

AMROBA^{inc.}

**Aircraft Maintenance Repair & Overhaul Business Association
inc.**

**Aircraft Maintenance Engineer Training
Aircraft Maintenance Engineer Licensing System**

**Proposal to Improve Skills to the Global Standards
of the
ICAO Asia/Pacific Region**

December 2012

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A M R O B A

General

The International Civil Aviation Organisation (ICAO) lists the following countries as part of the Asia/Pacific Region:

- Australia
- Azerbaijan
- Bhutan
- China
- Fiji
- India
- Indonesia
- Japan
- Kyrgyzstan
- Malaysia
- Maldives
- Marshall Islands
- Mongolia
- Myanmar
- New Zealand
- Pakistan
- Philippines
- Republic of Korea
- Singapore
- Thailand
- Turkmenistan
- Vietnam

The ICAO “*Global and Regional 20-year Forecast, Doc 9956*” states that the Asia/Pacific region will have an annual fleet growth of 5.0% passenger, 5.3% cargo and 9.1% others. This is the highest growth region in the world as identified by ICAO.

The vast majority of these countries have ‘adopted’ the European Aviation Safety Authority (EASA) Part 66/147 aircraft maintenance engineer (AME) licensing and training requirements. The EASA Part 66 licensing was initially based on meeting airline needs by providing:

- ❖ a specific line maintenance engineer (A Category) task trained to meet normal turn-around/transit maintenance, and
- ❖ a highly qualified aircraft and/or avionic maintenance engineer (B1/B2 Category) to:
 - perform & oversee line maintenance by the person mentioned in (a);
 - perform all maintenance work within the scope of the licence and to release aircraft to service in an airworthy state; and
 - provide quality control during base maintenance by performing ‘stage’ maintenance inspections.

Those countries that have adopted the EASA Part 66/147 licensing and training system have also adopted EASA’s Part 66/147 “Regulations for Competent Authorities”; regulations that mandate the hours of training by a Part 147 organisation that have to be achieved to obtain a qualification. These NAA specific regulations were not “adopted” by the Civil Aviation Safety Authority (CASA).

CASA introduced the EASA licensing concept into Australia in 2008 for airline licensed aircraft maintenance engineers (LAME) by the promulgation of CAO 100.66. It was made applicable to all other LAMEs in 2012 post the making of Civil Aviation Safety Regulation (CASR) Parts 66 & 147.

Adopting the EASA standards meets one of ICAO’s main tasks in the field of personnel licensing to foster the resolution of differences in licensing requirements and to ensure that international licensing standards are kept in line with current practices and probable future development. By ensuring that all maintenance engineers are fully trained and regulated, the aviation industry (and governments/agencies) aims to maintain;

the safety of the aircraft and all passengers

It is extremely important that Australian aircraft maintenance engineers be provided with the same skills, or better, than those that are being trained in the Asia/Pacific region. EASA also enabled the use of a “group” licence rating system not unlike the “group” rating system in CAO 100.90 series.

CASA implemented CASR Part 66 without the flexibility of EASA Part 66 by only adopting the formal training aspects of EASA Part 66/147 but without adopting the mandatory course duration and knowledge/practical training ratio regulated by EASA.

Has CASA been misled by training organisations, government skill councils and others that see ‘government funding’ as the limit on training rather than adopting EASA training standards?

It is time to develop competency training based on the duration and knowledge/practical training ratio as mandated by EASA to obtain an equivalent licence standard in the Asia/Pacific Region.

A M R O B A

The Issue

CASA has accepted that EASA has set the best formal AME training standard irrespective of the vocational education system used to develop the aircraft maintenance engineers' competence for the aviation industry. **EASA regulatory training standards have not been fully adopted in Australia.**

The formal training aspects of EASA's A, B1 & B2 introduced by CASA did modernise & harmonise the Australian AME training package with most countries in the Asia Pacific Region. However, it did not expand the training elapsed time to enable competence to be fully attained.

- The B1 and B2 requirements added more training to an already overloaded training package.
- The A category introduced a new training package.
- EASA, in its wisdom, developed avionic/mechanical training modules for each basic licence (A, B1 & B2) and, to obtain global standardisation within Europe, they regulated the elapsed times of each type of basic licence training course in their regulations.
 - The courses were also regulated to have the right mix between knowledge learning and practical training so graduates had the competence needed by industry employers.
 - Practical training is the responsibility of the Part 147 organisation not the Part 145 AMO.
 - EASA Part 147 MTO may supervise some practical training in a maintenance facility.

