International Civil Aviation Organization | Organisation de l'aviation civile internationale | Organización de Aviación Civil Internacional | Международная организация гражданской авиации | منظمة الطيران المدني الدولي | 国际民用航空组织

Tel.: +1 (514) 954-6728

Ref.: AN 12/48-10/50 2 August 2010

Subject: Proposals for the amendment of the PANS-TRG regarding the training of aviation personnel

Action required: Comments to reach Montréal by 2 November 2010

Sir/Madam,

1. I have the honour to inform you that the Air Navigation Commission, at the twelfth meeting of its 184th Session on 8 June 2010, considered a proposal developed by the Secretariat with the assistance of the Next Generation of Aviation Professionals (NGAP) Task Force and the International Air Transport Association (IATA) Training and Qualifications Initiative (ITQI) to amend the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868) to broaden the scope of competency-based training not only to all flight crew licences but also to other personnel licences. The Commission authorized their transmission to Contracting States and appropriate international organizations for comments.

2. The amendment proposals to the PANS-TRG introduce a new Chapter 4, supported by additional definitions, which contains procedures supporting the implementation of competency-based training and assessment for aircraft maintenance personnel, consisting of:

a) guidelines for implementation;

b) competency frameworks consisting of competency units, competency elements and performance criteria;

c) guidance on the design and development of a competency-based training programme; and

d) examples of training objectives.

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3. In examining the proposed amendments, you should not feel obliged to comment on editorial aspects as such matters will be addressed by the Air Navigation Commission during its final review of the draft amendment.

4. May I request that any comments you wish to make on the amendment proposals be dispatched to reach me not later than 2 November 2010. The Air Navigation Commission has asked me to specifically indicate that comments received after the due date may not be considered by the Commission and the Council. In this connection, should you anticipate a delay in the receipt of your reply, please let me know in advance of the due date.

5. For your information, the proposed amendment to the PANS-TRG is envisaged for applicability on 10 February 2011. Any comments you may have thereon would be appreciated.

6. The subsequent work of the Air Navigation Commission and the Council would be greatly facilitated by specific statements on the acceptability or otherwise of the proposals. Please note that for the review of your comments by the Air Navigation Commission and the Council, replies are normally classified as “agreement with or without comments”, “disagreement with or without comments” or “no indication of position”. If in your reply the expressions “no objections” or “no comments” are used, they will be taken to mean “agreement without comment” and “no indication of position”, respectively. In order to facilitate proper classification of your response, a form has been included in Attachment B which may be completed and returned together with your comments, if any, on the proposals in Attachment A.

Accept, Sir/Madam, the assurances of my highest consideration.

Raymond Benjamin
Secretary General

Enclosures:

A — Proposed amendment to the PANS-TRG
B — Response form

PROPOSED AMENDMENT TO THE PROCEDURES FOR AIR NAVIGATON SERVICES – TRAINING (PANS-TRG, DOC 9868)

NOTES ON THE PRESENTATION OF THE AMENDMENT

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

~~Text to be deleted is shown with a line through it.~~	text to be deleted
New text to be inserted is highlighted with grey shading.	new text to be inserted
~~Text to be deleted is shown with a line through it~~ followed by the replacement text which is highlighted with grey shading.	new text to replace existing text

PROPOSED AMENDMENT TO THE

PROCEDURES FOR AIR NAVIGATON SERVICES

TRAINING

Editorial Note.— The following table of contents is provided to facilitate the reading of the material and is not part of the proposed amendment.

Table of Contents

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FOREWORD

1. ~~Introduction~~ **Historical background**

1.1 ~~This edition of the~~ The *Procedures for Air Navigation Services – Training* (PANS-TRG) ~~was prepared~~ are the result of the evolution from the work initiated by the Flight Crew Licensing and Training Panel (FCLTP) ~~and contains material that provides for the uniform~~ on the implementation of the training required for the pilot licences and ratings found in Annex 1, including the multi-crew pilot licence (MPL).

1.2 The FCLTP, at its first meeting (Montreal, 8 to 19 December 2003), identified a clear need for licensing and training material that, although too detailed to take the form of Standards, was of sufficient importance to provide universal benefit to States. The need called for material that had to be harmonized and subjected to a formal consultation and approval process and that called for a higher level of adherence on the part of States than that required of guidance material. The FCLTP determined that the establishment of the PANS-TRG would be the appropriate document for use by all States.

1.3 The second edition of the PANS-TRG was issued in 2010, following the work undertaken by the IATA Training and Qualifications Initiative on the development of a competency-based approach to the training and assessment of aircraft maintenance mechanics/technicians/engineers (AMMTEs) for the practice of maintenance, including those personnel with licensed or authorized privileges.

2. Scope and purpose

2.1 The *Procedures for Air Navigation Services — Training* (PANS-TRG) are complementary to the Standards and Recommended Practices (SARPs) contained in Annex 1 – *Personnel Licensing*.

2.2 The PANS-TRG specifies, in greater detail than in the SARPs, the actual procedures to be applied by training organizations ~~in~~ when providing training for aeronautical personnel. The ~~current~~ second edition contains, in particular, procedures for the development and implementation of a competency-based training programme for the MPL and the aircraft maintenance mechanic/technician/engineer (AMMTE) licence to support Annex 1 requirements.

3. Status

3.1 The Procedures for Air Navigation Services (PANS) do not have the same status as SARPs. While the latter are adopted by Council in pursuance of Article 37 of the Convention on International Civil Aviation and subject to the full procedure of Article 90, the PANS are *approved* by the Council and recommended to Contracting States for worldwide application.

3.2 While the PANS may contain material that may eventually become SARPs when it has reached the maturity and stability necessary for adoption as such, it may also comprise material prepared as an amplification of the basic principles in the corresponding SARPs and designed particularly to assist the user in the application of those SARPs.

4. Implementation

4.1 The implementation of PANS-TRG procedures is the responsibility of Contracting States; they are applied in the actual training only after, and in so far as, States have enforced them. However, with a view to facilitating their processing towards implementation by States, they have been prepared in language that will permit direct use by the personnel of approved training organizations and others associated with

the development and implementation of a training programme for the multi-crew pilot licence and the aircraft maintenance mechanic/technician/engineer licence.

5. Publication of differences

5.1 The PANS do not carry the status afforded to Standards adopted by the Council as Annexes to the Convention and, therefore, do not fall under the obligation imposed by Article 38 of the Convention to notify differences in the event of non-implementation. Attention of States is drawn, however, to the provision in Annex 15 related to the publication, in their Aeronautical Information Publications, of lists of significant differences between their procedures and the related ICAO procedures.

