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ADVOCATE OF THE AVIATION MRO INDUSTRY

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Part A: Aircraft Maintenance Engineer (AME) Trade Training.

Part B addresses Licensing Aspects.

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

In the past, the aviation regulator, pre CAA, promulgated the Chicago Convention Annex 1, Chapter 4 recommended AME training manual minimum standards so each State VET system applied these minimum training standards to their aircraft maintenance engineer (AME) apprentice training systems. Australian trade qualifications were recognised worldwide. Today we have lost that recognition.

With the creation of the CAA in 1988 and changing Executive management, the promulgation of the Convention's international minimum AME training standards was discontinued. Pressure from specific industry sectors in the maintenance industry then demanded sector based trade training that did not meet the international minimum training standards. This removed the flexibility of the workforce that had to be retrained every time they moved within the sectors of aviation maintenance. The result in loss of trained personnel has been very damaging to the industry.

The decision not to promulgate the minimum international trade training standards has meant that global recognition of our skilled workforce no longer exists.

Therefore this document once again promulgates the minimum theoretical and practical minimum trade training standards as detailed in Convention's Annex 1 recommended training manual developed and promulgated by ICAO. The global training standard.

Australia had a 2 stream trade training system based on the global training standards.

A return to this system is imperative to support the sound development of civil aviation.

The global recognition of our maintenance workforce skills is imperative for Australia's aviation maintenance industry to participate in the global aviation market.

Australia's AME training system must be industry based so AMEs have the skills to work in any sector of aircraft and/or component maintenance and manufacturing.

'Convention on International Civil Aviation' (Chicago Convention)

Article 37 ***Adoption of international standards and procedures***

Each contracting State (Australia) **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.

Annex 6 states: 8.7.6.3 The competence of maintenance personnel shall be established in accordance with a procedure and **to a level acceptable to the State** granting the approval. The person (LAME) signing a maintenance release shall be qualified in accordance with Annex 1.

Australia's competency based training system, if based on the Annex 1 recommended minimum trade training standards, will provide skills that are transportable and flexible so AMEs are industry wide employable not only in Australia but globally.

It is time that the training of aviation tradespersons to these global standards be adopted and implemented by the education regulator, Australian Skills Quality Authority, ASQA.

The following are detailed theoretical and practical training standards specified in the ICAO promulgated AME training manual recommended in Annex 1, Chapter 4.

(**ICAO AME Training Manual Chapter 4 Excerpts**)

"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 mechanical and avionics 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"*

Pathway to Trade Employment

Both the Annex 1 recommended aircraft maintenance engineer (AME) training manual and EASA's AME training identify a clear separation of licencing knowledge requirements from the minimum trade theoretical and practical training requirements to be qualified as an aircraft maintenance engineer.

It is that clear that separation no longer exists in the NVET training package.

The international avionic and mechanical streams are listed below. Recommended training hours duration are specified similar to the EASA Part 66 licencing system.

Subject matter	*Recommended duration (hours)*	*Level of capability*
Chapter 4 Natural science and general principles of aircraft – knowledge	**445 total hrs**	
4.3 Mathematics	75	1
4.4 Physics	70	1
4.5 Technical drawing	70	1
4.6 Chemistry	30	1
4.7 Fixed wing aerodynamics and flight control	100	2
4.8 Rotary wing aerodynamics and flight control	100	2

Chapter 4 is applicable to both avionic and mechanical knowledge training streams

Chapter 5 Aircraft engineering and maintenance: Airframe Knowledge	**800 total hrs**	
5.3 Maintenance practices and materials: Airframe/Powerplant	200	3
5.4 Aircraft systems and structures: Fixed wing	250	3
5.5 Aircraft systems and structures: Rotary wing	250	3
5.6 Airship systems and structures	100	3

Chapter 5 is applicable to the mechanical knowledge training stream.

Chapter 6 Aircraft engineering and maintenance: Engines/Powerplants - Knowledge	**750 total hrs**	
6.3 Piston engines	250	3
6.4 Propellers	100	3
6.5 Gas turbine engines	300	3
6.6 Fuel systems	100	3

Chapter 6 is applicable to the mechanical knowledge training stream.