The EASA B1/B2 training modules makes the training package much larger than what is funded and applied currently in Australia. Current course duration is too short to achieve EASA like results.

Current CASA approved maintenance engineer training courses are below global standard used in Asia Pacific region.

Australia simply cannot provide the same 'skills' within its antiquated 1280 training hours of government funding and a 'Log of Industry Experience' that no longer equates to the EASA aircraft maintenance engineers' Part 147 Maintenance Training Organisation's 2400 hours training standards. Our "Log of Industrial Experience" is not their Part 147 "Practical Training & Assessment Record".

If the EASA promulgated training time, including their training modules and the ratio of knowledge and practical training provided by their Part 147 training organisation, had been adopted then Australia would have a compatible AME licence with appropriate skill outcomes.

Fact

- You cannot compress the EASA training standards into the 1280 hours allotted in Australia.
- We are not intellectually smarter than our European or Asia Pacific neighbours.
- 50-60% of EASA training B1/B2 courses are allotted to knowledge training then 1200 to 1440 hours is knowledge based. This leaves no time for practical training.
- 40-50% of EASA practical B1/B2 training means the Part147 MTO would need to provide 960-1200 practical training within their CASA approved course.

Has CASA approved an Australian Part 147 MTO A, B1 or B2 course that complies to the EASA mandated course duration with the EASA knowledge/practical training ratio?

Regional Harmonisation

Australia, if the our training system was 100% compatible with our Asia Pacific neighbours, would have training facilities that could assist in addressing the massive annual shortage of pilots, maintenance engineers and air traffic controllers in the Asia/Pacific region identified by ICAO in their *Global and Regional 20-year Forecast*.

Attrition: 4% per annum	Needed 2030	Annual Training Needs	Annual Training Capacity	Shortage/Surplus
Pilots	290,844	18,257	4,935	-13,222
LAME	289,510	19,010	4,265	-14,745
ATC	44,282	2,931	1,865	-1,066

This EASA licence structure is not the best model for the domestic non airline sector.

Proposal – Part 66/147 Adaptation

The following proposal means adoption of Asia Pacific training/skill standards based on the EASA Part 66/147 regulation, including the regulations for “Competent Authorities”.

1. To provide aircraft maintenance engineer training equivalent to the EASA standards in the same manner being applied by other Asia/Pacific countries that have adopted the EASA A, B1 & B2 aircraft maintenance engineer training standards. No unique alterations to be applied by CASA, training organisations or the skill council, Manufacturing Skills Australia.
 - a. The EASA course duration as specified in applicable EASA regulations to be adopted without change.
 - b. The EASA knowledge/practical training ratio specified in EASA regulations to be adopted without change.
 - c. That the government increase current training funding to fully cover the knowledge component of the EASA training hours. This needs a submission to DEEWR.
 - d. The practical training component to be funded by the student under HECS-HELP, FEE-HELP or other funding system. Employers usually make arrangements to help repay HECS.
2. Resurrect the “Group” AME licence rating system, which is possible under EASR Part 66, for aircraft other than Transport Category aircraft used in airline/charter work.
 - a. Adopt EASR 66.A.45 *Type/task training and ratings* requirements but attach CAO 100.90 series group ratings to the EASA “group” ratings.
 - b. CAO 100.90 series ‘ratings’ can be added to the EASA “group” ratings as Limitations to the AME licence as Exclusions for the CAO 100.90 series rating not held.
 - c. CASA should still provide examinations for the “group” ratings not held so current LAMES can remove groups entered on the licence as exclusions.

The outcome of the above proposal will provide Australia with competent aircraft maintenance engineers that meet the standards developed by the EASA by globally competitive training facilities.

It would also put Australia in an improved position to negotiate aviation trade agreements within the Asia Pacific Region. Australia’s 1280 allotted training hours includes assessment of around 300 hours.

Justification

No other country, that has adopted the European aircraft maintenance engineering system contained in their regulations, has not adopted the ‘regulations’ for a Competent Authority specifying course durations as specified in Appendix I to the regulators Part 147 regulations.