5.2 The ICAO course development methodology is based on the Instructional Systems Design (ISD) model used for much of the competency-based training material in this document. It is, however, acknowledged that there are a variety of ISD models that may be equally appropriate and that States may wish to apply in the development of competency-based training. It might also be the case that no single methodology has all the elements needed and that a number of methodologies will have to be drawn upon for the design of a particular course. In addition, methodological prescriptions are counter-productive, as all training methodologies should display the flexibility and adaptability needed to accommodate changes in training circumstances, goals and technology. For this reason, differences in the systems approach methodologies and models used for the design of competency-based training need not be published, so long as the methodologies contain the ISD elements that govern the three basic procedural steps of a needs analysis, design and production, and evaluation.

6. Contents of the document

6.1 Chapter 1 – Definitions and acronyms

This chapter contains a list of terms and their technical meanings as used in this document. In some cases, the terms are defined in other ICAO documents.

6.2 Chapter 2 – General provisions for competency-based training and assessment

6.2.1 This chapter outlines the general principles and procedures to be followed in the design and implementation of a competency-based approach to training and assessment. It outlines its key features and describes how the competency-based approach is to be used by course developers, instructors~~,~~ and examiners.

6.2.2 Developments in the late 1950s and 1960s in the application of systems engineering methodologies, such as ISD and the Systems Approach to Training (SAT), to the design of training curricula resulted in the implementation of structured, performance-based training programmes. Competency-based training also evolved from later developments in mastery learning and criterion-referenced testing, whereby knowledge and skills had to be demonstrated at levels that met the entry-level occupational requirements and assessments had to be based on observable behaviours or outcomes. The 1970s saw the widespread use of competency-based principles in both vocational and technical education and training in the United States which, by the 1980s and 1990s, had spread to Europe and to other parts of the world.

6.2.3 A description of the ICAO course development methodology is provided in the Attachment to Chapter 2. Since, as mentioned in 5.~~3~~2, several other ISD methodologies are available, the purpose of this document is not to prescribe the specific methodology to be used. Instead, it outlines the elements to be included in the procedural steps that constitute ISD methodology in general and how to apply them to the design of a competency-based ~~flight~~ training programme.

6.3 **Chapter 3 – Competency-based training and licensing for the Multi-Crew Pilot Licence (MPL)**

This chapter outlines the principles and procedures that are applicable to the development and implementation of an MPL course and that shall be followed in addition to those outlined in Chapter 2. Chapter 3 also contains the competency units, competency elements and performance criteria developed for the MPL. Attachment A to Chapter 3 contains guidance material on the design and development of an MPL training programme; Attachment B contains examples of training objectives.

6.4 **Chapter 4 – Competency-based training and assessment for aircraft maintenance personnel**

This chapter outlines the principles and procedures that are applicable to the development and implementation of an AMMTE course and that shall be followed in addition to those outlined in Chapter 2. Chapter 4 contains the competency units, competency elements and performance criteria developed for the AMMTE licence. Attachment A to Chapter 4 contains guidance material on the design and development of an AMMTE training programme; Attachment B contains examples of training objectives.

6.5 **Chapter 45 – Instructor, examiner, inspector and course developer competencies**

Annex 1 contains Standards for the issuance of the flight instructor rating and for granting authorizations to ~~simulator~~ flight simulation training device (FSTD) instructors. Chapter 45 of this document and its Attachment contain the qualifications to be held, and the competencies to be demonstrated, by those instructors, examiners, inspectors and course developers employed in a competency-based ~~MPL~~ training programme. In competency-based programmes, instructor competencies are made explicit, and instructors have to demonstrate their instructional skills and their knowledge of the subject matter and training course content. Instructor's competencies relative to flight simulation and the delivery of ~~simulator~~ FSTD-based training are also essential where extensive use is made of ~~flight simulation training devices~~ FSTDs. Examiners and inspectors must demonstrate competencies in competency-based assessment techniques.

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Chapter 1. DEFINITIONS AND ACRONYMS

1.1 DEFINITIONS

Editorial Note.— Insert the following new definitions or *amend* the existing definitions in the appropriate order and location in Chapter 1, 1.1.

Aircraft operating manual. A manual, acceptable to the State of the Operator, containing normal, abnormal and emergency procedures, checklists, limitations, performance information, details of the aircraft systems and other material relevant to the operation of the aircraft.

Note.— The aircraft operating manual is part of the operations manual.

Air operator certificate (AOC). A certificate authorizing an operator to carry out specified commercial air transport operations.

Approved maintenance training organization (AMTO). An approved training organization performing training for aircraft maintenance technicians/engineers/mechanics.

ATA chapters. A common industry referencing standard for aircraft technical documentation.

Note.— The competency frameworks of Chapter 4 use references to the ATA chapters numbering, due to its widespread use in civil aviation.

Configuration deviation list (CDL). A list established by the organization responsible for the type design with the approval of the State of Design which identifies any external parts of an aircraft type which may be missing at the commencement of a flight, and which contains, where necessary, any information on associated operating limitations and performance correction.

Certify as airworthy (to). To certify that an aircraft or parts thereof comply with current airworthiness requirements after maintenance has been performed on the aircraft or parts thereof.

Dispatch Deviation Procedures Guide (DDPG). Manual to identify any procedure to dispatch an aircraft with allowable systems/components inoperative or missing.

Note.— Large aircraft manufacturers may choose to produce operating and maintenance procedures in documents such as Dispatch Deviation Procedure Guides, for use by operators.

Error. An action or inaction by ~~the flight crew~~ an operational person that leads to deviations from organizational or ~~flight crew~~ the operational person's intentions or expectations.

Note — See Attachment E of Annex 13 — Aircraft Accident and Incident Investigation *for a description of operational personnel.*

Error management. The process of detecting and responding to errors with countermeasures that reduce or eliminate the consequence of errors and mitigate the probability of further errors or undesired ~~aircraft~~ states.

Note.— See Attachment C to Chapter 3 and Circular 314 — Threat and Error Management (TEM) in Air Traffic Control *for a description of undesired ~~aircraft~~ states.*

Generic Standard Shop Practices Manual. Manual that has been developed by an operator or by an Approved Maintenance Organization that provides guidance and direction to shop personnel with respect to all aspects of in-house procedures as applied to the various maintenance and maintenance support activities that has been accepted or approved by the regulator for the scope of activities for that organization.

Generic Standard Storage Practices Manual. Manual that has been developed by an operator or by an Approved Maintenance Organization that provides guidance and direction to maintenance support personnel engaged in the storage and preservation of aircraft parts, components, and other materials used in aircraft maintenance activities. The scope of the manual forms part of the organization's accepted or approved maintenance program as indicated by the regulator.

Human Factors principles. Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

Human performance. Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

Large aeroplane. An aeroplane of a maximum certificated take-off mass of over 5 700 kg.

Maintenance. The performance of tasks required to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair.

