



AMROBA Submission to Part 66 Review

The shortage of aircraft maintenance engineers and licenced aircraft maintenance engineers reflects directly on the barriers between government departments and the lack of formative career pathways supporting the civil aviation maintenance and manufacturing sectors.

Without career pathways being clearly identified within the education system, aviation struggles to attract potential maintenance personnel. This disconnect started before the partial adoption of EASR Parts 66/147 that completed the disconnect of documented career pathways to civil aircraft maintenance.

Note: The Parts 66/147 adopted did not work in Europe either and EASA amended EASR Parts 66/147 to work better in General Aviation. These amendments have not been adopted by CASA.

Providing aviation maintenance/manufacturing career pathways from secondary school to tertiary training and completing a Certificate IV, Diploma or Advanced Diploma qualifications can also provide the student entry into a number of popular degrees. This has to be restructured.

The civil aviation maintenance sectors are competing with all the other mechanical trade based sectors for a limited number of potential secondary school leavers each year.

The options available to school leavers are many and most students consider whether to do a university degree or a tertiary qualification. They have to consider:

- Which courses and qualifications best suit their interests and aptitudes.
- The cost associated with the qualification or degree they want to study.
- Whether completing the course will give them the skills you need to get the job you want.

Career pathways must make it clear how a potential maintenance employee can add to their qualifications to progress their careers in civil aviation, not just how to become a LAME.

The current regulatory modular training in Part 66 has not been accepted into the NVET system even though Part 66 was introduced in 2008. The NVET system is competency based – not knowledge based and that is the reason why it is not compatible with CASA’s non competency based Part 66.

Until the licences and NVET training support the micro/small business, then LAME career pathways cannot be developed and promulgated to address the shortage of AMEs and LAMEs.

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2023 – Provide Aircraft Maintenance Personnel Licencing for the Future.

The current aircraft maintenance engineer licencing system, regulatory standards, processes and training have contributed to the shortage of licenced aircraft maintenance engineers (LAME). It does not include future licence ratings to meet changed aeroplane certification standards (*Part 23 Levels {low/high speed}*) and new competency based training standards promulgated by amendments to Annex 1, Chapter 4, *Aircraft Maintenance Engineer* and referred to in ICAO guidance documents.

Are the licence categories and sub-categories compatible with maintenance personnel employer needs?

The AME Part 66 licencing regulatory system does not specifically detail training requirements, provided in Australia under the National Vocational Education Training system (NVET) that uses competency based training, for each licence category/sub category. The NVET system is designed to meet employer needs but the diploma course available suits major airlines with their employee splits of avionics, mechanical and structures.

The current training available to employers does not provide an employee with the competencies to maintain the aircraft that many aeroplane and helicopter MRO maintenance organisations service.

An AMO maintaining helicopters or piston engined aeroplanes do not need various elements of Modules 11 or 12. CASA needs to detail which module subjects are required, specifically, for each licence category or sub-category. The B1.2 aeroplanes needs to split module 11A into 2 levels to meet future small aeroplane categories. This will actually align better with the maintenance organisation sectors. For example, both Modules 11 & 12 are too broad for the maintenance sectors of aviation within Australia.

EASA addressed this by creating Group Ratings within the B1.2 licence. Both the B1.2 and B1.3/4 need the specific elements of the modules 11 & 12 identified to match the licence. Competency based training requires a different approach to the European knowledge based system and examinations.

