrical/avionics licence and 11 required for an engine/airframe licence.
  - Some subjects are common to both disciplines. Each written examination costs \$150 and each oral examination costs \$213.
  - A recount or review of examination results costs \$85.73.
  - This puts the total cost of exams for an engines/airframes licence subjects at \$1650 presuming the applicant passes each examination on the first attempt. The electrical/avionics subjects cost \$1950 to sit all the examinations once.
- specific type training required for the 737 NG is the type rating course for each discipline.
  - The organisation in New Zealand which maintains 737 NGs does not charge its own employees for the course.
  - Outside students from other organisations, however, are charged \$8,000-\$9,000 depending on the size of the group and the other training arrangements.
- there are several other routes into aircraft engineering. One is from other trade qualifications like car mechanics. Such mechanics are required to complete all the technical subjects but only require three years technical experience in aviation prior to being issued a LAME certificate.
- people from a military aircraft maintenance background are able to use their prior experience for the experience requirements for the LAME qualification but again must complete all the technical subjects.

#### 2.2.4 Total cost

The out-of-pocket expenses for a person entering the aviation maintenance industry and qualifying as a LAME in New Zealand vary according to the route chosen by the individual.

**Table 4 - Costs for 1 year and 2 year apprenticeship programs**

Two year pre-apprenticeship program				One year pre-apprenticeship program			
engines/airframe		electrical/avionics		engines/airframe		electrical/avionics	
pre-apprenticeship training	\$12,002	pre-apprenticeship training	\$12,002	pre-apprenticeship training	\$6,001	pre-apprenticeship training	\$6,001
subjects	\$1,650	subjects	\$1,950	subjects	\$1,650	subjects	\$1,950
<b>Total</b>	<b>\$13,652</b>	<b>Total</b>	<b>\$13,952</b>	<b>Total</b>	<b>\$7,651</b>	<b>Total</b>	<b>\$7,951</b>

## 2.3 United Kingdom

### 2.3.1 Background

In the UK, people entering the aviation maintenance industry are expected to have completed some training prior to commencing working up their experience for the issue of a licence to certify for aircraft maintenance. There are two alternative routes to enter the industry and these are discussed in Section 2.3.3. Details of the EASA UK Part 66 system are detailed at Annex 1.

### 2.3.2 Funding

Qualifications in the UK are offered through a Part 66 or degree program. Structural differences in the organisations of the aircraft maintenance industry in the UK probably reflects the reason why a degree program is supported along with apprentice type programs similar to those in other countries in the

study. The degree programs are orientated to people who want to move into management roles later in their career. The Part 66 program can also offer graduates the same position in the industry but they might be less likely to progress as quickly into management positions.

- The degree program in Scotland is fully funded through a grant system. Students in the degree program in England and Wales are required to pay back some of the fees associated with their training. This is in the order of \$22,460<sup>3</sup> and students would graduate with a B. Eng. degree.
  - After studying either the degree program or one year EASA Part 66 course, people entering the industry commence practical training and experience.
  - The cost of the Part 66 course is \$9,725 for the basic licence course and usually only undertaken by individuals who have significant experience in an area that is complementary to the area of the licence issue. For example, someone who has been working on military aircraft and wishes to qualify to work on civilian aircraft would do a Part 66 course.
  - The Part 66 course does not attract any government or other funding arrangements.
- The type rating course for the J41 costs \$5,615.
  - Some other 'small' aircraft have a similar arrangement.
  - In the case of the 737NG the two disciplines are separated into a B1 and B2 category.

### 2.3.3 Training system

The UK system is similar to Australia and New Zealand in that there is a basic licence above which specific qualifications are added as required. The broad framework of the British (EASA) system is outlined at Annex 1.

There are two routes to entering the industry.

- The one chosen will usually depend on the previous experience of the individual. The first route is a Part 66 course which covers all the modules required for the issue of a basic licence. It does not attract any government funding. It is followed by a two-year apprenticeship program and further self-study to complete the subjects for their basic licensed maintenance engineer qualifications. A licence is not granted until people entering the industry have at least five years experience including the Part 66 course.
- An alternative route to become a licensed engineer is to complete a Bachelor degree in Engineering and complete 2 years practical experience following the degree.
- The minimum time a person entering the aviation industry can obtain an aircraft maintenance engineer licence is five years.
- Typically, industry entrants spend between five and six years in the industry prior to meeting the requirements for issue of their licensed maintenance engineer qualifications.
- People entering the civilian maintenance business from the military are given recognition for their time spent in the military but may be required to complete all the subjects required for the issue of a civilian license.
- The degree program in the UK allows individuals to complete all their theory training prior to commencing their practical work. Applicants for the issue of an aircraft maintenance license must be at least 21 years of age before they are eligible to exercise the privileges of their license.
- In the case of the Jetstream 41 a B1/B2 type rating specific to the aircraft is required.
  - The course is a 15 day course and six months experience is required on the specific type before the licence can be endorsed with the qualification.
  - In the case of the Jetstream 41 a combined B1/B2 course has been developed which combines avionics requirements with the airframe and engine requirements. This means there is only one type rating course for the aircraft, regardless of category.

### 2.3.4 Total cost

The cost for each exam is \$67.38 and this is not included in the cost of either the degree course or the Part 66 course. For the basic licence, this cost is over \$800 and a further \$140 for the avionics licence.

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<sup>3</sup> 1 AUD = 0.445 UK pounds or 1 UK pound = 2.246 AUD.