Maintenance Defect Reporting Sheet. Is used by aircraft maintenance personnel to report any defects and malfunctions being found during aircraft inspections.

Maintenance organization's procedures manual. A document endorsed by the head of the maintenance organization which details the maintenance organization's structure and management responsibilities, scope of work, description of facilities, maintenance procedures and quality assurance or inspection systems.

Maintenance programme. A document which describes the specific scheduled maintenance tasks and their frequency of completion and related procedures, such as a reliability programme, necessary for the safe operation of those aircraft to which it applies.

Maintenance records. Records which provide a description of work accomplished on the aeronautical products or parts thereof including the release to service certification, as required by Civil Aviation Authorities, Operators, and Maintenance Organizations.

Note.— The maintenance record is used to record discrepancies, corrective action, modification details, total time in service, current status of compliance with mandatory continuing airworthiness information, and the current status of the aircraft's compliance with the maintenance program. Finally, maintenance records show that all requirements for the signing of a maintenance release have been met.

Maintenance release. A document which contains a certification confirming that the maintenance work to which it relates has been completed in a satisfactory manner, either in accordance with the approved data and the procedures described in the maintenance organization's procedures manual or under an equivalent system.

Note.— A maintenance release is also referred to as a release to service.

Master minimum equipment list (MMEL). A list established for a particular aircraft type by the organization responsible for the type design with the approval of the State of Design containing items, one or more of which is permitted to be unserviceable at the commencement of a flight. The MMEL may be associated with special operating conditions, limitations or procedures.

Minimum equipment list (MEL). A list which provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the MMEL established for the aircraft type.

Modification. A modification to an aeronautical product that means a change to the type design which is not a repair.

Non-destructive testing (NDT). An inspection technique used to test the condition of materials, components and systems used in aircraft, powerplants, associated systems, and components to examine these articles for condition and defects without causing damage to the item being inspected.

Note.— NDT testing methods may include but are not limited to ultrasonic, magnetic-particle, liquid penetrant, radiographic and eddy-current testing.

Operations manual. A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

Repair. The restoration of an aeronautical product to an airworthy condition to ensure that the aircraft continues to comply with the design aspects of the appropriate airworthiness requirements used for the issuance of the type certificate for the respective aircraft type, after it has been damaged or subjected to wear.

Serviceability of an aircraft part. An approved part is serviceable when it meets approved design data applicable to that part and has been manufactured and subsequently maintained in accordance with the requirements of the State of Design, Manufacture or Registry, as applicable.

Small aeroplane. An aeroplane of a maximum certificated take-off mass of 5 700 kg or less.

Standard parts. Parts, such as fasteners, which are considered as approved parts when in accordance with a national or industry accepted standard and when referenced in the type design of the particular aircraft.

Standard Practices Manuals. Manuals establishing standard practices to be applied by aircraft and component maintenance personnel for the proper handling (identification, application, working procedures, use of tools, and quality standards) of standard aeronautical hardware.

Special Standard Practices/Maintenance Procedures Manuals. Manuals establishing standard practices for selected processes to be applied by aircraft and component maintenance personnel for the proper handling (identification, application, working procedures, use of tools, and quality standards) of standard aeronautical hardware; e.g. welding, NDT.

Standard Wiring Practices Manuals (SWPM). Manuals establishing standard practices for processes in relation to any wiring used in aeronautical equipment to be applied by aircraft and component maintenance personnel for proper handling (identification, application, working procedures, use of tools, and quality standards).

Technical Log Book. A book, which may be issued in separate volumes, e.g.:

a) Aircraft Technical Log;

b) Cabin Discrepancy Log; and

c) In Flight Entertainment (IFE) Defect Log.

Note 1.— An Aircraft Technical Log:

a) is required to be kept for all large aircraft for which a Certificate of Airworthiness is in force;

b) is used in accordance with procedures that must comply with the requirements as set forth in the operator's engineering procedures;

c) is required to reflect the current status of defects, repairs, replacements, adjustments and inspections whilst the aircraft is in service; and

d) contains entries that form a permanent part of the aircraft records.

Note 2.— Large aeroplanes are defined in Annex 8, Part III, as aeroplanes of over 5 700 kg maximum certificated take-off mass intended for the carriage of passengers or cargo or mail in international air navigation. A large helicopter is a helicopter of over 3 175 kg maximum certificated take-off mass intended for the carriage of passengers or cargo or mail in international air navigation.

Note 3.— Large aircraft are known in some States as transport category aircraft.

Threat. Events or errors that occur beyond the influence of ~~the flight crew~~ an operational person, increase operational complexity and must be managed to maintain the margin of safety.

Note. — See Attachment E of Annex 13 — Aircraft Accident and Incident Investigation *for a description of operational personnel.*

Threat management. The process of detecting and responding to threats with countermeasures that reduce or eliminate the consequences of threats and mitigate the probability of errors or undesired ~~aircraft~~ states.

Note.— See Attachment C to Chapter 3 and Circular 314 — Threat and Error Management (TEM) in Air Traffic Control *for a description of undesired ~~aircraft~~ states.*

Training for specialty rating. Training aimed at developing the set of particular competencies required to perform maintenance tasks on a specific type of equipment and in specific environments.

Note.— Such types of equipment include but are not limited to:

a) a specific aircraft or a broad category of aircraft;

b) an airframe or aircraft structure;

c) engines;

d) aircraft systems or components; and

e) avionic systems or components.

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Editorial Note.— Insert the following new paragraph 1.2 in Chapter 1.

1.2 ACRONYMS

AD	Airworthiness Directives
AMMTE	Aircraft maintenance mechanic/technician/engineer
AMM	Aircraft Maintenance Manual
AMO	Approved maintenance organization
AMTO	Approved maintenance training organization
APU	Auxiliary power unit
ATA	Air Transport Association (of America)
BITE	Built-in test equipment
CDL	Configuration deviation list
CMM	Component maintenance manual
CRS	Certificate of return to service
DDPG	Dispatch Deviation Procedures Guide

FIM Fault Isolation Manual

KSA Knowledge, skills and attitudes

LWTR Licence without type rating (an aircraft maintenance technician licence)

MEL Minimum equipment list

MM Maintenance manual

MMEL Master minimum equipment list

MOPM Maintenance organization's procedures manual

MRM Maintenance resource management

NDT Non-destructive test(ing)

OJT On-the-job training

SMPM Special maintenance procedures manual

SPM Standard practices manual

SRM Structural repair manual

SWPM Standard wiring practices manual

TEM Threat and error management

TR Type rating (on an aircraft maintenance licence)

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Editorial Note.— Insert the following amended paragraph 2.3 in Chapter 2.