Maintenance Capability	Module 11	Module 12	Licence
Helicopter Maintenance Basic helicopters (Part 27) Non-transport category		<ul style="list-style-type: none"> ➤ Non-complex helicopters ○ Applicable Module 12 elements to be specified ○ Piston engine ○ Mainly rigid hubs 	<ul style="list-style-type: none"> ○ B1.4 Light (basic)
Helicopter Maintenance Complex helicopters (Part 19) Transport category		<ul style="list-style-type: none"> ➤ Complex Helicopters ○ Applicable Module 12 elements to be specified ○ Turbine engine, piston option ○ Mainly fully articulated hubs 	B1.4 (advanced) Plus type ratings
Aeroplane Maintenance Part 23, excluding Level 4 and 1-4 High Speed, Excluding transport aircraft	<ul style="list-style-type: none"> ➤ Non-complex aeroplanes <ul style="list-style-type: none"> ▪ Piston engine, turbine option, electric option ▪ Non-pressurised structures and systems ▪ Applicable Module 11 elements to be specified ▪ Levels 1-3 (Part 23) <ul style="list-style-type: none"> • Low speed 		B1.2 Light
Aeroplane Maintenance All non-Part 25 transport aeroplanes, including gliders	<ul style="list-style-type: none"> ➤ Complex aeroplanes <ul style="list-style-type: none"> ○ Piston engine with turbine option, electric option ○ Pressurised structures and systems <ul style="list-style-type: none"> ▪ Applicable Module 11 elements to be specified ○ Level 4 (Part 23) <ul style="list-style-type: none"> ▪ Low speed and <ul style="list-style-type: none"> • Levels 1-4 High speed 		B1.2 Plus type ratings
Aeroplane Maintenance All transport aeroplanes and designated complex aeroplanes	<ul style="list-style-type: none"> ➤ Little to no change 		B1.1 Plus type ratings

A. EASA Part 66 Groups Not Adopted

Why did EASA create “Groups”? **Ans:** To meet the GA civil maintenance industry requirements.

Aircraft groups For the purpose of **ratings** on aircraft maintenance engineer licences, aircraft shall be classified in the following groups:

1. **Group 1:** complex motor-powered aircraft as well as multiple engine helicopters, aeroplanes with maximum certified operating altitude exceeding FL290, aircraft equipped with fly-by-wire systems and other aircraft requiring an aircraft type rating when defined so by the NAA.
2. **Group 2:** aircraft other than those in Group 1 belonging to the following subgroups:
 - sub-group 2a:* single turbo-propeller engine aeroplanes ----
 - sub-group 2b:* single turbine engine helicopters ----
 - sub-group 2c:* single piston engine helicopters.
3. **Group 3:** piston engine aeroplanes other than those in Group 1

These groups, if adopted when EASR Part 66 was amended, would have partially fixed many issues.

B. Changed Aeroplane Descriptors – Next Generation

Under the B1 ratings, the B1.2 training courses need to provide elective options pathways to complement the Part 23 four levels with low speed or high speed options..

- | | | |
|---|---|--------------------------------------|
| <ol style="list-style-type: none"> (1) Level 1 - for airplanes with a maximum seating configuration of 0 to 1 passengers. (2) Level 2 - for airplanes with a maximum seating configuration of 2 to 6 passengers. (3) Level 3 - for airplanes with a maximum seating configuration of 7 to 9 passengers. (4) Level 4 - for airplanes with a maximum seating configuration of 10 to 19 passengers. | } | Previous
<5700 Kg

Commuter |
|---|---|--------------------------------------|

Each of the above have performance levels based on:

- (1) **Low speed** - for airplanes with a VNO and VMO ≤ 250 KCAS and a MMO ≤ 0.6.
- (2) **High speed** - for airplanes with a VNO or VMO > 250 KCAS or a MMO > 0.6.
 - (2) Completely new concept – jets, high altitude, etc.),

1. MRO Capabilities – Licences should match the MRO Certificate Capabilities

Adoption of new terminology is required to stimulate employment. E.g. Part 23 descriptors. Basically, civil aviation maintenance employment ranges from specialised component shop, specialised service facilities, small non-complex to complex aeroplane or helicopter maintenance organisations, medium to large aircraft maintenance organisation providing private aviation to commercial aviation trading domestically and globally.

Note: The CAR31 Groups matched the CAR30 AMO approvals.

AME Licence “Groups” supported the micro/small directly supervised AMOs pre the CARs. For example, general aviation AMO approvals is yet to be split iaw new aircraft certification standards that replaced the 5700Kg limits for Part 23 into certification based on passenger numbers and whether the aircraft is low or high speed:

- A. Levels 1-3 low speed** piston powered would support the majority of general aviation maintenance organisations.
 - a. Levels 1-3 ‘High Speed’ should be combined with the Level 4 approval below.
 - (Note: this is basically the below 5700Kg limit)
- B. Level 4 low and high speed** piston and/or turbine powered would be the next level for AMOs.
 - (Note: this is commuter category plus high speed aeroplanes)

Level 4 has both low and high speed. Level 4 covers jet aeroplanes. New technology.