**Table 5 - Costs for training in the UK**

Degree program				Part 66 program			
Engines/airframe (B1)		Avionics (B2)		Engines/airframe (B1)		Avionics (B2)	
Course work	\$22,460	Course work	\$22,460	Part 66 Course work	\$9,725	Part 66 Course work	\$9,725
		Avionics training	\$2,178			Avionics training	\$2,178
Subjects	\$800	Subjects	\$940	Subjects	\$800	Subjects	\$940
<b>Total</b>	<b>\$23,260</b>	<b>Total</b>	<b>25,578</b>	<b>Total</b>	<b>\$10,525</b>	<b>Total</b>	<b>\$12,843</b>

## 2.4 USA

### 2.4.1 Background

The regulatory system for aircraft maintenance personnel in the USA is quite different from the other countries included in the study.

Maintenance personnel are referred to as airframe and power plant mechanics (A&Ps) and individuals are expected to have some prior training before joining an organisation to become an A&P mechanic. A higher 'licence' is an Inspection Authority which requires that individuals hold a current mechanic's certificate, with airframe and powerplant ratings and have held that qualification for at least three years. It also requires that the applicant must have been actively engaged in maintaining certificated aircraft for at least the two-year period before applying.

The qualification is dependent on a fixed base of operations where the authority holder may be found in person or by telephone during the normal working week but it need not be the place where they will exercise their inspection authority. The holder must have available equipment, facilities, and inspection data necessary to properly inspect airframes, power plants, propellers or any related part or appliance.

There is an annual renewal requirement which consists of a written test on their ability to inspect according to safety standards for returning aircraft to service after major repairs and major alterations and annual and progressive inspections performed under Part 43 of the FARs. There is a Notice of Proposed Rule Making (NPRM) to decrease the renewal to a biennial requirement.

### 2.4.2 Funding

Some funding appears to be available for training from State sources but the following should be noted:

- It is usually dependent on a range of conditions including independence from parents, the right to vote in a particular state, registration of vehicles and the opening of bank accounts in the same state.
- There are some degree programs available from universities which give graduates the academic qualifications for completion of an A&P licence.
- Personnel need to demonstrate experience to complete their A&P qualification and once they have completed the A&P qualification, they will then work under a repair station umbrella to carry out the maintenance authorised under the repair station certificate.

### 2.4.3 Training system

In contrast to Australia, the US training system is almost exclusively privately managed. Some funding is available from State or other government sources and there are benefits for returned servicemen and women. There are numerous universities and technical colleges which offer aviation related courses.

- The courses are generally pre-vocational training and paid for by individuals.
- Once individuals have completed the course and are employed, additional training is conducted at the employer's cost.
- The three basic systems are as follows:

- The first system is that people complete a pre-vocational course to do the technical subject required for their A&P licence. This is followed by apprenticeship-like training with an employer. Once they have completed the experience requirements they can have their A&P licence issued.
- The second system is a university degree route which is significantly more expensive but has the benefit of giving the individual the status of a university degree. Again graduates must complete practical experience requirements before having their A&P licence issued.
- The third route is from the military or other relevant aviation training organisations. Individuals are required to complete the subjects for their A&P licence but can have the practical experience requirements substantially reduced.
- The cost of tuition varies widely from State to State and University to University for degree programs. Some complete programs over three years and eight semesters and are available for as little as \$10,690<sup>4</sup> - but typically course costs are in the order of \$5,600 per semester for eight semesters which makes the total cost in the order of \$45,000.
- An A&P school program costs somewhere in the order of \$11,100 - \$13,360 and takes 18 months to two years. Alternative programs exist for people exiting the military and wish to become qualified in the civilian market. This is a significantly cheaper option for both employers and employees.
- Authorised Inspection courses cost an average of \$1,655. The full course duration is 100 hours and self study is available for those people who don't require or don't have the time available for full-time study.
- The minimum time a person entering the aviation industry can obtain an aircraft A&P mechanic qualification is 3 years except if they have previous relevant experience. With this qualification individuals will be able to certify for maintenance and sign an airworthy release.
- Exams from the FAA are free of charge but other providers may charge up to \$550 for oral exams and more for exams which require the supervisors to travel.

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<sup>4</sup> 1 AUD = 0.897 USD or 1 USD = 1.114 AUD.

## 2.4.4 Total cost

**Table 6 - Costs of the two paths of entry into the industry**

Degree program				A&P program			
engines/airframe		avionics		engines/airframe		avionics	
Course work	\$45,000	Avionics training	\$900	A&P Course work	\$12,300	Avionics training	\$ 900
Authorised Inspection qualification	\$1,655			Authorised Inspection qualification	\$1,655		
		Total	\$47,555*			Total	\$14,855*

\* Both programs require practical experience before a licence is issued.

### 3 Notified ICAO differences

Table 7: Summary of compliance with ICAO ANNEX 1 Chapter 4<sup>5</sup>

ICAO Requirement	Australia	New Zealand	United Kingdom	United States
<b>4.2.1.1 (Age 18 years)</b>	No difference notified but CAR 31 states 21 years as the minimum age	No difference notified	Minimum age 18 years for Part 66 license, without type rating and 21 years with type rating.(exceeds ICAO requirement) Part 66 is 18 years.	No difference notified
<b>4.2.1.2 (Knowledge)</b>	Australia does not require knowledge of human factors	No difference notified	No difference notified	USA does not require knowledge of human factors
<b>4.2.1.2 (a) (Requirements)</b>	No difference notified	No difference notified	No difference notified	No difference notified
<b>4.2.1.2 (b) (General knowledge)</b>	No difference notified	No difference notified	No difference notified	No difference notified
<b>4.2.1.2 (c) (Engineering)</b>	No difference notified	No difference notified	No difference notified	No difference notified
<b>4.2.1.2 (d) (Maintenance)</b>	No difference notified	No difference notified	No difference notified	No difference notified
<b>4.2.1.2 (e) (Human factors)</b>	Australia does not require knowledge of human factors	No difference notified	Human factors examination not yet implemented.	USA does not require knowledge of human factors

