

# Licensed Aircraft Maintenance Engineer International Training (NVET) Standards



Australia's aviation MRO businesses, to stay competitive in the domestic and global aviation market, need licenced maintenance personnel with skills and qualifications that meet the minimum training standards that have been, for many decades, promulgated by the International Civil Aviation Organisation. Refer to Part A of this Guide for AME Trade Training. Aircraft Licenced maintenance personnel globally are trained to meet these personnel standards. Australia, once again, needs to adopt and implement these training standards into our National Vocational Education Training System. This guide is based on those ICAO minimum training standards.

**Aviation Maintenance  
Repair & Overhaul  
Business Association, inc.**

July 2019

**Part B – Licence  
Training Syllabi  
Based on ICAO  
AME Training  
Manual**

**PART B**

**GUIDE**

**TO**

**AIRCRAFT MAINTENANCE**

**ENGINEER**

**LICENCE TRAINING**

Based On Part A

**AVIONICS – MECHANICAL**

**Trade Training**

Based on ICAO's AME Training Manual  
covering both  
Avionics and Mechanical Trades

**Ratified Treaty**

**'Convention on International Civil Aviation'**

**Article 37**

*Adoption of international standards and procedures*

Each contracting State **undertakes to collaborate in securing the highest practicable degree of uniformity** in regulations, standards, procedures, and organization in relation to **aircraft, personnel**, airways and auxiliary services in all matters in which such uniformity will facilitate and improve air navigation.

## Foreword

(Department of Civil Aviation 1956)

*“The International Civil Aviation Organisation (ICAO) decided at the Third Air Navigation Conference at Montreal in September, 1956, to amend International Standards and Recommended Practices to permit Member States [Australia] adopting either a system of personnel licencing or a system of approved organisations whereby the privileges of the licenced aircraft maintenance engineer are delegated to persons in the approved organisation who must fulfil the experience and knowledge requirements specified for the aircraft maintenance engineer.*

*Australia has retained a system of personnel licencing as the most suitable means of determining a standard of experience and knowledge necessary for the supervision and certification of most aircraft maintenance activities other than overhaul, major repair or major modification of aircraft, and ensuring that it meets its obligation in the international sphere.*

*Under international standards it is a requirement that every aircraft be in an airworthy condition prior to flight and that a certification be issued as evidence of this airworthiness. This requirement is implemented by means of a licencing system whereby aircraft maintenance engineers are authorised by the Director-General of Civil Aviation [CASA] to exercise stated privileges and accept responsibilities directly related to airworthiness. **These engineers act on behalf of the Director General [CASA] in ensuring that established and approved airworthiness standards are continuously maintained during the operation of all aircraft.***

*This phase of airworthiness control begins after an aircraft is manufactured or undergoes overhaul or other major work in an approved workshop and it continues at all times throughout the operating life of the aircraft.”*

**Note: The Department of Civil Aviation in 1956 also correctly specified the privileges and responsibilities of the licenced aircraft maintenance engineer as follows:**

*“The privileges which may be exercised by a licenced aircraft maintenance engineer include (1) certification of safety of flight of an aircraft; (2) certification of documents for issue or renewal of a Certificate of Airworthiness; (3) approval of subsequent flight tests; (4) certification for issue of an aircraft maintenance release; (5) certification for work carried out under regular maintenance schedules; (6) certification after (a) replacement of components; (b) rectification of defects; and (c) maintenance inspections. i.e. certification for completion of.*

*The exercise of these privileges involves the acceptance of responsibilities and briefly stated they are as follows:*

***When certifying work and inspections the licenced aircraft maintenance engineer must ensure that he/she has adequately supervised the work, that established standards have been maintained and that the resulting condition is satisfactorily in all respects. This means the he/she must satisfy himself/herself that all work or processes leading up to the end result and that which is the product of other approved persons or organisations, have been properly certified.***

*The crucial role that the licenced aircraft maintenance engineer plays in the on-going airworthiness of aircraft is fully dependent on the aircraft maintenance engineers’ vocational education training system providing training courses that meet the minimum training standards promulgated by ICAO. The following are reprints of these minimum training standards and syllabi for both the avionics and mechanical trades.”*

The only change that has happened since 1996 is the Vocational Training System has been changed so much that the avionic and mechanical trade training levels no longer meet these ICAO international minimum training standards.

