

Part B: Aircraft Maintenance Engineer (AME) Trade Training V CASR Part 66 AME Licencing.

The biggest issue confronting the aviation maintenance industry is attracting new apprentices/trainees to a trade that has had its training system regulatory ruined.

Aviation regulatory reform that started back in 1990s, removed promulgated international maintenance training standards under pressure from some sectors of the industry to create sector trade training instead of industry wide trade training.

"The VET system has gone through a number of changes since 1970 that were supposed to improve skill training for Australian industries.

- *The establishment of the national VET system with nationally funded Technical and Further Education (TAFE) Colleges in the 1970s;*
- *The establishment of traineeships to complement the traditional apprenticeship system in the 1980s;*
- *The decision to implement competency-based training in the late 1980s;*
- *A raft of more recent reforms and developments during the 1990s, including the development of an industry-led training system and a prominent role played by industry training bodies have played in the development of national training packages." **

* The above is an excerpt by the National Centre for Vocational Education Research.

However, the basis for aviation maintenance training, the Chicago Convention's Annex 1, Chapter 4 recommended minimum training standards were removed from the Civil Aviation Authority's promulgated standards in the mid-1990s. This was then overridden by CASA's promulgation of CASR Part 66/147 that specified the EASA's application of the Convention's Annex 1 recommended AME training standards.

Both the Annex 1 recommended aircraft maintenance engineer (AME) training manual and EASA's AME training identify a separation of the licencing knowledge requirements from the minimum theoretical and practical trade training elements to be qualified as an aircraft maintenance engineer. It is that clear separation that no longer exists in the NVET training package.

This system of separating licencing and trade skills parallels Australia's trade training system. Licencing requirements are post achieving trade training qualifications.

Internationally, AME licence training is specified in Chapter 3 of the Annex 1, Chapter 4 training manual and Module 10 of the EASA system implemented by CASR Part 66. This separated training is desperately needed by the aviation industry today.

Australia's trade training regulator, Australian Skills Quality Authority (ASQA), must be made solely responsible for adopting and implementing the Convention's Annex 1 recommended minimum training standards. These must be packaged into the trade module format, excluding Part 66 module 10, legislatively promulgated by CASR Part 66 that was originally implemented as CAO 100.66 in **2007**. NVET system not modular.

Australia once had an internationally accepted aviation trade training system that enabled many Australian trade trained aircraft maintenance engineers to travel the world finding work in many countries. It was based on the Annex 1 recommended training manual minimum standards.

Pathway to Employment

NVET training must provide a pathway to employment in an industry, not just within a business sector. In addition, the recognition of the trade person's capability must exist within a regulatory system.

This can only occur if the regulatory system specifies the role and responsibility of the tradesperson as well as the license holder's role and responsibilities. Under the Annex 1 recommended training manual standards this has been clearly clarified by specifying additional licensing training (Module 10) in Chapter 3 of the training manual.

This qualification is clearly the responsibility of the aviation regulator, CASA, to examine qualified tradesperson's knowledge of these global minimum standards. Industry desperately needs both the two LAME levels specified:

1. To ensure the airworthiness and safety standards of an aircraft are maintained.
 2. Managing a maintenance business and/or aircraft airworthiness control.
1. Qualified Aircraft Maintenance Engineers, prior to applying to the Civil Aviation Safety Authority (CASA) for an aircraft maintenance engineer license, should attain the knowledge specified in the international AME minimum training standards manual:
 - Sections 3.3.1 to 3.3.3 and sections 3.3.8 to 3.3.12 are the basic knowledge that all LAMEs need to attain to be licensed.
 - Additional 90 hours of training above trade.
 2. For LAMEs to meet Chief Engineer/Maintenance Manager levels, they should attain the knowledge specified in the international AME minimum training standards manual:
 - Sections 3.3.4 to 3.3.7 are knowledge that a LAME needs to attain to manage an approved maintenance organisation or perform maintenance control of operator's aircraft.
 - a. Additional 60 hours of training above basic LAME.

To understand the above, the following are excerpts taken from the Convention's Annex 1, Chapter 4 recommended training manual that related to the above Sections 3.3.1 to 3.3.12. AMROBA has separated these knowledge requirements into basic LAME knowledge and CE/MM/MC knowledge levels.

Naturally, the aviation regulatory system would need to state NVET qualification, or equivalent, as a precursor to obtaining an aircraft maintenance engineer's license if government is serious about promoting the sound development of civil aviation.

Recognition of these potential NVET qualifications in aviation regulations must be included to implement such a system.

The LAME knowledge standards could be fully provided on-line based training, self-study and passing of on-line examinations.