Chapter 2. GENERAL PROVISIONS FOR COMPETENCY-BASED TRAINING AND ASSESSMENT

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2.3 The competency framework

2.3.1 The competency framework consists of ***competency units***, ***competency elements***, ***performance criteria***, ***evidence and assessment guide*** and ***range of variables***. ~~The competency framework for flight crew shall be based on the following competency units:~~ Competency units, competency elements and performance criteria shall be derived from job and tasks analysis and shall describe observable outcomes.

Note.— Definitions of competency units, competency elements and performance criteria are provided in Chapter 1.

2.3.2 The competency framework for flight crew shall be based on the following competency units:

1. Apply threat and error management principles
2. Perform ground and pre-flight operation

3. Perform take-off
4. Perform climb
5. Perform cruise
6. Perform descent
7. Perform approach
8. Perform landing
9. Perform after-landing and post-flight operation

~~2.3.2 Competency units, competency elements and performance criteria shall be derived from job and tasks analysis of flight crew and shall describe observable outcomes.~~

~~*Note. Definitions of competency units, competency elements and performance criteria are provided in Chapter 1.*~~

2.3.3 The competency frameworks for aircraft maintenance personnel shall be based on the following competency units:

Aircraft systems maintenance personnel	Aircraft structure maintenance personnel	Aircraft component maintenance personnel
1. Perform fault isolation 2. Perform maintenance practices 3. Perform service 4. Remove component/assembly 5. Install component/assembly 6. Adjust 7. Test 8. Inspect 9. Check 10. Clean 11. Paint 12. Repair 13. Perform MEL and CDL/DDPB Procedures	1. Perform aircraft structural repair inspection 2. Perform structural damage investigation, cleanup and aerodynamic smoothness check 3. Perform special process application 4. Perform metal rework/testing 5. Perform structural repair	1. Perform testing fault isolation 2. Perform disassembly 3. Clean 4. Perform inspection/check 5. Repair 6. Perform assembly 7. Perform storage

Editorial Note.— Insert the following new Chapter 4 and *renumber* existing Chapter 4 as Chapter 5.

Chapter 4. COMPETENCY-BASED TRAINING AND ASSESSMENT FOR AIRCRAFT MAINTENANCE PERSONNEL

4.1 Introduction

4.1.1 This chapter provides material on the implementation of a competency-based approach to training and assessment of personnel working in aircraft maintenance, including those with certification privileges. This material will be useful to Licensing Authorities responsible for approving training courses, to Approved Maintenance Organizations (AMOs) that should ensure that their personnel demonstrate the competencies appropriate to their individual functions, and to Approved Maintenance Training Organizations (AMTOs) that should implement training programmes complying with the requirements of the Licensing Authorities and fulfilling the needs of AMOs.

4.2 Existing aircraft maintenance licences and training programmes

4.2.1 Aircraft maintenance work covers a wide range of activities. Therefore, aircraft maintenance personnel require a wide range of competencies that depends on:

a) the type and scope of work they do;

b) the type and structure of the maintenance organization in which they work; and

c) the environment in which they work.

4.2.2 In most States, maintenance functions have been grouped and national Licensing Authorities issue aircraft maintenance licences in accordance with these groups. Typically, these licences are issued in accordance with one of the following groups:

a) Technology groups: licences covering a certain technology range (e.g. aircraft system, airframe, engines, avionics, hydraulic components, aircraft seats, etc.); and

b) Groups defining the kind of tasks: licences covering a certain maintenance environment (e.g. line maintenance, base maintenance, shop maintenance and their special processes, etc.);

and within these groups there are additional subsets like:

a) Aircraft maintenance mechanic/technician/engineer licences with or without specialty-rating endorsements; and

b) Licences rated to a certain level or complexity of work (e.g. Level 1-2-3… / Level A-B-C.

4.2.3 Where maintenance personnel are required to hold a licence, training programmes shall follow the licensing requirements. Where maintenance personnel are not required to hold licences, training programmes are required to comply with the minimum requirements of Annex 1 and follow the maintenance organization's requirements for particular maintenance functions and/or maintenance authorizations.

4.3 The link between competency-based training and assessment and privileges

4.3.1 Holders of licences and/or authorizations are granted privileges to perform defined maintenance tasks and are accountable for them. Therefore, the competencies required to perform these maintenance tasks should form the basis of training, examinations, and assessments.

4.3.2 The Licensing Authority or organization (as described in 4.4) shall ensure that a candidate for a particular licence and/or authorization demonstrates the required set of competencies in relation to the privileges granted.

4.4 Issue of Licences and Authorizations

Licensing Authorities set the standards for the issue of licences in terms of contents, training and experience requirements, examinations and assessments, and administrative procedures. They may delegate some or all of these functions to designated personnel of Aircraft Maintenance Training Organizations (AMTOs) or Approved Maintenance Organizations (AMOs) to act on their behalf. Or they allow Approved Maintenance Organizations (AMOs) to substitute or complement licences with in-house issued authorizations, which then will grant maintenance and certification privileges on behalf of the AMO. In the latter case the system which controls the

issue of authorizations has to be described in the AMO's procedures manual, which is subject to Civil Aviation Authority approval.

4.4.1 Involvement of the Licensing Authority in competency-based training and assessment

4.4.1.1 In States introducing competency-based training and assessment for maintenance personnel, Licensing Authorities should issue an AMMTE licence without specialty-rating endorsements. The scope of privileges of these licences should follow the contents of generic (non-specialty-rated) Standard Practices Manuals, in which the standard practices to perform individual maintenance tasks are stipulated.

4.4.1.2 The licence will refer to a specified set of standard practices and indicate that the holder of the licence is competent to perform them. A modular licence system should be established to cover the broad range of maintenance of aircraft structure (or airframe), aircraft (or engine) systems, avionic systems and components. This modular approach will allow individuals to build up their competencies as required.

4.4.1.3 The Licensing Authority may delegate certain functions leading to the issuance of specialty-rating licence endorsements to designated personnel of Approved Maintenance Organizations (AMOs) under its jurisdiction and shall exercise oversight over the designee performance of delegated functions. AMOs would then issue those authorizations which reflect the scope of maintenance work that the organization performs. The criteria for the issuance of these authorizations shall be stipulated in the Approved Maintenance Organization's Quality Management Documentation, which is approved by the Civil Aviation Authority.

4.4.1.4 The scope and privileges of the authorizations as well as the prerequisites for their issuance, extension, currency, revocation, cancellation, and renewal are subject to the approval of the Licensing Authority.

4.4.1.5 The scope, requirements and privileges of the AMMTE licence issued, its ratings and/or authorizations shall be stipulated in the State's regulations and, in the case of authorizations, expanded in the AMO quality management documentation.

4.4.2 Involvement of Approved Maintenance Training Organizations (AMTO) in competency-based training and assessment

4.4.2.1 A candidate to obtain a licence or authorization shall demonstrate that the required competencies associated with the licence/authorization have been attained. These competencies can be acquired through formal training, practical experience, self-study or a combination of these methods.