In addition, by not adopting EASA’s Part 66 “group” aircraft maintenance engineers’ ratings, CASA placed unreal and unnecessary costs on the non airline industry that still needs LAME “group” ratings to match the needs of the non airline sectors.

For a couple of decades, the AME training curriculum has been continually expanded in Australia without increasing the duration of the training. Competency is a combination of theory and practical training purporting to provide the skills the industry needs. The collective educational expertise of the EU countries combined to mandate the course duration & knowledge/practical training ratio.

Basing development of training packages, with an expanded LAME scope, on available government funding means skill levels will be affected. Australian societal education standards do not excel above European countries or many other countries that have adopted the EASA A, B1 & B2 AME licenses.

In fact, due to the major change in the scope of the EASA style licences, it is imperative that this country also adopt the duration of courses & knowledge/practical training ratio specified by EASA.

To address the funding of courses that almost double the current funding model will mean students will need to adopt alternative funding models. CASA could assist by gaining assurance from the government that increased training costs will be accepted under HECS-HELP, FEE-HELP, etc.

CASA did not adopt the flexibility of the EASA Part 66/147 licensing/training system – the only aspect that was adopted was the licence titles and scope.

A M R O B A

Clarification

Australia needs to make urgent changes to the mandatory training requirements to bring Australia into line with the Asia Pacific Region. The benefit from this approach could earn foreign money by having a Part 66/147 training system that is compatible with other countries in the Asia/Pacific region.

- Since CASA decided to move to the EASA Part 66/147 licensing system, many employers have publicly complained that skill outcomes are not good enough to maintain aircraft and aircraft components. This is the reverse of what the aviation maintenance industry is experiencing in other countries of the Asia/Pacific region and in Europe.
- In addition, the transition to the new AME licensing system was badly managed for the industry sector outside the airline system – unlike the EASA transition system. CASA, as a Competent Authority, did not develop a transition report that identified current Group licences ratings and the training needed to be attained to remove “Exclusions” from the EASA like AME licences.
- Research into how the EASA and the Asia Pacific NAAs adopted the Parts 66/147 AME licensing system has highlighted differences in the methodology used by CASA.
 - The biggest difference is that the course duration allotted to the Part 147 training organisation is about half the time allotted to the same Part 147 training organisations in Europe or the Asia/Pacific Region.
 - The transition did not provide a report that listed current licence “exclusions” and what training (competencies) were needed to remove each “exclusion”.

Practical training & assessment is not obtained by a **Log of Industry Experience** under the EASA system. However, the Part 147 may provide some practical training at a maintenance organisation under the supervision of a Part 147 practical training instructor/assessor.

CASA adopted EASA AME licensing titles, and then amended the training modules that we now know would add at least 250-300 hours to the B2 EASA package, using EASA training standards, without any increase in the training elapsed time allotted in Australia.

Why didn't CASA, as a Competent Authority, adopt the EASA mandatory standards for training?

One reason that is surmised is CASA wanted to convince government that the licence change was cost neutral. In reality, if done properly, it adds considerable costs to current training.

Another reason is they believed training organisations and some employers who were more concerned with costs than skills. Manufacturing Skills Australia, the government funded skill council; openly admit that they wrote the training modules competency units to match the government funded hours not to meet the EASA regulated course times. **This has to be corrected.**

Government Funded = 1280 hours	(New) Individual Funded = 1120 hours
CASA compressed System	Add EASA Requirements
New System Based on EASA mandatory standards – 2400 hours	

In most countries, there is some government funding but individuals also have to fund a portion of the training. The concern to all is funding the additional hours to enable adoption of the EASA Parts 66/147 licensing system.

This should have been canvassed by CASA prior to the making of the maintenance regulations – regulations that attempted to jamb into current training times and funding, the new broader basic licence scope.

Until CASA adopts the EASA requirements (see page 7) we will continue to witness lower skills instead of becoming the smart country that the government promises. The availability of the government HECS-HELP, FEE-HELP, etc. systems is discussed later in this paper.

There is nothing wrong with the new licensing system if the same training standards are adopted without change. This will provide for GA a broader trained LAME that includes once what was called licence privileges in CAO 100.90 series.