<sup>5</sup> Analysis based on ICAO Annex 1 Supplement (eighth edition)

ICAO Requirement	Australia	New Zealand	United Kingdom	United States
<b>4.2.1.3 (Experience)</b>	No difference notified	No difference notified	<p>Minimum experience for single or multiple category licenses is 4 years.</p> <p>Part 66 Certifying Staff — minimum experience required for Category A certifying mechanic license issue is 3 years, for Category B1 or B2 certifying technician license issue is 5 years, for Category C certifying engineer license issue is 3 years holding a Category B1 or B2 license. For Graduate entrants, a Category C license may be issued after 3 years' experience.</p>	No difference notified
<b>4.2.1.4 (Training)</b>  <b>(Recommended practice)</b>	No difference notified	No difference notified	The UK does not require the completion of a course of training for basic license issue or for certain aircraft types prior to type endorsement. <b>(Recommended practice)</b>	No difference notified
<b>4.2.1.5 (Skill)</b>	No difference notified	No difference notified	The UK does not require a demonstration of practical ability.	No difference notified

ICAO Requirement	Australia	New Zealand	United Kingdom	United States
<b>4.2.2 (Privileges &amp; conditions)</b>	No difference notified	No difference notified	<p>The UK issues a license without type rating (basic license) which may be valid in one or more categories. This confers no certification privileges unless it includes a valid type rating endorsement or is used in conjunction with a type authorization issued by an approved Maintenance organization for use within that organisation.</p> <p>Part 66 Certifying Staff — The UK issues an aircraft maintenance licence which may contain endorsements for both basic categories and specific aircraft types.</p>	No difference notified
<b>4.2.2.1 (Privileges)</b>	No difference notified	No difference notified	No difference notified	No difference notified
<b>4.2.2.2 (a)(1)</b>	No difference notified	No difference notified	No difference notified	No difference notified
<b>4.2.2.2(a)(2)</b>	No difference notified	No difference notified	No difference notified	No difference notified
<b>4.2.2.2 (a)(3)</b>	No difference notified	No difference notified	No difference notified	No difference notified
<b>4.2.2.2.(b)</b>	No difference notified	No difference notified	No difference notified	No difference notified
<b>4.2.2.2 (c)</b>	No difference notified	No difference notified	No difference notified	No difference notified

ICAO Requirement	Australia	New Zealand	United Kingdom	United States
<b>4.2.2.3 (Scope of privileges)</b>	No difference notified	No difference notified	No difference notified	No difference notified
<b>4.2.2.3.1 (Recommendation – certification privileges)</b>	No difference notified	No difference notified	No difference notified	Not implemented <b>(Recommended practice)</b>
<b>4.2.2.4 (Non-licensed AME)</b>	No difference notified	No difference notified	No difference notified	No difference notified

### 3.1.1 Comparison of different training costs.

Predicting the effect of the new Australian legislation (Parts 66 and 147) in terms of cost is difficult to quantify. Given that neither currently exists, it can't be measured. However, it is likely that the total package will be substantially similar in terms of training and out comes as the current system. However, there may be significant changes in cost between categories because of the nature of each category. Therefore a cost comparison of the Australian system between new and old is likely to be misleading because the metrics are significantly different. With this in mind, note that the first three columns of the following table would have similar costs across the rows. Where possible costs have been incorporated into Table 6 for comparison purposes.

**Table 8: Comparison table**

Australian base line (current)	Australian CAO 100.66)	Australian 66/147 (anticipated/projected cost)	USA	UK	NZ
BAe J41/42 specific type ratings - Airframe and engine Not currently available commercially in Australia but likely to be in the range \$6000-\$7500 based on UK Course syllabus	B1.1 BAe J41/42  Not currently available commercially in Australia	Unknown but similar types take in the order of 6 weeks for a combined B1-B2 qualification. Course taking this amount of time vary in price depending on the group size but indicative prices for 10 students is about \$6000-\$7500 per student.	Course costs for similar aircraft are in the order of \$6000 per student again depending on the group size.	\$5,615 for a combined B1-B2 qualification	No J41/42 aircraft in NZ

Australian base line (current)	Australian CAO (100.66)	Australian 66/147 (anticipated/projected cost)	USA	UK	NZ
BAe J41/42 specific type ratings - electrical Instrument and radio  Not currently available commercially in Australia	B2 BAe J41/42  Not currently available commercially in Australia	As above.  Not currently available commercially in Australia	As above.	As above.	As above.
B737NG specific type ratings - Airframe and engine \$4800-\$7500	B1.1 B737NG \$4800-\$7500	\$7500 and six weeks duration	Depends on the certification of the repair station.	\$10,100, 4 weeks duration followed by 6 months practical experience.	\$8000-\$9000 depending on course size
B737NG specific type ratings - electrical Instrument and radio \$4800-\$7500	B2 B737NG \$4800-\$7500	\$7500 and six weeks duration	Depends on the certification of the repair station.	\$10,300, 4 weeks duration followed by 6 months practical experience.	\$8000-\$9000 depending on course size
Group 1 Engine and Group 1 Airframe \$3751	\$3751	\$3751	US 12,000-\$32,000	\$10,000-\$24,000	\$7600-\$13,600

## 4 Comparison between countries

### 4.1.1 People

All jurisdictions require a minimum age to hold a license and an understanding and written comprehension of the English language.