2. Courses to Support Career Pathways

CASR Part 66 MoS should list the syllabi, with options for each licence category and sub-category and specify training courses content to be provided by training facilities. Modules 11 and 12 will be needed to be developed and promulgated in the MoS to support appropriate MRO maintenance sectors:

- B1.4 helicopter maintenance
 - **Specific Course to be developed and promulgated:**
 - Piston engine, turbine option,
 - All modules list specific applicable elements,
 - Specifically Module 12 associated elements.
 - Mainly semi rigid hubs.
- B1.3 helicopter maintenance
 - **Specific course to be developed and promulgated:**
 - Piston engine, turbine option, **electric option**,
 - Turbine engine, piston option,
 - All modules list specific applicable elements,
 - Specifically Module 12 associated elements.
 - Mainly fully articulated hubs.
- B1.2 aeroplane maintenance
 - **Specific course to be developed and promulgated:**
 - Piston engine, turbine option, **electric option**,
 - Non-pressurised structures and systems,
 - Applicable Module 11 elements,
 - Levels 1-3 (Part 23),
 - Low speed, **and/or**
 - High speed elements.
 - **Specific course to be developed and promulgated:**
 - Pressurised structures and systems
 - Applicable Module 11 elements,
 - Level 4 aeroplanes,
 - Low speed **and**
 - Levels 1-4 High speed elements.
- B1.1 aeroplane course (No Change)
 - **Current B1.1 course specified**
 - Turbine engine, piston option, **electric option**,
 - Applicable Module 11 elements,
 - Pressurised structures and systems,
 - Applicable Module 11 elements,
 - Low speed **and**
 - High speed elements.
- B2 avionics course
 - **Specific B2 & 2BL courses to be developed and promulgated**
 - B2L avionics course (adopt EASA system)

3. Module 10 Implementation to Match ICAO LAME Responsibilities

Over the years, the responsibilities of the LAME has been changed numerous times that has blurred the clarity of responsibilities initially specified by DCA.

ICAO AME Training Manual, Doc 7192, Chapter 3 identifies training for both the individual LAME and the corporate LAME. In other words, the employed LAME's responsibility and the management LAME responsibilities.

DCA originally provided the best clarity of the LAME's responsibilities in the Department of Civil Aviation *Publication No.35*. This publication had sections on: "*General Requirements of Licence Holders and Privileges and Responsibilities of Licence Holders*."

4. General Points with Modules

Suggestion: Modules 11 and 12 need to be restructured to meet the capability of above. 11A for B1.1, 11B for B1.2 aeroplanes Levels 1-3 low speed and **new 11C for aeroplanes Level 4 low and high speed aeroplanes.**

- **Module 11** learning options pathways:
 - Pressurised or unpressurised and
 - low speed or high speed.
- Airframe structures and airframe systems differ greatly from micro/small GA organisation capabilities to larger aeroplane or helicopter organisation capabilities.

Either licencing has to viewed independently from apprentice/trade training programs or, as other trades have achieved, it is additional to, and dependent on trade qualification.

Are proposed Part 66 changes really preparing Australia for future aircraft types?

CASR Part 66

For instance, academically you should not be able to obtain an AQF V licence Diploma unless you hold a AQF IV avionic or mechanical AME trade qualification. Education should also provide an AQF III general trade qualification supported by a pre-employment AQF II qualification for those that don't have basic trade hand skills.

5. Licences and Ratings Global Perspective

In addition to holding trade qualifications, licencing knowledge is different and applicable to all licence holders. Part 66 modular syllabi identifies this in *CASR Part 66 MoS Module 10*.

CASA has partially adopted the EASA Part 66 licences and ratings. The lack of EASA ratings, as applied by CASA, have not been workable in the general aviation sectors, non-airline sectors and helicopter sector. Neither were they workable in Europe. EASA has made a number of changes that have not been adopted by CASA. Time to abandon this adoption approach and resurrect previous “group” ratings.

- 33,150 civil aircraft registered in Canada, 82% engaged in GA activities.
- 27,000 civil aircraft registered in the UK, 96% engaged in GA activities.
- 13,750 civil aircraft are registered in Australia. 89% engaged in GA activities.
- Both AME licencing and pilot licencing have direct impact on GA activities.