Maintenance Engineers Competence – EASA Requirements

Skilled and competent maintenance engineers are the outcome of obtaining the level of knowledge and the practical skills required to perform and certify maintenance and/or release to service activity. It has been the basis of trade training since the days of artisans – skills are passed down from one generation to another. In this case, skill outcomes is the result of proper competency based training.

What JAA/EASA confronted when developing their skills and licensing system was the reliability of modern aircraft and the inability for the industry “artisans” (licensed aircraft maintenance engineers (LAME)) to pass on the knowledge and skills within a time acceptable to employers – skills needed to maintain the safety of aircraft and all passengers. EASA NAA standardisation regulations:

EASA Part 147, Procedures for Competent Authorities:

SUBPART C

THE APPROVED BASIC TRAINING COURSE

147.A.200 The approved basic training course

- (a) The approved basic training course shall consist of knowledge training, knowledge examination, practical training and a practical assessment.
- (b) The knowledge training element shall cover the subject matter for a category or subcategory A, B1 or B2 aircraft maintenance licence as specified in Part-66.
- (c) The knowledge examination element shall cover a representative cross section of subject matter from the paragraph (b) training element.
- (d) The practical training element shall cover the practical use of common tooling/equipment, the disassembly/assembly of a representative selection of aircraft parts and the participation in representative maintenance activities being carried out relevant to the particular Part-66 complete module.
- (e) The practical assessment element shall cover the practical training and determine whether the student is competent at using tools and equipment and working in accordance with maintenance manuals.
- (f) The duration of basic training courses shall be in accordance with Appendix I.
- (g) The duration of conversion courses between (sub) categories shall be determined through an assessment of the basic training syllabus and the related practical training needs.

EASR Part 147 Appendix I has been adopted by all countries in the Asia/Pacific region that adopted the EASA Part 66/147 AME licensing system, excluding Australia.

Appendix I

Basic Training Course Duration

Minimum duration of complete basic courses

Basic Course	Duration (in hours)	Theoretical training ratio (in %)
A1	800	30 to 35
A2	650	30 to 35
A3	800	30 to 35
A4	800	30 to 35
B1.1	2400	50 to 60
B1.2	2000	50 to 60
B1.3	2400	50 to 60
B1.4	2400	50 to 60
B2	2400	50 to 60

EASA General Aviation Group Rating Capability

It was, and is possible to have a LAME “Group” rating system that could have harmonised with the system that existed pre 2012. Why was it not used in CASR Part 66/147?

EASR 66.A.45 Type/task training and ratings

(g) Notwithstanding paragraph (b), for aircraft other than large aircraft, the holder of a category B1 or B2 aircraft maintenance licence may also exercise certification privileges, when the aircraft maintenance licence is **endorsed with the appropriate group ratings, or manufacturer group ratings, unless the Agency has determined that the complexity of the aircraft in question requires a type rating.**

2. **Full group ratings may be granted** after complying with the type rating requirements of three aircraft types representative of the group from different manufacturers. However, no full group rating may be granted to B1 multiple turbine engine aeroplanes, where only manufacturer group rating applies.

3. The groups shall consist of the following:

(i) for category B1 or C:

- helicopter piston engine
- helicopter turbine engine
- aeroplane single piston engine — metal structure
- aeroplane single piston engine — wooden structure
- aeroplane single piston engine — composite structure
- aeroplane multiple piston engines — metal structure
- aeroplane multiple piston engines — wooden structure
- aeroplane multiple piston engines — composite structure
- aeroplane turbine — single engine
- aeroplane turbine — multiple engine

[order changed to collate single & twin ratings together]

(ii) for category B2 or C:

- aeroplane
- helicopter

Avionics:

From an avionics licence standing, all CASA needs to do is issue a B2 licence for aeroplanes and/or helicopters with Limitations listing any CAO100.90 series avionic “group” rating NOT held.

During the transition period, CASA continues to provide “basic examinations” for the group ratings to enable removal of excluded ratings. The transition period should be extended for another 5 years considering no warning or planning was possible by the non airline sector pre making of CASR Part 66.

Mechanical:

CAO 100.90 series already identifies metal, wood, composite as the basis of the airframe licence. Engines are also split between piston and turbine. The avionic privileges in electrical, instrument and radio enable the commonality between both approaches to be combined.

e.g. Individual rating for “propellers” should be retained for safety purposes.