4.4.2.2 All competency-based maintenance training programmes shall be conducted by an approved maintenance training organization or an AMO in accordance with paragraph 4.4.3.2. The programmes and their revisions shall be evaluated and approved by the licensing Authority. Conditions for obtaining the approval shall include having the necessary documentation, manuals and equipment for conducting the course.

4.4.2.3 One role of the AMTOs is to deliver optional training programmes (including theoretical and practical training) as appropriate in relation to the competencies required for a licence or an authorization. In addition, designated personnel of AMTOs should carry out competency-based exams and assessments for licences under delegation received from the Licensing Authority; or for authorizations by delegated authority from the AMO, under its responsibility. The Licensing Authority shall specify all requirements for competency-based exams and assessments including contents, delivery and achievement standards and shall maintain oversight of the training and assessment processes.

4.4.3 Involvement of Approved Maintenance Organizations (AMO) in competency-based training and assessment

4.4.3.1 Candidates for licences without specialty-rating endorsement may work in Approved Maintenance Organizations to gain practical experience under the supervision of licensed/authorized personnel. In conjunction with self-study, distance learning, or formal training, these candidates should acquire the required competency to successfully pass the examinations/assessments for the licence.

4.4.3.2 Should an AMO seek to provide training that will allow an alternate means of compliance to the experience requirements established by Annex 1, the training programme, instructors and facilities shall meet the requirements of an approved aircraft maintenance training organization. Furthermore, the training shall be conducted in accordance with the approved aircraft maintenance training organization requirements. The AMO training programmes and their revisions shall be evaluated and approved by the Licensing Authority.

4.4.3.3 For specialty-rating endorsements, the AMO shall specify an authorization system which reflects its requirements in relation to the scope of the work performed in the AMO and the degree of specialization required by its personnel. The contents and privileges granted by the authorizations shall be based on criteria given in approved maintenance instructions. The Civil Aviation Authority shall approve the instructions governing how the competency-based examinations/assessments are performed to ensure that authorizations are granted only to personnel who can execute the attached privileges to the defined standards.

4.5 Assessment

4.5.1 Licensing Authorities, AMTOs and AMOs may use the competency units, competency elements and performance criteria in approving and developing their own assessment and training programmes for the licensing and/or authorization of maintenance personnel, as contained in the competency-based frameworks of Appendix 2 to this chapter. Licensing Authorities, AMTOs, and AMOs, shall develop the range of variables and the evidence and assessment guide and/or practical test standards required for assessing applicants for aircraft maintenance licences in accordance with Annex 1, and for authorizations by an AMO, respectively.

4.6 Training

4.6.1 Competency-based training programmes for aircraft maintenance personnel shall be developed with the use of an ISD methodology.

Note.— A detailed description of the ICAO course development methodology, a competency-based approach to training and assessment and an example of an ISD methodology can be found in the Attachment to Chapter 2.

4.6.2 Each phase of maintenance training programmes shall integrate instruction in underpinning knowledge and in practical training segments. Training in the underpinning knowledge requirements and skill requirements should be fully integrated or harmonized for any maintenance training programme.

Note.— Guidelines for the Implementation of Aircraft Maintenance Personnel Competency-Based Training and Assessment can be found in Appendix 1 to this chapter.

4.6.3 Training courses for maintenance personnel shall include continuous evaluation of the effectiveness of the training programme and of the performance of individual students attending the programme. The process of continuous evaluation shall be acceptable to the Authority. This evaluation shall ensure that:

a) the competencies and related assessment are relevant to the task of maintenance personnel acting in a particular function; and

b) the students acquire the necessary competencies in a progressive and satisfactory manner.

4.6.4 Corrective action shall be taken if in-training or post-training evaluation indicates a need to do so.

Appendix 1 to Chapter 4. Guidelines for the Implementation of Competency-based Training and Assessment for Aircraft Maintenance Personnel

1. Introduction

1.1 The introduction of competency-based training and assessment for aircraft maintenance personnel presents several safety and efficiency benefits, not only for the licence holders, who certify the aircraft or parts of the aircraft as airworthy, but also for all those non-licensed personnel undertaking work that will lead to airworthiness certification.

1.2 The Quality Management System of an AMO depends on the competency of their maintenance personnel. Competency standards therefore play a key role in harmonizing task performance, thereby upholding and potentially improving safety standards in aircraft maintenance. Whether the work is performed by licensed/authorized personnel or not, all personnel inspect their own work. Only in exceptional cases is a duplicated inspection (four-eye-inspection) deemed necessary. Since the risk associated with a poorly performed task rests to a large extent with the individual, it is essential to ensure that personnel authorized to sign for their own work performance be adequately trained and assessed against the corresponding competency standards.

1.3 Airworthiness regulations stipulate the licences and authorizations that personnel shall acquire and maintain valid in order to exercise the certification privileges for different aircraft maintenance tasks. These regulations vary substantially from one State to another in terms of the scope of the privileges, and the requirements for training, experience and examination or assessment. This lack of harmonization hampers the movement of competent personnel amongst Contracting States as well as the outsourcing of maintenance work from one State to another.

1.4 A competency-based training and assessment of aircraft maintenance personnel facilitates the use of a modular approach suited for the wide variety of maintenance tasks. Because generic knowledge-based training programmes are not outcome-driven, their effectiveness in terms of time and resources used can be limited. Competency-based training and assessment programmes can be tailored to specific sets of competencies required to perform defined maintenance operations, with each competency representing a “building block”.

1.5 This modular approach can deliver further efficiencies by taking into account the already acquired competencies that a particular trainee brings into a training programme. Typically, trainees entering a course do not have to meet predetermined entry requirements or undergo a pre-training assessment. For some students, this can result in the repetition of previously attended training and for others in unrealistically demanding course content. To increase the effectiveness and efficiency of the training programmes, the pre-training competencies of trainees should be measured against the competencies to be achieved. Consequently, individual training needs would be identified and training focused on the identified competency gaps thereby potentially reducing training time and effort.

1.6 The constant introduction of new technology results in a permanent requirement for aircraft maintenance personnel to adopt new methods and processes. Consequently, personnel need to master new knowledge and skills to meet the competencies needed to cope with technological development. Because of its modular approach, competency-based training programmes can easily accommodate the introduction of training activities for new technological applications.

1.7 Finally, competency-based training programmes accommodate the introduction of new, more effective and efficient training methodologies, including but not limited to simulation, e-learning, multi-media-based and self-directed learning.