**Table 9 - General requirements for a person to apply for a maintenance engineer license (however described)**

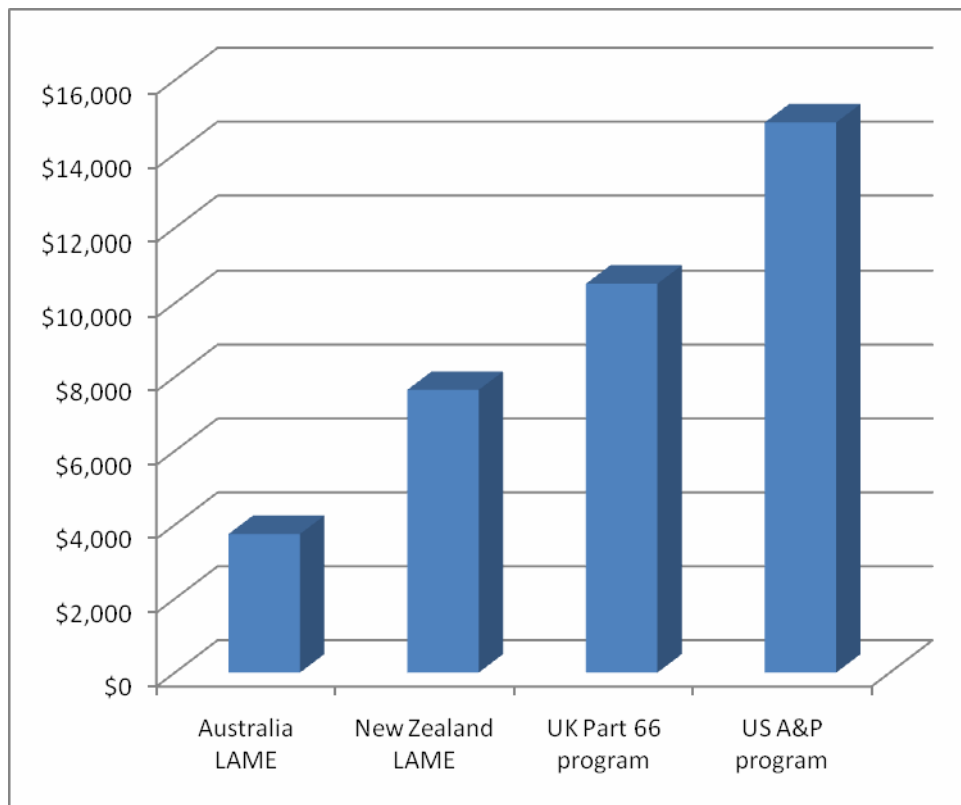
ICAO	Australia	New Zealand	United Kingdom	United States
Minimum Age 18	Minimum age 21 (CAR 31).	Minimum age 21	Minimum age 18 (for Part 66) and 21 to certify.	Minimum age 18 for A&P, 21 for an Inspection Authorisation.
No specified fitness standards	No physical disabilities etc.	Fit and proper person	Must not certify if fitness doubts exist.	Nil discovered
No specified language capability	Able to speak and understand English language.	Able to speak and understand English language	Must demonstrate understanding of written English	Able to speak and understand English language.
No proof of identity standard	Nil required	Nil notified	Proof of identity requirements	Proof of identity requirements

All jurisdictions meet or exceed the ICAO requirements. Any differences in these requirements between the States would not significantly change the cost of engineer training.

### 4.1.2 Minimum cost for the basic qualification

Figure 1 shows a comparison of the cost of obtaining a basic qualification to certify for aircraft maintenance. Where applicable, this includes government subsidisation.

**Figure 1 Minimum basic qualification cost with Government funding.**

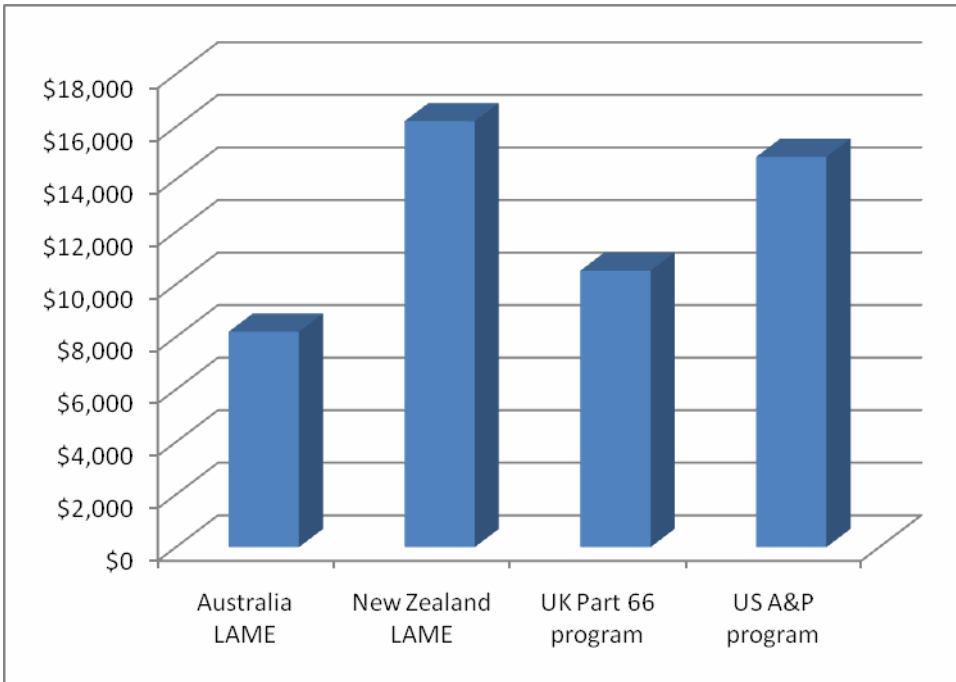


### 4.1.3 Government funding

Figure 1 shows that the cost of basic training for an Australian LAME is the lowest of all the countries included in the study.