Possibly the better method should be the retention of the CAO100.90 series ratings as sub ratings of the EASA group ratings.

CASA seems to have forgotten that the CAO “group” ratings have served this industry well and is why safety and productivity has been high in the non aviation maintenance industry.

Recommendation: CASA amend the Part 66 MoS to include the above EASR and return to past group rating system.

CAA(UK) Approved Courses – Sample

CAA(UK) approves courses that meet the mandatory requirements of EASA. Many CAA(UK) Part 147 are also involved in the Asia/Pacific Region. As a sample of the many training providers in the UK, Air Service Training Ltd (AST), one of the oldest, has been randomly selected. It demonstrates how integrated the college and university system in the UK. They also partner training facilities in many countries, e.g. Malaysia, and provide EASA examinations in these countries.

<http://airservicetraining.co.uk/partners.cfm>

Air Service Training Ltd (AST) is a wholly owned subsidiary of Perth College UHI, part of the University of the Highlands and Islands (UHI). AST themselves have been a world leader in the field of Aviation training since 1934, making it arguably the longest-established organisation of its kind in the world.

Air Service Training – Training Courses			
Course	Duration	Hours	Approved
Part 66 Category A	32 training weeks	25 theory weeks 5 weeks OJT (split by 2 week)	CAA(UK)
Part 66 Category B	89 training weeks	The first 14 months of the course are common to all licence types, therefore students do not need to make a decision regarding whether to follow Mechanical or Avionic licensing until the second year of the course.	CAA(UK)
Part 66 Category B 'Sandwich' Course (normal apprenticeship)	Completed over 4 years.	In each of the <u>first 3 years</u> of the course students will undertake <u>22 weeks of study at AST</u> . They then return to their sponsoring organisation for <u>3 weeks OJT</u> and <u>24 weeks of maintenance experience</u> . In the <u>final year</u> there are <u>11 weeks of training at AST</u> , 3 weeks of OJT, and the remainder adding to the student's experience requirement.	CAA(UK)
Part 66 B Integrated Course (For non certifying skilled worker.) <i>[Not CAA(UK) approved]</i>	AST offers a flexible, short, modular programme that provides the <u>theoretical knowledge and examinations</u> required for the full IR Part 66 licence	This may be studied as a complete full time programme lasting <u>between 22 and 26 weeks</u> , depending on the type of course, or as individual modules, each lasting between 1 and 6 weeks. Some modules may be available for distance study using an online learning environment.	Transition for those that are considering transition to Part 66 licensing.
Non Certifying Courses (AME/AMT)	This course provides an overview of aircraft systems and maintenance processes, and basic hand skills such as metal shaping and forming, wire locking and general aircraft handling.		4 weeks
• Aeroplane Fundamentals course	This course builds on the same model as the LAMEs course. The course places greater emphasis on the development of basic engineering skills, with approximately 50% of the course being used for practical work.		12 weeks
• Helicopter Maintenance fundamentals	Similar to the Aeroplane fundamentals course, this is designed for those new to the helicopter industry.		12 weeks
• Foundation courses	Foundation courses are designed to meet the specific needs of sponsoring organisations, the actual content and duration being based on a thorough Training Needs Analysis (TNA).		Depends on TNA

As can be seen, the normal apprenticeship training method includes 77 weeks of training at AST over the four years – a big difference to our current system.

Current CASR LAME Requirements

Under the new CASRs, the LAME role is quite different than under the CARs and will take some time for employers and LAMEs to come to terms with the change. Basically, the role of the LAME under the new CASRs is more like the FAA A&P mechanic than the B1/B2 LAME under EASA.

The regulatory difference for the LAME under CASRs and CARs is certifying for maintenance and not the “completion of” maintenance or “stage of” maintenance. The other difference is the licence issued by CASA no longer means that the LAME has the experience or competence to do maintenance as it is based on achieving an academic qualification.

The onus is now on the employer to ensure the LAME is competent – i.e. has the experience and skills to do the maintenance task and sign for it. The LAME will/should maintain a “Log of Industrial Experience” so employers can assess the experience of the LAME.

We are not sure who ensures an independent LAME has the competence or skills to do maintenance. This is something that CASA has not explained. The FAA system has a regulatory process to address this issue but CASA has not adopted the FAR system.