**AMROBA recommends adoption of these international minimum academic training standards so aircraft maintenance engineer tradespersons may qualify for a licence from the Civil Aviation Safety Regulator.**

# ICAO AME TRAINING MANUAL

---

**Part B of this Guide addresses Training of graduates qualified as “Part A” AME avionics or mechanical tradespersons studying for a license issued by the Civil Aviation Safety Authority.**

## **Introduction**

### **(ICAO AME Training Manual Chapter 4 Reprint)**

*In addition to the subjects which are of direct day-to-day concern to the responsibilities of the Aircraft Maintenance (Technician / Engineer / Mechanic) (AME), the AME training should include a sound understanding of the academic aspects of aircraft and aviation operations. This background will provide the trainees with a more complete understanding of not only their working environment but also the wider scientific principles employed in aviation.*

*The academic level of background subjects such as mathematics and physics should be specified as a prerequisite to course entry. However, if this is not practical or possible, then mathematics and physics may be taught to the required level before the start of the aviation training course. Where the knowledge of mathematics and physics is only just below the required entry level, or it is felt that a refresher course in mathematics and physics would be advantageous to the students, then these subjects could be taught in parallel with the aviation subjects.*

*The selection of topics for the mathematics and physics syllabi as well as the type of course instruction must reflect the depth and breadth of knowledge required to fully complement the level required by the aviation subjects.*

*Even though it is covered in the Maintenance Practices and Materials sections of both the avionics and mechanical curricula, technical drawing has been incorporated into the area of natural science and general principles of aircraft for the benefit of those students who will be involved in major modification and/or repair work.*

*Understanding the subjects of mathematics, physics, technical drawing, etc. constitutes an important part of the AMEs training base. It will permit a more comprehensive operational understanding, develop general in-depth awareness of air transport operations, and improve communication with both flight crew members and other maintenance personnel, thereby improving the overall safety of the aircraft operation.*

### **TRAINING OBJECTIVES**

**Conditions:** *The trainees will receive instructions on pertinent information on aviation-relevant situations or characteristics.*

**Performance:** *The trainees will be able to identify and explain how the conditions relate to the scientific principles by using correct aviation nomenclature and mathematics.*

**Standard of accomplishment:** *The trainees will display a good understanding of the principles, and make required calculations quickly and accurately, while also displaying some understanding of the context of practical applications*

## LAME Responsibilities

(Reprint from ICAO AME Training Manual)

The responsibilities of a Licenced Aircraft Maintenance Engineer (LAME) range from line maintenance, day-to-day care and defect rectification to base maintenance (which can include major modification and repair of the aircraft structure or systems). In many approved maintenance organizations (AMOs), the LAME supervises the work of teams of less experienced personnel.

For this reason, the syllabi of instruction for the trade training of AMEs should be developed based on the specifications outlined in Chapters 4 to 14 of this manual. Refer too Part A of this Guide for AME Training.

The standard of training recommended in this manual is intended to be sufficient for a qualified tradesperson to qualify for a Licence which complies with Annex 1 — Personnel Licensing, and for an individual, if given additional specialised training, to undertake responsibilities in relation to more specialised aircraft systems or equipment.

The target audience of this manual are State aviation regulatory bodies which, in turn, **may recommend the manual to their aviation training centres for the development of detailed training syllabi**. It may also be used by the State as the basis for the approval of aviation training centres and/or their courses.