Annex 1, Chapter 4 referred AME Training Manual LAME specific minimum training standards. (Refer Part A for Trade Training)

<i>Subject matter</i>	<i>Recommend ed duration (hours)</i>	<i>Level of capability</i>
Chapter 3 - Civil aviation requirements, laws and regulations	LAME ONLY	
3.3.1 International and State aviation law LAME	10	3
3.3.2 Airworthiness requirements LAME	10	3
3.3.3 Civil aviation operating regulations LAME	10	3
3.3.4 Air transport operations LAME Mgr	10	3
3.3.5 Organization and management of the operator LAME Mgr	10	3
3.3.6 Operator economics related to maintenance LAME Mgr	10	3
3.3.7 Approved maintenance organizations (AMOs) LAME Mgr	30	3
3.3.8 Aircraft maintenance licence requirements LAME	20	3
3.3.9 The role of the State aviation regulatory body LAME	10	3
3.3.10 Aircraft certification, documents and maintenance LAME	10	3
3.3.11 Individual Aircraft Certification LAME	10	3
3.3.12 Requirements for continuing airworthiness LAME	10	3

The following excerpts are from the ICAO international recommended training manual.

3.1 REQUIRED KNOWLEDGE, SKILLS, & ATTITUDES***ALL LAMEs Basic Knowledge Standards*****3.3.1 International and State aviation laws**

- International Civil Aviation Organization (ICAO): formation, structure, functions, obligations and responsibilities
- Review of ICAO Annexes, particularly
 - Annex 1 — Personnel Licensing,
 - Annex 6 — Operation of Aircraft and
 - Annex 8 — Airworthiness of Aircraft.
 - Includes Annex 7, Registration of Aircraft
- ICAO specifications applicable to the particular course of study;
- Australia's civil aviation regulations, etc;
- Government, ministerial and departmental responsibilities for civil aviation within Australia;
- State competency and licensing regulations for AMEs;
- Formalities prescribed by Australia: Certificates of Airworthiness (CoA), logbooks, Certificates of Maintenance, maintenance schedules, and Certificates of Approval;
- Format of documents, required signatures, conditions for issue of or compliance, and period of validity.

3.3.2 *Airworthiness requirements*

- Design requirements: performance, structural strength, handling, aerodynamics, reliability, system or component performance and reliability, engine types and tests;
- Construction requirements: material quality, construction methods, approved manufacturing organizations (AMOs), systems of traceability to source of origin, and quality control/assurance;
- Test requirements: structural test programmes, including “safe life”, “fail safe” and “damage tolerant” testing;
- Component testing and systems testing;
- Flight test schedules and engine test schedules;
- Test programmes for special cases (aircraft, systems and components);
- Procedures for the maintenance of continuing airworthiness;
- Airworthiness directives (AD): indigenous, foreign, issue dissemination, and action;
- Operational requirements: performance scheduling, flight and operations manuals;
- Maintenance requirements: use of aircraft maintenance manuals, maintenance schedules, overhaul periods/ lives, “on-condition” maintenance programmes and “condition monitoring” programmes;
- Responsibilities of licensed aircraft maintenance personnel working in an operator or an AMO.

3.3.3 *Civil aviation operating regulations*

- Regulations concerning aircraft, aircraft operations, safety, and airworthiness requirements;
- Personnel licensing, maintenance of competency, approved organizations, and training requirements;
- Aircraft and aircraft maintenance documentation.

3.3.9 *Aircraft maintenance licence requirements*

- Eligibility, age, limits of location, language and fees;
- Categories of licence as defined in State requirements;
- Knowledge and experience requirements;
- Training requirements;
- Examination requirements and content and issue of licence document;
- Privileges of the licence;
- Revocation and suspension procedures by the State.

3.3.10 *The role of the State aviation regulatory body*

- Protection of public interests by establishing the need for and feasibility of air service and ensuring the safety of flight operations conducted within the State;
- Regulation of the degree of competition between operators and exercise of control over commercial air operators;
- Definition of the requirements for State-owned or State-operated facilities and services;
- State authority is normally exercised through the incorporation of civil aviation acts, laws and statutes into the State’s legal system. It is also asserted through the establishment of a State Civil Aviation Safety Authority (CASA) which has the power to apply principles

set forth in aviation law, develop civil aviation regulations and orders, and establish requirements for the issue of licences, certificates and other instruments of authority deemed necessary for commercial air transport. The State must also inspect all aspects of commercial air transport operations to ensure continuing compliance with State requirements, recommend corrective action to air operators and revoke air operators' licences.

3.3.11 *Aircraft certification, documents and maintenance*

- Aircraft, propeller and engine Type Certification;
- Certification rules (e.g., FAR/JAR 23, 25, 27 and 29);
- Type Certification (TC), TC issue, and associated TC Data Sheet;
- Supplemental Type Certification or major modification.

3.3.12 *Individual aircraft certification*

- Approval of design or production organizations;
- Issue of Certificate of Airworthiness (CofA) and Certificate of Registration (CofR);
- Documents to be carried on-board the aircraft: CofA, CofR, Noise Certificate, Weight and Balance Reports, and Radio Station Licence and Approval.