Globally, and in compliance with international licencing and trade training standards, aviation maintenance personnel have an avionic and a mechanical trade pathway to licencing. In some countries there is one pathway to licencing supported by many specialised training courses.

5A. Experience

This is where the current problem lies. With the current licencing system, gaining all the experience needed for a rating is very hard, if not impossible, to be obtained working within a small to medium business. Add the complication of competency based training for the avionic and mechanical pathways where competency combines practical and knowledge but also require experience results in an unachievable system.

In other words, the adopted ratings are not aligned with the small maintenance businesses in Australia as they were under CAR31 AME licence ratings.

“FAA: *The goal of any AMTS should be to prepare students with the basic knowledge, skills, and attitude to be successful in an aviation maintenance career.*” [**career focused**]

CASA approves RTOs as MTOs but CASA does not approve specific career courses to support each of their licence categories and sub-categories. Why approve a Part 147 MTO and not approve specific trade/licence courses to match legislated licence categories and sub-categories?

ICAO Procedural Changes to Implement Changes to Annex 1, Chapter 4 – Formal Training.

In 2020, procedures on a new approach for the implementation of competency-based training and assessment for Aircraft Maintenance Personnel (AMP) were included as Part III in the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868). These procedures provide States, approved maintenance organizations (AMOs) and aviation training organizations (ATOs) with guidance on how to structure their approach to training and assessment of AMP. The procedures provide a flexible framework that stakeholders can adapt to their local operational contexts and requirements.

AMP can have varying degrees of educational background, which can range from the self-taught individual to the holder of a university engineering degree. However, irrespective of educational background, all AMP must demonstrate a high level of technical competency and understanding of regulatory compliance. Often, meeting these high standards requires comprehensive training that provides the necessary knowledge, skills and attitudes for assuming the responsibility for aircraft maintenance.

This manual provides guidance on a new approach of applying competency-based training and assessment to aircraft maintenance personnel in accordance with Part III of the PANS-TRG, Doc 9868. This manual was developed by the Competency-Based Training and Assessment Task Force with contribution from subject matter experts on maintenance personnel.

Annex 1 Personnel Licensing

1.2.3 Privileges of the holder of a licence

A Contracting State shall not permit the holder of a licence to exercise privileges other than those granted by that licence.

CHAPTER 4. Licences And Ratings For Personnel Other Than Flight Crew Members

4.1 General rules concerning licences and ratings for personnel other than flight crew members

4.1.1 *An applicant shall, before being issued with any licence or rating for personnel other than flight crew members, meet such requirements in respect of age, knowledge, experience and where appropriate, medical fitness and skill, as are specified for that licence or rating.*

4.1.2 *An applicant, for any licence or rating for personnel other than flight crew members, shall demonstrate, in a manner determined by the Licensing Authority [CASA], such requirements in respect of knowledge and skill as are specified for that licence or rating.*

4.2 Aircraft maintenance (~~technician/engineer/mechanic~~)

Note.— The terms in brackets are given as acceptable additions to the title of the licence. Each Contracting State is expected to use in its own regulations the one it prefers.

4.2.1 Requirements for the issue of the licence

4.2.1.1 Age

The applicant shall be not less than 18 years of age.

4.2.1.2 Knowledge

The applicant shall have demonstrated a level of knowledge relevant to the privileges to be granted and appropriate to the responsibilities of an aircraft maintenance licence holder, in at least the following subjects:

Air law and airworthiness requirements

- a) rules and regulations relevant to an aircraft maintenance licence holder including applicable airworthiness requirements governing certification and continuing airworthiness of aircraft and approved aircraft maintenance organization and procedures;

Natural science and aircraft general knowledge

- b) basic mathematics; units of measurement; fundamental principles and theory of physics and chemistry applicable to aircraft maintenance;

Aircraft engineering

- c) characteristics and applications of the materials of aircraft construction including principles of construction and functioning of aircraft structures, fastening techniques; engines and their associated systems; mechanical, fluid, electrical and electronic power sources; aircraft instrument and display systems; aircraft control systems; and airborne navigation and communication systems;

Aircraft maintenance

- d) tasks required to ensure the continuing airworthiness of an aircraft including methods and procedures for the overhaul, repair, inspection, replacement, modification or defect rectification of aircraft structures, components and systems in accordance with the methods prescribed in the relevant Maintenance Manuals and the applicable Standards of airworthiness; and

Human performance

- e) Human performance, including principles of TEM, relevant to aircraft maintenance.