## 1.2 TRAINING REQUIREMENTS

1.2.1 *States and maintenance organizations may use the training specifications in this manual as part of their training requirements to establish the competence of maintenance personnel, both licensed or unlicensed.*

1.2.2 *Licensed or unlicensed, AMEs usually specialize in a particular category or categories (e.g. airframes; engines; propellers; aircraft; airships; electrical; instruments or radio systems). The method of performing specific duties may vary according to the type and make of aircraft; the duties and detailed tasks described in this paragraph represent typical examples of those performed by AMEs specializing in the airframe category. It must be understood that the work of other categories may vary quite considerably from that of an airframe category technician. The following paragraphs are a general description of the types of tasks which are performed under the supervision of a licensed AME:*

- a) *Responds to defects found and recorded by flight crew. Inspects and checks condition of aircraft parts (e.g. engines, wings, tail, fuselage and landing gear) for serviceability by visually inspecting the skin and noting condition of landing gear parts, leaking connections, correct fitting of parts and of operating controls. Attends to all other factors which can affect the safe operation of an aircraft. Determines whether adjustment, repair or replacement is necessary; and if necessary, makes adjustments to manufacturer's/company's maintenance schedule and to the instructions on use of appropriate equipment.*
- b) *When required to rectify a defect or to meet the Approved Maintenance Programme, ensures the removal and replacement of parts as well as the opening of inspection panels in structure in order to inspect or disconnect control cables, fuel lines and electrical wiring. Determines when and how to support the aircraft on jacks in order to remove and replace major assemblies such as landing gear or powerplants from the aircraft.*
- c) *Ensures that adjustments and repairs are carried out as required; e.g. the replacement of cracked material in metal skin surfaces by cutting a new metal patch in accordance with the structural repair manuals from the Type Certificate holder. Reads engineering drawings in order to ensure that structural members are repaired to an approved standard in accordance with manufacturer's instructions.*
- d) *Supervises the performance of servicing activities such as oleo and tyre inflation, fuel/oil replenishment and lubrication; cleaning of structure and mechanical components; and replacement of light filaments. In accordance with the Type Certificate holder's instructions, a wide variety of test equipment, hand and other tools are used for these tasks.*
- e) *Writes reports and work details for the maintenance release as required by the operator, the AMO, and Parts I, II and III of Annex 6.*

# ICAO AME TRAINING MANUAL

## *ICAO Recommended Theoretical Training Hours*

*(Knowledge/Practical Hours for Trade Training Refer Part A of this Guide)*

Aircraft maintenance engineers, prior to applying to the Civil Aviation Safety Authority (CASA) for an aircraft maintenance engineer license, should complete this 130-hour duration post trade training before applying to CASA for a license.

Sections 3.3.1 to 3.3.4 and sections 3.3.8 to 3.3.10 are the basic elements that all LAMEs need to attain. For LAMEs to meet Chief Engineer/Engineering Manager levels, they need to also graduate with a qualification including the sections 3.3.5. to 3.3.7.

<i>Subject matter</i>		<i>Recommended duration (hours)</i>	<i>Level of capability</i>
<b>Chapter 3 Civil aviation requirements, laws and regulations</b>		<b>LAME ONLY</b>	
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	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

Note: Text in purple relate to senior supervisory/management LAME roles and responsibilities within an approved maintenance organisation or supervising an operator's maintenance program.

# ICAO AME TRAINING MANUAL

---

## Minimum AME Licencing Training Standards

### Minimum International AME Training Standards that must underpin NVET post Graduate Training meeting Licensing Requirements

#### Table of Content

1.2 TRAINING REQUIREMENTS .....	4
CHAPTER 3 (ICAO Manual) .....	7
3.1 INTRODUCTION .....	7
3.2 TRAINING OBJECTIVES.....	7
3.3 REQUIRED KNOWLEDGE, SKILLS, & ATTITUDES .....	7
3.3.1 International and State aviation laws (LAME Knowledge).....	7
3.3.2 Airworthiness requirements (LAME Knowledge).....	8
3.3.3 Civil aviation operating regulations (LAME Knowledge).....	8
3.3.4 Air transport operations (LAME Knowledge).....	8
3.3.5 Organization and management of the operator (LAME Management) .....	8
3.3.6 Operator economics related to maintenance (LAME Management).....	9
3.3.7 Approved maintenance organizations (AMOs) (LAME Management) .....	9
3.3.8 Aircraft maintenance licence requirements (LAME Knowledge).....	9
3.3.9 The role of the State aviation regulatory body (LAME Knowledge).....	10
3.3.10 Aircraft certification, documents and maintenance (LAME Knowledge).....	10
3.3.11 Individual aircraft certification (LAME Knowledge).....	10
3.3.12 Requirements for continuing airworthiness (LAME Knowledge).....	10

Licensed Aircraft Maintenance Engineer Training Package should be a post trade course covering Chapter 3 of the ICAO Aircraft Maintenance Engineer Training Manual.