2. Guidelines for the Civil Aviation Authority and Maintenance Organizations

2.1 Aircraft Maintenance Mechanic/Technician/Engineer (AMMTE) Training and Licensing Path

2.1.1 Competency-based training requires continuous evaluation to ensure that it remains effective and relevant to maintenance operations. All relevant Standards related to approved training organization in Annex 1, Appendix 2 shall apply, including those dealing with approval of the curriculum and quality assurance system.

2.2 Competency-based training – Non-specialty-rated

2.2.1 At the end of fundamental training, students shall demonstrate the set of competencies associated with the "Standard Practices", as described in "Standard Practices Manuals", that they will eventually use on the job. In order to demonstrate these competencies, underlying knowledge and skills shall be acquired. These "Standard Practices" are applicable to all types of aeronautical equipment and all existing environments.

2.2.2 As all personnel involved in aircraft maintenance should undergo fundamental training, it is essential that Civil Aviation Authorities closely monitor these training programmes and oversee the final examinations and assessments to ensure that trainees meet the standards associated with the set of competencies that they will use on the job ("Standard Practices"). Civil Aviation Authorities shall therefore approve fundamental competency-based training programmes.

2.2.3 Conditional to the successfully passing the final fundamental training examinations and assessments, Licensing Authorities may issue aircraft maintenance licences without specialty-rated endorsement giving clear statements about which competencies the licence holder can demonstrate.

2.3 Competency-based training - Specialty-rated (aircraft systems and structures or components)

2.3.1 At the end of competency-based training for specialty-rating, students shall demonstrate the set of competencies they require to perform maintenance tasks on specific equipment and in specific environments. These specialty-rated maintenance tasks are described in maintenance instructions found in a variety of manuals such as the "Aircraft Maintenance Manual (AMM)", "Component Maintenance Manual (CMM), "Structural Repair Manual (SRM)", "Fault Isolation Manual (FIM)", and other authorized maintenance instructions, which describe how these tasks are executed and to which standards.

2.3.2 In order to perform work in accordance with maintenance instructions, an AMMTE needs to apply the relevant "Standard Practices" learned in fundamental training to the specific equipment on which work is to be performed. To achieve this, additional training on the specific type of equipment is required.

2.3.3 Competency-based training for specialty-rating shall address the features that are unique to the aircraft or component to be worked on and were not included in fundamental training. Competency-based training for specialty-rating may include but is not limited to the following features:

- location and identification of systems and components;
- operation and monitoring of systems and components;
- analysis of system or component functions;
- removal and installation of units;

- performance of adjustments and tests; and
- use of tools, equipment and materials.

2.3.4 Because of the wide variety in the scope of work undertaken by different maintenance organizations and their personnel, approved maintenance organizations and/or approved maintenance training organizations shall be responsible for the contents of training programmes for specialty-rating, required for the various maintenance functions personnel carry out.

2.3.5 The Civil Aviation Authority shall closely monitor competency-based training programmes for specialty-rating and approve them. These programmes shall be described in the Maintenance Organizations Procedures Manual. The evaluation of the effectiveness of the training programmes is the responsibility of the Maintenance Organization and shall be included in the auditing and monitoring activities performed by the Civil Aviation Authority on that organization.

2.3.6 Examiners designated by the Licensing Authority in AMTOs or appointed by the AMOs are responsible for the final competency-based examinations and assessments of the students in courses for specialty-rating. These examinations and assessments should not only examine the attained knowledge but also ensure that the students demonstrate competencies to perform maintenance tasks to defined standards as per the maintenance instructions. Based on the successful completion of these examinations and assessments, the AMO shall issue aircraft maintenance authorizations which clearly indicate the competencies that the holder of the authorization has demonstrated.

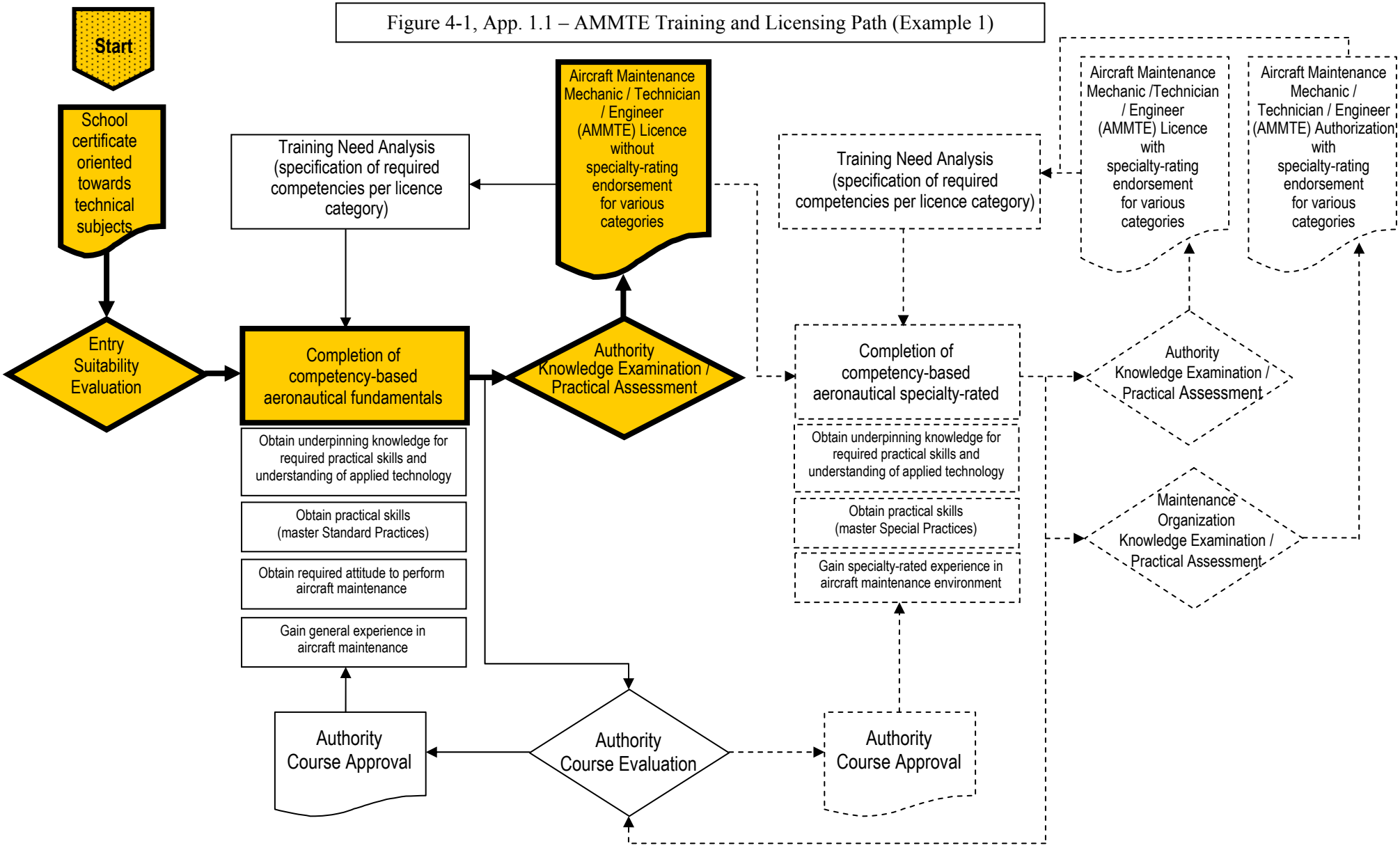
2.3.7 The procedures to conduct examinations and assessments, as well as the requirements to be met for the issuance of authorizations shall be described in the Maintenance Organizations Procedures Manual (MOPM). The Civil Aviation Authority shall approve these procedures and exercise oversight.