- This reflects the level of government funding available.
- Training organisations receive substantial subsidisation for each student but if this is removed the costs vary dramatically.
- The fee-for-service courses for the basic trade qualification in Australia vary from \$7000-\$26000 depending on which training institution is used. Figure 2 shows the costs on a fee-for-service basis. The UK and USA prices remain the same.

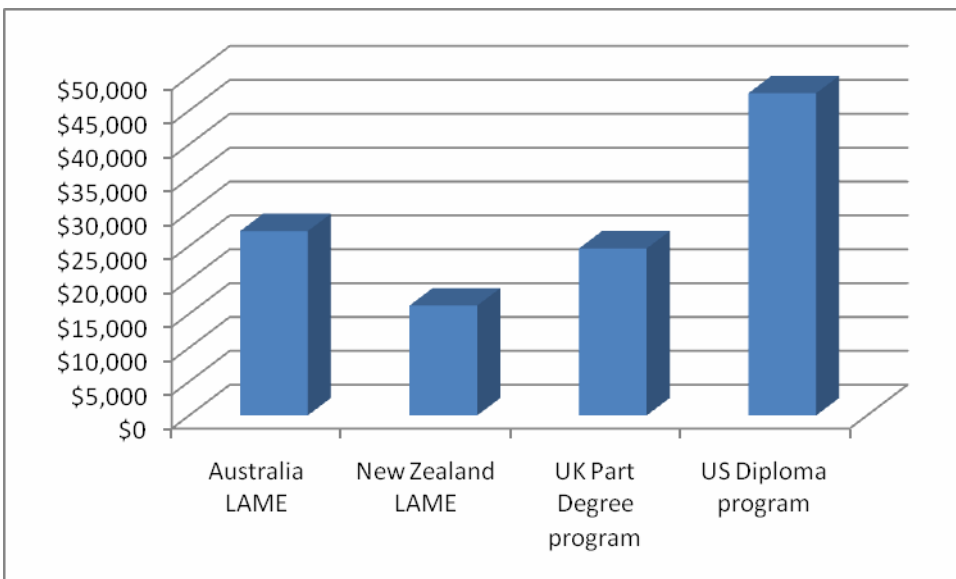
**Figure 2 Cost of basic training without Government funding**



**4.1.4 Cost without government funding (high end)**

There are various programs available for entrance into the industry for those desiring higher levels of training than the minimum and qualifications other than the basic apprenticeship program. Figure 3 represents a profile of the cost of the different programs. The Australian figures show a more expensive TAFE College program. The high and low numbers for New Zealand are the same in Figures 2 and 3 because there are only two technical training institutions. The UK and USA figures reflect a degree and diploma program respectively.

**Figure 3 Cost of training without Government funding (high end)**

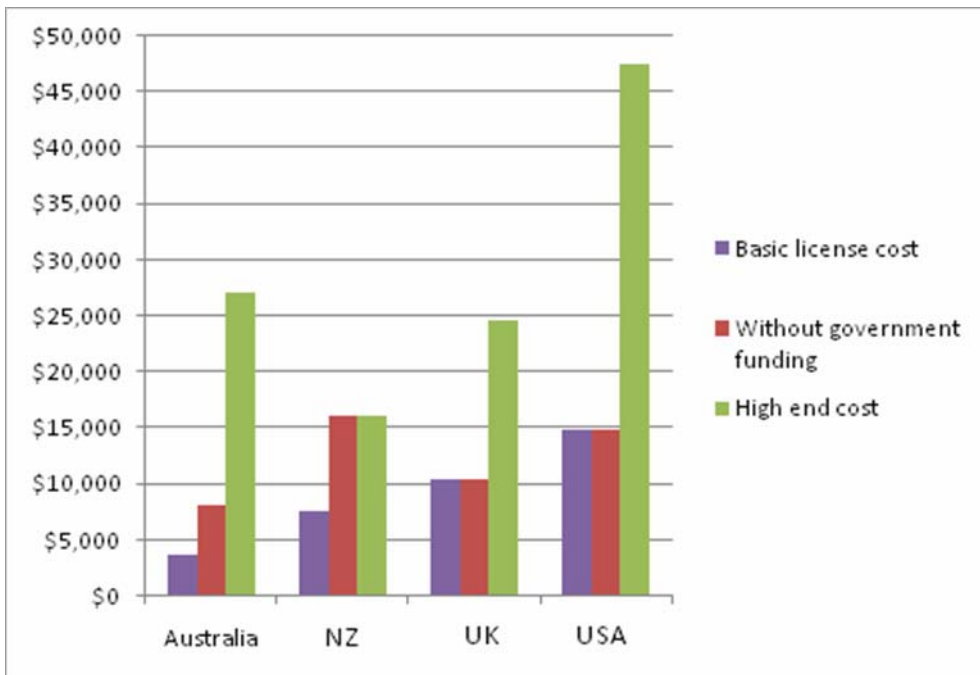


**Comment:** From the three figures above it important to note that the cost of training varies according to the level of government funding and the courses chosen.

**Comment:** Type rating qualifications for both the J41/42 and the 737NG are similar between all countries included in the study because they are either delivered by Boeing or their agencies. In Australian dollars these costs are about \$7000-\$9000 for the Boeing course and \$3000-\$5000 for the Jetstream course. Low end courses with extensive pre-requisites for the Boeing 737 NG cost about \$5000.

Figure 4 combines Figures 1, 2 and 3 for comparison purposes.