AMROBA has produced Part B to this Guide to address AME training subjects and standards that licence holders should possess.

Implementing these international trade training standards will improve safety in aviation.

## CHAPTER 3 (ICAO Manual)

### CIVIL AVIATION REQUIREMENTS, LAWS AND REGULATIONS

#### 3.1 INTRODUCTION

- 3.1.1 *International aircraft operations is governed by the rule of law; since the first flight by a heavier-than-air machine, a number of conventions, regulations, legislation, orders, agreements, etc. have been promulgated among and within States to ensure that flights are operated in a safe and orderly manner. Achievement of safety and regularity in air transportation operations requires that all States accept and implement a common standard of aircraft operations with regards to training, licensing, certification, etc. for international operations. The standardization of operational practices for international services is of fundamental importance in order to prevent costly errors which may be caused by misunderstanding or inexperience. Although this manual and other ICAO manuals address international aircraft operations, the need for standardization is equally applicable to all other aircraft operations.*
- 3.1.2 *International and national regulations and air laws are promulgated to ensure safety, regularity and efficiency of international aircraft operations. On the international scene, ICAO, pursuant to the provisions of Article 37 of the Convention on International Civil Aviation, develops and adopts Standards and Recommended Practices or SARPs (Annexes to the Convention) as the minimum requirement for aircraft operations. National regulations are developed on the basis of the SARPs, with some variations to suit the specific requirements of individual States. States may enact legislation that may differ significantly from those enacted in other States. However, international aircraft operations share many regulations, laws and statutes. The syllabus contained in this chapter gives an overview of air law as adopted by ICAO and practised in international aircraft operations.*

Note: Students need to have graduated under NVET system as a qualified avionics and/or mechanical AME, or equivalent as determined by CASA, before being enrolled in this elective AME Training Course..

#### 3.2 TRAINING OBJECTIVES

**Conditions:** The trainees will be provided with a broad outline of the regulatory requirements that must be met by an operator engaged in commercial air transport and an outline of regulatory documents that are significant to the Aircraft Maintenance (Engineer/Technician/Mechanic) (AME) (including those on maintenance), and maintenance control concepts that illustrate the application of regulatory requirements as they relate to the responsibilities and work of the AME.

**Performance:** The trainees will be able to identify the role of international and national aviation regulatory bodies, identify the importance of applicable regulations to aircraft maintenance activities, and describe the application of regulations relating to aircraft maintenance in those areas which fall under the duties and responsibilities of the AME.

**Standard of accomplishment:** The regulations and legislation applicable to the described case will be accurately identified. Provisions, practical applications and implementation will also be described to demonstrate understanding of the relevant issues.

#### 3.3 REQUIRED KNOWLEDGE, SKILLS, & ATTITUDES

##### 3.3.1 International and State aviation laws (LAME Knowledge)

- *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.*
- *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*

# ICAO AME TRAINING MANUAL – CHAPTER 9

---

*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 (LAME Knowledge)**

- *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 (LAME Knowledge)**

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

## **3.3.4 Air transport operations (LAME Knowledge)**

- *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 (LAME Management)**

- *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*
- *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 (LAME Management)

- *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) (LAME Management)

- *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*
- *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*

## 3.3.8 Aircraft maintenance licence requirements (LAME Knowledge)

- *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*

## **3.3.9 The role of the State aviation regulatory body (LAME Knowledge)**

- *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 Authority (CAA) 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*

## **3.3.10 Aircraft certification, documents and maintenance (LAME Knowledge)**

- *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*

## **3.3.11 Individual aircraft certification (LAME Knowledge)**

- *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*

## **3.3.12 Requirements for continuing airworthiness (LAME Knowledge)**

- *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)*