Under CASR Part 42, the LAME is an entity that signs for aircraft maintenance irrespective if the LAME has assistance – apprentice, pilot or AME.

Both the Civil Aviation Act and Macquarie Dictionary identify maintenance as a task or an act of doing maintenance NOT the completion of maintenance. This is very different to signing for the completion of maintenance or stage of maintenance as has been the regulatory norm up till now.

Under the CASR requirements, the LAME is the new AME in base maintenance as there is no quality control exercised by the LAME doing stage inspections as exists in the FARs and EASRs. Even NZ includes a LAME with an Inspection Authorisation to provide quality control.

If the training is properly expanded to harmonise with the EASA standards, then it will also harmonise with North America maintenance personnel training courses duration. There is a trend world wide for the LAME training outcomes to be at the degree level.

It is also interesting to note the variety of training being made available by many sources.

This is possibly the last chance that Australia will get to update its aviation maintenance training standards to harmonise with modern global standards used by our Asia/Pacific neighbours.

If the maintenance training was similar to the sample shown on page 9, then the Australian LAME would once again be respected and harmonised with world’s best practice.

The General Aviation LAME

The non airline LAME works in a different regulatory and workplace environment than the LAME employed in the airline industry where technical support is provided to LAMEs working on the floor. The same applies to most large maintenance organisations that also have technical support available.

The GA LAME can do a lot of work under the cover of his/her licence without being employed by an approved maintenance organisation (AMO). The LAME can do any work on a Class B aircraft except for the work specified in Schedule 7. Refer CAR42ZC(4)(b)(i)(ii)(A)

CAR Schedule 7 clearly states maintenance that cannot be done by an independent LAME or does it?

If the aircraft registered operator opted for a maintenance release inspection every 300 hours instead of 100hours, the LAME can do all other inspections including special inspections, airworthiness directives etc as long as the inspections were not required to be done at the maintenance release inspection. CASA and its predecessors regulatory excluded the independent LAME from specific types of maintenance based on previous maintenance error records, accidents and incidents. This is the sign of a mature aviation regulator. The result has been considerable lowering of maintenance related accidents/incidents to the current acceptable level.

There is nothing today that stops an independent LAME doing an engine change and most other maintenance. So why aren't there a lot of independent LAMEs operating in the non airline sector? The simple answer is legal liability. Today's society is litigious and there are little regulatory defences under current and proposed regulations for the independent LAME.

The requirement for facilities, data, tooling and equipment should be exactly the same irrespective whether the LAME is an individual or employed by an AMO or operator. This is where the CAR system, unlike the FARs, got it wrong. CASA also has a responsibility to the government to create regulations where it can provide regulatory oversight at a reasonable cost to government.

Legal liability in a litigious society prevents individuals from performing much of the maintenance that is permitted in the current system. The decline of the independent LAME has happened over the last couple of decades as regulations are changed to shift the responsibility of proving guilt from the accuser to the LAME to prove innocence. The problem with current regulations is that they also have move from 'rule by law' to 'rule by the regulator'. This alone discourages any LAME from doing maintenance without the cover of an AMO.

In the non airline system, the costs of setting up a registered business, compliance with government requirements, especially OHS and Environment requirements is forever increasing. In the US, under their Transport and FAR system, these commercial businesses are known as Fixed Based Operators. FBOs may provide services without FAA approval but must comply with FARs and employ FAA licensed personnel. The services they provide are limited to certain aircraft operations.

This system supports air services that also do not have FAA approvals such as aerial agriculture operations. This system is not used where an AMO provides maintenance services to passenger-carrying operators. The AMO is FAA approved in such cases. Understanding the difference in the maintenance capability of the independent LAME and an AMO is not clearly defined.

If CASA, who continue to propose the independent LAME, had non airline experience and understood other legislation, then the only proposal for an independent LAME should be:

- Employed by private registered operator directly to maintain the operator's aircraft.
 - System is used in US by, e.g. John Travolta.
 - Encourages private Australian owners to register aircraft in Australia
 - An approved maintenance organisation does not add to safety
- Employed directly by aviation flying clubs or corporate aircraft owners
 - Dedicated LAME looking after Club or Corporate aircraft only.

General aviation maintenance organisations could exist without CASA approval on condition that the FAA system for Fixed Based Operators applied.