**Figure 4 Consolidation of Figures 1, 2 and 3.**



#### 4.1.5 Will the introduction of Part 66 and Part 147 make a significant difference to training costs in Australia?

Initial indications from discussion across a range of training organisations in Australia undertaken as part of this report, suggest that there is little likelihood of significant increases in the cost of training aircraft maintenance engineers to a level where they can certify for maintenance if Part 66 and Part 147 are introduced.

- Training organisations suggest that they expect government funding to remain similar and the main costs to be in the development of tailored courses of the specific subjects.

- Training organisations also indicated that the people they use for training now would be suitable for training in the new system.
- The number of subjects required and their complexity is substantially similar.

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***Comment:*** *There is unlikely to be a significant increase in training costs under new system in Australia.*

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#### 4.1.6 Training comparison

Each country in the Report required some formal classroom work and completion of a number of aviation subjects followed by on the job training. This may be in the form of a Certificate, Diploma or Degree program. Table 7 sets out differences between the training regimes examined.

Table 10.

ICAO	Australia (current)	New Zealand	United Kingdom	United States
<p><b>Recommendation:</b></p> <p>The applicant should have completed a <b>course of training</b> appropriate to the privilege being granted.</p>	<p>Training course may be available through an organization approved under CAR 30(1).</p> <p>Most Group 20 aircraft require a training course.</p> <p>Most Group 21 &amp; 22 ratings require a training course.</p>	<p>Traineeship 4 years in an aviation technical trade.</p> <p>Traineeship in non aviation technical trade + 3years aviation experience.</p> <p>Integrated training course by a Part 141 organization.</p>	<p>Applicants may receive training (800 hours) through an organization approved under Part 147.</p>	<p>FAA Aircraft mechanic may be a graduate of a FAR Part 147 training organization.</p> <p>FAA Repairman may undertake an approved course specific to the job function.</p> <p>An inspection authorisation is available to people who have held both an airframe rating and a power plant rating, both of which are currently effective and have been in effect for at least three years.<sup>6</sup></p>
<p>The applicant shall have the following <b>experience</b>:</p> <p>a) Entire aircraft 4 years minimum.</p> <p>b) Approved training course 2 years</p> <p>c) License restricted by category 2 years minimum.</p>	<p>Applicant must demonstrate experience of;</p> <p>a) Total experience of 4 years of which,</p> <p>b) 2 years must be in the category sought, and</p> <p>c) Demonstrated practical experience in the Group or type of rating sought.</p>	<p>Applicant must demonstrate experience of;</p> <p>a) 2 years of the total experience requirement (however obtained) must be appropriate to the category of license applied for.</p> <p>b) Additional categories require 2 years experience OR if held a LAME for 10 years, 1 year experience required.</p>	<p>Applicant must demonstrate experience of</p> <p>a) 1 year (Category A, B2 or B4) or 2 years (Category B1 &amp; B3) if has completed a course conducted by a Part 147 organization.</p> <p>b) 3 years (Category A, B2 or B4) or 5 years (category B1 &amp; B3) experience if did not undertake a Part 147</p>	<p>Applicant for an A&amp;P rating who is not a graduate of a FAR Part 147 training school must demonstrate experience of</p> <p>a) a) 18 months of practical experience with the procedures, practices, materials, tools, machine tools and equipment generally used in constructing, maintaining or altering airframes, or powerplants appropriate</p>

<sup>6</sup> FAR 65.91

ICAO	Australia (current)	New Zealand	United Kingdom	United States
		<p>Practical on the job training for 5 years (if there has been no formal training course undertaken)</p>	<p>course. c) 2 years (category A, B2 or B4) or 3 years (Category B1 or B3) if already qualified in another acceptable technical profession.</p>	<p>rating sought b) 30 months concurrent experience on both airframes and power plant.<sup>7</sup>  A graduate of a certificated aviation maintenance technician school may not need further experience. To obtain an Inspection Authorisation, the minimum time in the industry required is 5.5 years</p>

<sup>7</sup> FAR 65.77

#### 4.1.7 Ensuring competency (Examinations, assessments, tests and experience)

All jurisdictions have a formal training course as an option for gaining sufficient knowledge for the issue of a license. The FAA regime has the Certified Mechanic and the Certified Repairman. The experience requirements for both are lower than those of the other countries. Table 8 sets out a summary of the requirements.

Table 11.

ICAO	Australia	New Zealand	United Kingdom	United States
<p>Applicant must <b>demonstrate a knowledge</b> of the following subjects;<sup>7</sup></p> <ul style="list-style-type: none"> <li>• Air Law &amp; airworthiness requirements</li> <li>• Natural science and aircraft general knowledge</li> <li>• Aircraft engineering</li> <li>• Aircraft maintenance</li> <li>• Human performance</li> </ul>	<p>Applicant must undertake written examinations in a number of core subjects appropriate to the category of license sought; all core examination requirements include;</p> <ul style="list-style-type: none"> <li>• Airworthiness Administration</li> <li>• Electrical fundamentals</li> <li>• Aerodynamics and maintenance practices.</li> <li>• + Core examinations specific to the <u>category</u> of license sought.</li> </ul> <p>The applicant has also to sit a number of examinations in specific group subjects relevant to the Group Rating applied for. In some cases these are specific to aircraft types.</p>	<p>Applicant must undertake written examinations appropriate to the category of license sought. Subjects include;</p> <ul style="list-style-type: none"> <li>• Aeronautical science</li> <li>• Engineering knowledge</li> <li>• Aircraft materials</li> <li>• Avionics</li> <li>• Human factors and supervision</li> <li>• Air law</li> <li>• Aeroplanes <u>OR</u> Rotorcraft and'</li> <li>• Specialist subjects appropriate to the category sought.</li> </ul> <p>Two special exams are set for lighter than air category.</p>	<p>Applicant must pass multi-choice examinations in a number of modules;</p> <ul style="list-style-type: none"> <li>• Mathematics</li> <li>• Physics</li> <li>• Materials and hardware</li> <li>• Maintenance practices</li> <li>• Basic aerodynamics</li> <li>• Human factors<sup>8</sup></li> <li>• Aviation Legislation</li> <li>• Aircraft aerodynamics structures and systems</li> <li>• Propulsion</li> <li>• + Other examinations appropriate to the category sought.</li> </ul> <p>In addition to the module multi-choice examinations an essay paper covering the whole syllabus is set.</p>	<p>Applicant must undertake a written and oral test with a Designated Mechanic Examiner in the broad subject areas of;</p> <ul style="list-style-type: none"> <li>• Airframe</li> <li>• General</li> <li>• Power plant</li> </ul> <p>These examinations and the oral test cover 43 technical subjects.</p>