2.4 Competency-based training flowcharts of existing licensing and training paths

2.4.1 The competency-based approach can be introduced in different ways in the existing licensing and training paths. The following flowcharts illustrate how this can be accommodated. All start with the student attending fundamentals/basic training.

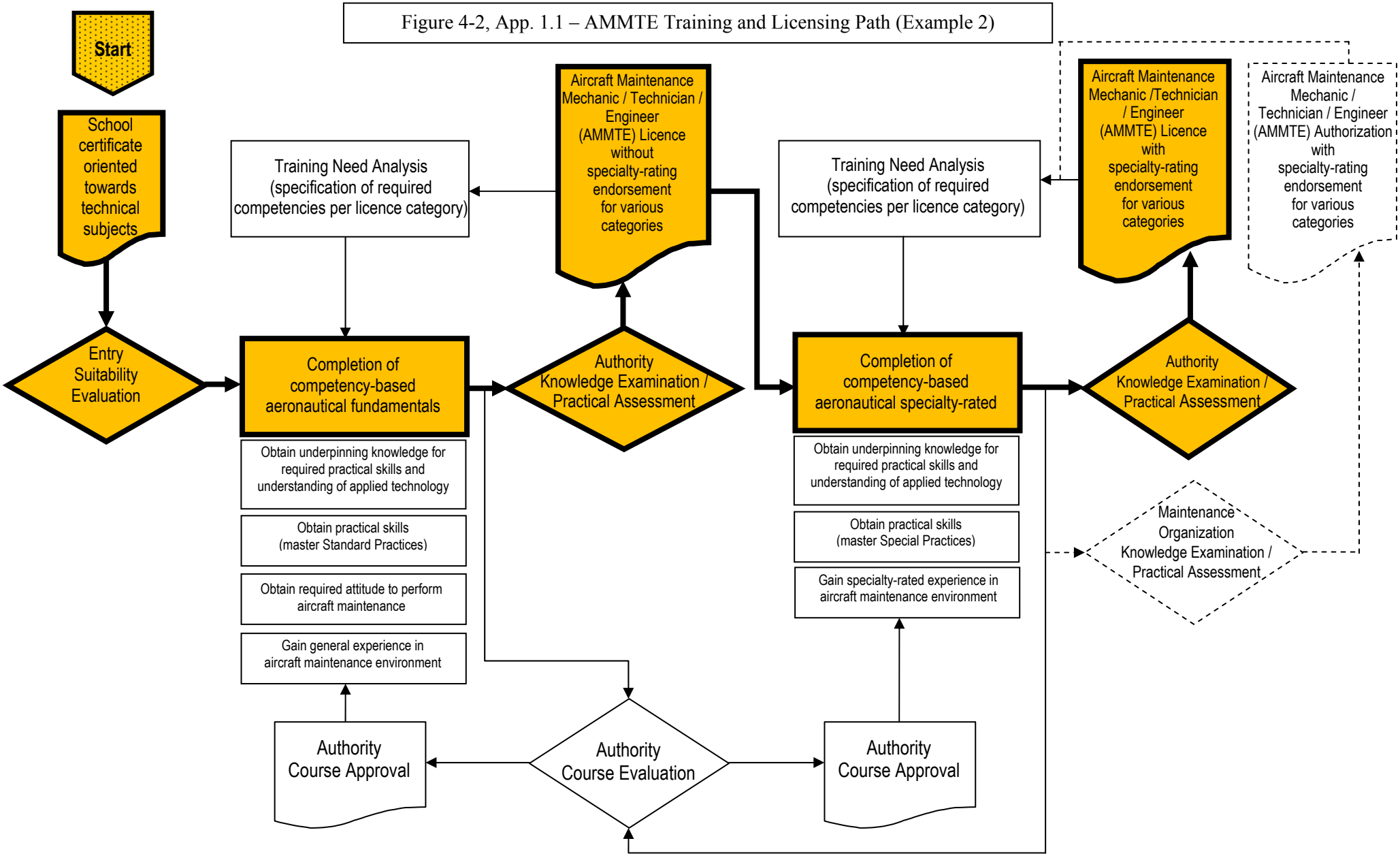
2.4.1.1 Person attending fundamentals/basic training and receiving a Basic Licence after a successful examination/assessment by the Licensing Authority.

Figure 4-1, App. 1.1 – AMMTE Training and Licensing Path (Example 1)