3.3.13 *Requirements for continuing airworthiness*

- Understanding of the concept that continuing airworthiness is the process of ensuring that at any time in its operating life, the aircraft should comply with airworthiness requirements and should be in a condition for safe operation;
- Renewal or continued validity of the CofA;
- State approval or acceptance of maintenance programmes, minimum equipment lists, ADs, manufacturer's service information (SBs, SLs, etc.), aircraft maintenance manual, operator maintenance control manual, and AMO Maintenance Procedures Manual;
- Understanding of the importance of defect reporting to the State of Registry and to the organization responsible for the type design;
- Analysis of defect accident or other maintenance or operational information by the organization responsible for the type design;
- Importance of structural integrity with particular reference to supplemental structural inspection programmes and any other requirements related to ageing aircraft;
- Special operational approvals (e.g. Extended Range Operations by Aeroplanes by Twin-engined Aeroplanes (ETOPS), All Weather Operations, Reduced Vertical Separation Minima (RVSM), Required Navigation Performance (RNP), and Minimum Navigation Performance Specifications (MNPS)).

Chief Engineer/Maintenance/Engineering Manager knowledge training standards

3.3.4 *Air transport operations*

- Brief historical review of commercial aviation;
- Outline of major factors in airline organization and economics;
- Description of route network of State concerned.

3.3.5 *Organization and management of the operator*

- Understanding of the air operator's responsibilities for maintenance and the relationship between the operator's Maintenance Control Manual and the maintenance organization's Procedures Manual;
- General structure of an airline; functions and organization of various departments; organization of the maintenance department and AMOs; and detailed functions of departments such as Technical, Engineering, Production Engineering, Quality Control/ Assurance and Inspection.
- **Documentation of maintenance:** use of aircraft manuals, manufacturer's bulletins and ADs, preparation and approval of maintenance schedules, job/task cards, worksheets, aircraft/engine logbooks and operator's technical logbooks;
- Operation of inspection and/or quality departments/sections;
- Stores organization and procedures;
- Planned maintenance work: inspection periods and component lifing, check cycles, rotation of components, and overhaul requirements;
- Hangar layout and equipment, and maintenance docks;
- Workshop safety, fire prevention and first aid;
- Responsibilities of departmental managers;
- Management methods: methods study, time and motion study, statistical methods, budgeting and analysis.

3.3.6 *Operator economics related to maintenance*

- Maintenance costs: percentage of operating costs, capital equipment costs, labour, consumable stores, store's inventory, effect of elapsed time on airline costs, man-hours required to complete typical work, and maintenance time overrun penalties;
- Relative costs of overhaul by manufacturer or airline;
- Component/powerplant leasing;
- Planning: analysis of different cyclic systems (progressive and equalized checks, etc.), long-term planning for mixed fleet, balancing work loading, effects of seasonal peaks on work loading, etc.;
- Preparation of worksheets and job cards, task time analysis, and task sequencing for optimum downtime;
- Development engineering: liaison with manufacturers; study of new aircraft types; performance analysis; modifications policy; defect analysis; engineering contributions to improved utilization; reliability programmes; engine trend monitoring and reliability centred maintenance studies;
- Labour policy: skills required, training and recruitment, grading and qualifications; salary structures; agreements with trade unions etc.;
- State regulations, incentives and discipline, and welfare;
- Quality control/assurance: inspection procedures, documents, records, and sampling techniques; psychological aspects of inspection, and duplicate inspections according to international, national and airline standards;
- Safety: national requirements for industrial safety, insurance requirements, hazards from hazardous fluids and gases (such as fuel, hydraulic fluid, vapours), mechanical dangers, and protective measures in work areas.

3.3.7 *Approved maintenance organizations (AMOs)*

- Concept of a corporate body, its legal responsibilities and organizational structure;
- Group of persons nominated as being responsible for ensuring compliance with approval requirements;
- Establishment of the competence of personnel and training of persons signing maintenance release (release to service aircraft-component);
- Issue of terms of approval by the State;
- AMO procedures and procedure manual;
- AMO quality assurance or inspection system;
- AMO facilities, tools, equipment and working environment;
- AMO storage facilities and procedures;
- Access to necessary technical data;
- Record-keeping and records procedures, and issue of a maintenance release.

Summary: These international minimum AME license training standards must underpin the Part 66 AME license if Australia is to return to global recognition of Australia's maintenance system.

Refer to Part A of this publication by AMROBA for AME trade training requirements.

The Chicago Convention was ratified by Australia many years ago. Time to re-align our regulatory system as it was pre-CAA days.

Globally, meeting the recommended standards promulgated in the Convention's Annexes, and referenced documents, as close as practical (Article 37 of the Convention) is necessary for the sound development of Australian civil aviation to enable participation in the global aviation market.