The current Australian examination regime is the most complex; the candidate engineer requires passes in basic core examinations, core examinations specific to the category of license sought, and specific aircraft, engine, component or avionic equipment type. The training proposed by CASR Part 66 is part of the initial trade training package. As a result the Australian system should become simpler.

The UK regime includes core module multi-choice examinations and an essay format examination paper covering the whole syllabus but is also orientated to human factors. The FAA appears to have a less stringent system in terms of formality, although 43 subject areas are examined either through a multi choice examination format or by oral examination of the candidate.

<sup>8</sup> Human factors examination may not be implemented – Differences (Eighth Edition)

# Annex A : Outline of the UK licensing system.

## The following are the sub-categories within Licence A:

- Category A1 – Turbine Engine Aeroplanes
- Category A2 – Piston Engine Aeroplanes
- Category A3 – Turbine Engine Helicopters
- Category A4 – Piston Engine Helicopters
- Category A5 – Reserved for Airships (to be developed)

## The following are the sub-categories within Licences B1 and B2:

- Category B1.1 – Turbine Engine Aeroplanes
- Category B1.2 – Piston Engine Aeroplanes
- Category B1.3 – Turbine Engine Helicopters
- Category B1.4 – Piston Engine Helicopters
- Category B1.5 – reserved for airships (to be developed)
- Category B2 – Line Maintenance Certifying Technician (Avionics)
- To be eligible for a licence, an individual must have completed the relevant modular examinations and have a prescribed period of aircraft maintenance experience.
- A minimum of Grade C GCSE's or equivalent in maths and a science subject is required. Practical maintenance experience will also be a benefit, in both assisting understanding and ensuring all experience requirements will be fulfilled within the specified 5 year period.
- Once passed, the modules are held in credit for 5 years. All experience and relevant examinations must be gained within this time period, otherwise module examinations will have to be retaken.

## Experience required:

- 5 years – where no previous experience of formal training has been achieved
- 4 years – where the applicant has already qualified as a 'skilled worker' in another profession
- 2 years – where the applicant has successfully completed a Part 147 approved cost of basic training at a category B1 or B2 level

## Privileges:

- The wider responsibilities of the Category B technician requires a more detailed knowledge than for Category A and, hence, a longer period of experience.
- Category B1 is mechanically orientated and covers aircraft structure, airframe systems, engines and propellers, or rotors, as appropriate. A category B1 certifying staff authorisation permits the holder to issue certificates of release to service following maintenance, including aircraft structure, power plants and mechanical and electrical systems. Authorisation to replace avionic line replaceable units requiring simple tests to prove their serviceability is also permitted.
- Category B2 is avionic based and confers privileges similar to those of the mechanical technician to cover electrical power and distribution and control and indication systems associated with avionic systems. Category B2 certifying staff can qualify for any A sub category subject to compliance with the appropriate A sub category requirements.
- A category C certifying staff authorisation permits the holder to issue certificates of release to service following base maintenance. The authorisation is valid for the aircraft, in its entirety, including all systems.
- The route to any B or C qualification can be via a trade or degree program.

Definitive information on the UK EASA licence is available in the Engineer's Licensing Guidance Document (ELGD) which is designed to assist Aircraft Engineers and those involved with aircraft maintenance engineering by providing detailed guidance to existing Aircraft Maintenance Engineering Licensing requirements. The latest version of this document and all applicable amendments are available in electronic format at [www.caa.co.uk/publications](http://www.caa.co.uk/publications). A change log can be on the web site at [www.srg.caa.co.uk](http://www.srg.caa.co.uk) detailing any significant amendments or additions. Information is current to June 2006.

# Annex B Outline of the proposed Australian Part 66 licensing system.

CASR Part 66 is under development and intends to adopt the EASA licence ratings for Australia. It is intended to be equivalent to the EASA Part 66.

## **The following are the sub-categories within Licence A:**

- Category A1 – Turbine Engine Aeroplanes
- Category A2 – Piston Engine Aeroplanes
- Category A3 – Turbine Engine Helicopters
- Category A4 – Piston Engine Helicopters

## **The following are the sub-categories within Licences B1:**

- Category B1.1 – Turbine Engine Aeroplanes
- Category B1.2 – Piston Engine Aeroplanes
- Category B1.3 – Turbine Engine Helicopters
- Category B1.4 – Piston Engine Helicopters
- Competency-based training will become the Australian standard for qualifying for initial issue of a Part 66 licence;
- Industry experience times are reduced to balance the output of competency-based training;
- Type training will include both theory and practical elements;
- a generic Aviation Maintenance Specialists (AMS) certificate will be introduced to allow certificate of release privileges for aircraft not catered for by the subcategories outlined above.