Note.— Guidance material to design training programmes on human performance, including TEM, can be found in the Human Factors Training Manual (Doc 9683).

4.2.1.3 Experience

*The applicant shall have had the following experience in the **inspection, servicing and maintenance** of aircraft or its components:*

- a) *for the issue of a licence with privileges for the aircraft in its entirety, at least:*

- 1) *four years; or*

- 2) *two years if the applicant has satisfactorily completed an approved training course; and*

- b) *for the issue of a licence with privileges restricted in accordance with 4.2.2.2 a) 2) or 3), a period of time that will enable a level of competency equivalent to that required in a) to be attained, provided that this is not less than:*

- 1) *two years; or*

- 2) *such a period as the State considers necessary to provide an equivalent level of practical experience to applicants who have satisfactorily completed an approved training course.*

4.2.1.4 Training

Recommendation.— *The applicant should have completed a course of training appropriate to the privileges to be granted.*

Note.— The Manual on Training of Aircraft Maintenance Personnel (Doc 10098) contains guidance material on the design and development of a training programme for aircraft maintenance personnel.

4.2.1.5 Skill

The applicant shall have demonstrated the ability to perform those functions applicable to the privileges to be granted.

4.2.2 Privileges of the holder of the licence and the conditions to be observed in exercising such privileges.

4.2.2.1 Subject to compliance with the requirements specified in 4.2.2.2 and 4.2.2.3, the privileges of the holder of an aircraft maintenance licence shall be:

- (1) to certify the aircraft or parts of the aircraft as airworthy after an authorized repair, modification or installation of an engine, accessory, instrument, and/or item of equipment, and*
- (2) to sign a maintenance release following inspection, maintenance operations and/or routine servicing.*

4.2.2.2 *The privileges of the holder of an aircraft maintenance licence specified in 4.2.2.1 shall be exercised only:*

a) in respect of such:

- 1) aircraft as are entered on the licence in their entirety either specifically [type rating] or under broad categories [group ratings]; or*
- 2) airframes and engines and aircraft systems [mechanical] or components as are entered on the licence either specifically [type rating] or under broad categories [group ratings]; and/or*
- 3) aircraft avionic systems or components [avionics] as are entered on the licence either specifically [type rating] or under broad categories [group ratings];*

b) provided that the licence holder is familiar with all the relevant information relating to the maintenance and airworthiness of the particular aircraft for which the licence holder is signing a Maintenance Release, OR such airframe, engine, aircraft system or component and aircraft avionic system or component which the licence holder is certifying as being airworthy; and

*c) on condition that, within the preceding 24 months, the licence holder has **either had experience in the inspection, servicing or maintenance of an aircraft or components in accordance with the privileges granted by the licence held for not less than six months, or has met the provision for the issue of a licence with the appropriate privileges, to the satisfaction of the Licensing Authority.***

4.2.2.3 *A Contracting State shall prescribe the scope of the privileges of the licence holder in terms of the complexity of the tasks to which the certification relates.*

4.2.2.3.1 Recommendation.— *Details of the certification privileges should be endorsed on or attached to the licence, either directly or by reference to another document issued by the Contracting State.*

4.2.2.4 *When a Contracting State authorizes an approved maintenance organization to appoint non-licensed personnel to exercise the privileges of 4.2.2, the person appointed shall meet the requirements specified in 4.2.1.*

4.2.3 Privileges of the holder of the licence and the conditions to be observed in exercising such privileges for RPAS

4.2.3.1 *The privileges of the holder of an aircraft maintenance licence specified in 4.2.2.1 shall be exercised only in respect of such:*

- a) RPA or RPS as are entered on the licence either specifically or under broad categories; or*
- b) RPAS and associated C2 link as are entered on the licence either specifically or under broad categories after appropriate knowledge and practical training on maintenance of the RPAS and associated C2 link system.*

4.2.3.2 *When a Contracting State authorizes an approved maintenance organization to appoint non-licensed personnel to exercise the privileges of 4.2.3, the person appointed shall meet the requirements specified in 4.2.1.*