Chapter 7 Aircraft engineering and maintenance: Avionics — Electrical and instrument Knowledge	**1350 total hrs**	
7.3 Maintenance practices and materials	200	3
7.4 Electrical and electronic fundamentals	450	2
7.5 Digital techniques, computers and associated devices	200	2
7.6 Aircraft electrical systems	250	3
7.7 Aircraft instrument systems	250	3

Chapter 7 is applicable to the avionic knowledge training stream.

Electrical system knowledge is also applicable to the mechanical stream.

Chapter 8 Aircraft engineering and maintenance: Avionics — AFCS/Navigation/Radio Knowledge	785 total hrs	
8.3 Automatic flight control systems (AFCS): Fixed wing	200	3
8.4 Automatic flight control systems (AFCS): Rotary wing	75	3
8.5 Aircraft inertial navigation systems (INS)	60	3
8.6 Aircraft radio and radio navigation systems	450	3

Chapter 8 is applicable to the avionics knowledge stream

Chapter 9 Human performance and limitations Knowledge	30 total hrs	
9.7 Required knowledge, skills and attitudes		
A. General programme overview	3	3
B. Human Factors knowledge	3	3
C. Communication skills	3	3
D. Teamwork skills	3	3
E. Performance management	3	3
F. Situation awareness	3	3
G. Human error	3	3
H. Reporting and investigating errors	3	3
I. Monitoring and auditing	3	3
J. Document design	3	3

Chapter 9 is applicable to both the avionic and mechanical streams.

Chapter 10 Practical maintenance skills: Airframe	1825 total hrs	
10.3 Basic workshop and maintenance practices: Airframe	725	3
10.4 Basic workshop and maintenance practices: Repair, maintenance and function testing of aircraft systems/component	1 000	3
10.5 Job/task documentation and control practices	100	3

Chapter 10 is applicable to the mechanical practical stream

Chapter 11 Practical maintenance skills: Engine and propeller	1000 total hrs	
11.3 Basic workshop and maintenance practices: Engine and Propeller	450	3
11.4 Basic workshop and maintenance practices: Engine/Propeller Systems/ Component and Function Testing	450	3
11.5 Job/task documentation and control practices	100	3

Chapter 11 is applicable to the mechanical practical stream

Chapter 12 Practical maintenance skills: Avionics — Electrical, instruments, autoflight and radio	3075 total hrs	
12.3 Basic workshop and maintenance practices: Avionics — Electrical	775	3
12.4 Basic workshop and maintenance practices: Avionics — Instrument	1 000	3
12.5 Basic workshop and maintenance practices: Avionics — Autoflight	225	3
12.6 Basic workshop and maintenance practices: Avionics — Radio	875	3
12.7 Repair, maintenance and function testing of aircraft systems/component: Avionics	100	3
12.8 Job/task documentation and control practices	100	3

Summary: These international minimum AME trade training standards must underpin the avionic and mechanical trade skills if Australia is to return to global recognition of Australia's maintenance system.

- The basic of electrical and instrument systems is also incorporated into the mechanical training stream.
- The basis of the mechanical airframe systems is also incorporated into the avionic stream.

e.g., This enables an avionic trade person to remove/install airframe parts to gain access to avionic components. It also enables the mechanical stream to disconnect/connect avionic components during maintenance.

Refer to Part B of this publication by AMROBA for AME licensing 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.

References:

Chicago Convention, Annex 1, Chapter 4, Aircraft Maintenance Engineer standards.

International Civil Aviation Organization

The Flight Safety Section is responsible for the following Manuals and Circulars:

- **Training Manual (Doc 7192)**
  - Part B-5 — Integrated Commercial Pilot Course
    - Volume 1 — Course Details
    - Volume 2 — Instructor Briefing Sheets
  - **Part D-1 — Aircraft Maintenance Technician/Engineer/Mechanic**
  - Part D-3 — Flight Operations Officers/Flight Dispatchers
  - Part E-1 — Cabin Attendants' Safety Training Manual
  - Part E-2 — Air Traffic Safety Electronic Personnel (Unedited*)
  - Part E-3 — Aeronautical Information Services Personnel (Unedited*)
  - Part F-1 — Meteorology for Air Traffic Controllers and Pilots
- **Human Factors Training Manual (Doc 9683)**