Turbine engines that may never be fitted to aeroplanes above 5700 kg MTOW or helicopters above 3175 kg MTOW will not normally require a type rating unless deemed to require one by CASA.

**The B2 licence is an avionics licence and does not have sub-categories.**

**There is also a B3 category for non-complex aircraft used in private and aerial work operations.**

- This category fills in the gap in the EASA system to deal with the large number of private and aerial work aircraft in Australia. It will probably cover aircraft used in training, aerial application and other aerial work activities using non-complex aircraft.

## **Experience required:**

- Information currently on the CASA website does not detail experience requirements of the stage but it is likely to be substantially similar to the current requirements for CAO 100.66

## **Privileges:**

- The category B1 licence parallels an existing airframe, engine and electrical licence with the addition of line replaceable unit and testing privileges in the instrument and radio categories. A B1 licence holder may also issue a certificate of release to service the work undertaken by others that he/she supervises. The B1 licence automatically covers the applicable A licence scope and privileges. Category B2 confers privileges to cover electrical and avionics systems.

# ANNEX C: CASA costs for licence issue

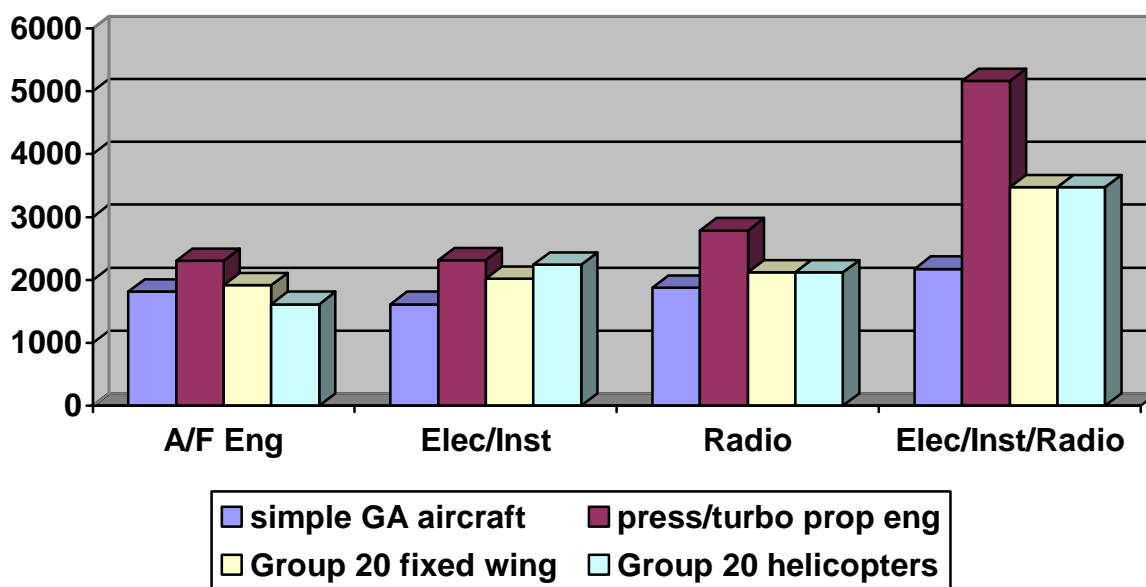
## Current CASA costs associated with a CAR 31 licence issue.

CASA has prepared the graph below to expand and identify the current indicative costs associated with a licence issue. As can be seen by the graph the costs vary from approximately \$1600.00 to over \$5000.00. The graph also includes costs associated with obtaining an Electrical/Instrument and Radio as well as the full Avionics (Electrical/Instrument/Radio) licence to better illustrate the demographics of the current licensing structure in Australian. The costs take into consideration CASA fees for:

- Exams
- Schedule of Experience
- Licence issue

The licence issue costs for a typical pressurised/Turbo Prop engine, in most cases, is higher due to the number of individual ratings issued to a LAME to exercise the privilege of the licence. The additional cost for a fully rated lower group avionics person is because a LAME may need to hold up to 16 ratings within the 3 categories to accommodate the different avionics packages in different aircraft. These costs also vary to the number of rating applied at the one time i.e. is a person applies separately for each individual rating than the costs would be marginally higher.

Figure1. Total CASA costs incurred for CAR31 Licence issue



**Simple GA aircraft** – Single piston engine, non pressurised, non retractable undercarriage un-supercharged

**Pressurised/Turbo Prop engine aircraft** – typically aircraft included would be King Air, Merlin 2, and Pilatus PC12 etc.

**Group 20 heavy aircraft** – aircraft from Jetstream 4100 to Boeing 747

**Group 20 Helicopters** – helicopters from Dauphin 365 to Sikorsky S92

Note: The table on page 10 of the “Comparison of costs of training aircraft maintenance engineers in Australia, New Zealand, the United Kingdom and the USA” report for a Boeing 737 NG AME licence includes partial costs for licence issue and therefore the difference between the indicative costs above and the \$1,200 identified as “subjects” in the report need to be added to the final costs for licence issue

Cost of a CAO 100.66 Maintenance Authority (per application - licence and rating or amendment) or for a proposed CASR 66 licence issue.

With the introduction of CAO 100.66 CASA charges for the assessment and issue per application (irrespective of the number of licence categories or ratings being applied for) at the hourly rate. The indicative cost of CAO 100.66 MA

application is \$190.00 (fees regulation 2.18 & 2.19). This current charging rate method is envisaged to continue when the new regulations are introduced.

The CAO 100.66 (and Part 66) authorities/licences are perpetual in nature ie no renewal fee; however, there is a cost of revalidation every five years (indicative cost is 0.5 hours – at current rate \$95.00). The five yearly count for revalidation recommences if a change/amendment has been made to the licence.