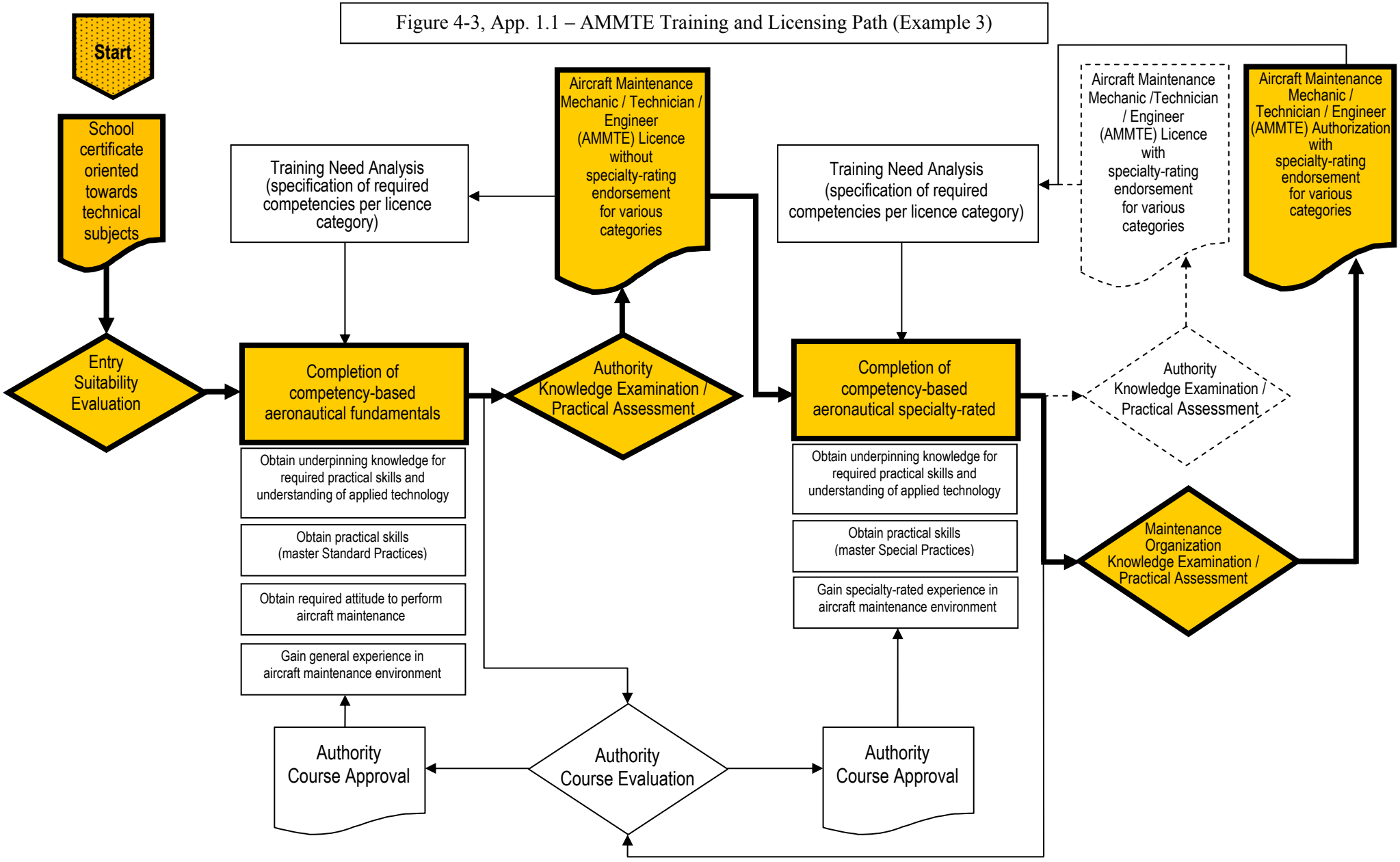
2.4.1.2 Person attending fundamentals/basic training and receiving a Basic Licence, then attending training for specialty-rating and receiving a specialty-rated endorsement on the Licence after a successful examination/assessment by the Licensing Authority.

Figure 4-2, App. 1.1 – AMMTE Training and Licensing Path (Example 2)



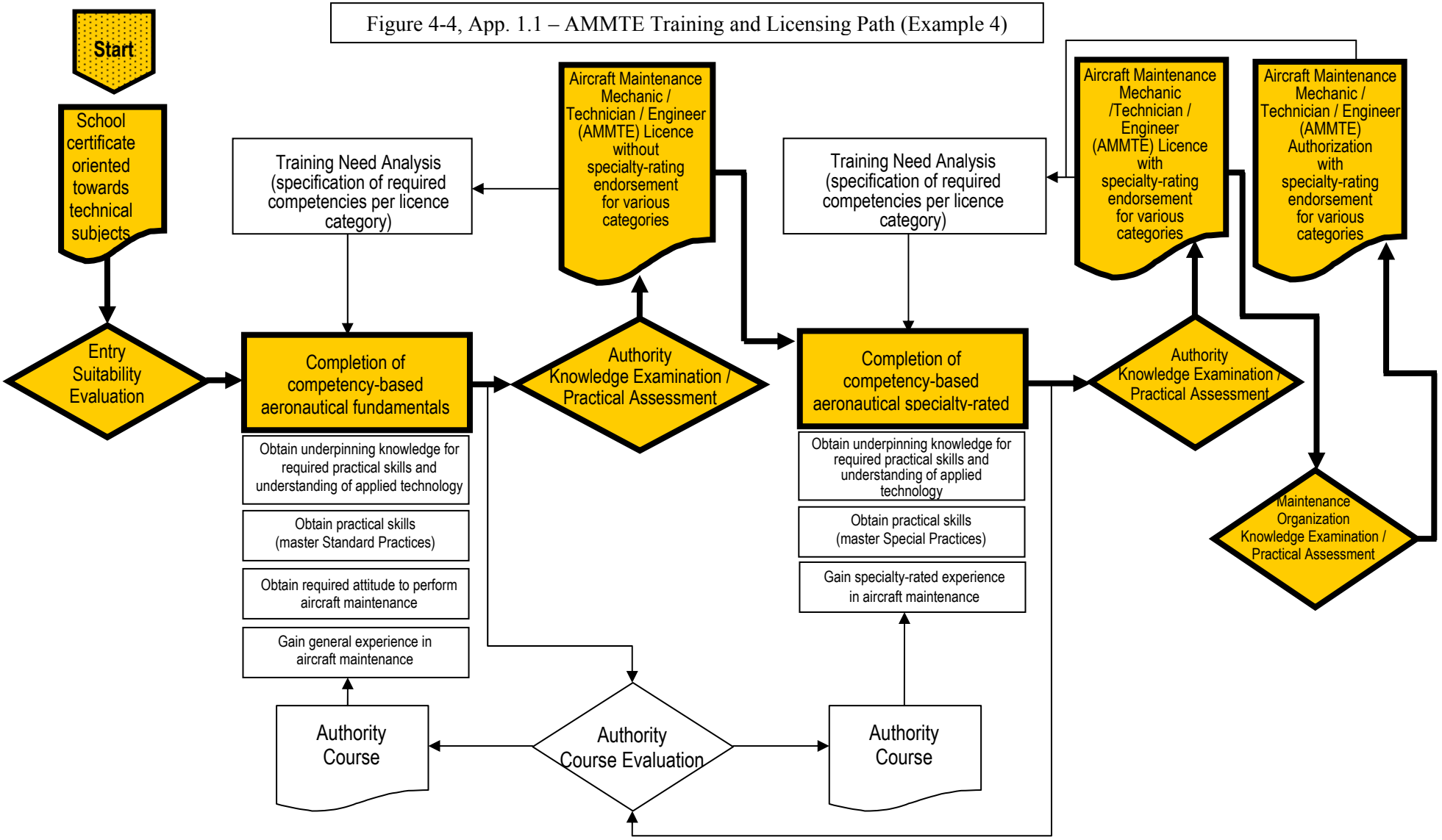
2.4.1.3 Person attending fundamentals/basic training and receiving a Basic Licence, then attending training for specialty-rating and receiving a specialty-rated AMO authorization after a successful AMO examination/assessment.

Figure 4-3, App. 1.1 – AMMTE Training and Licensing Path (Example 3)



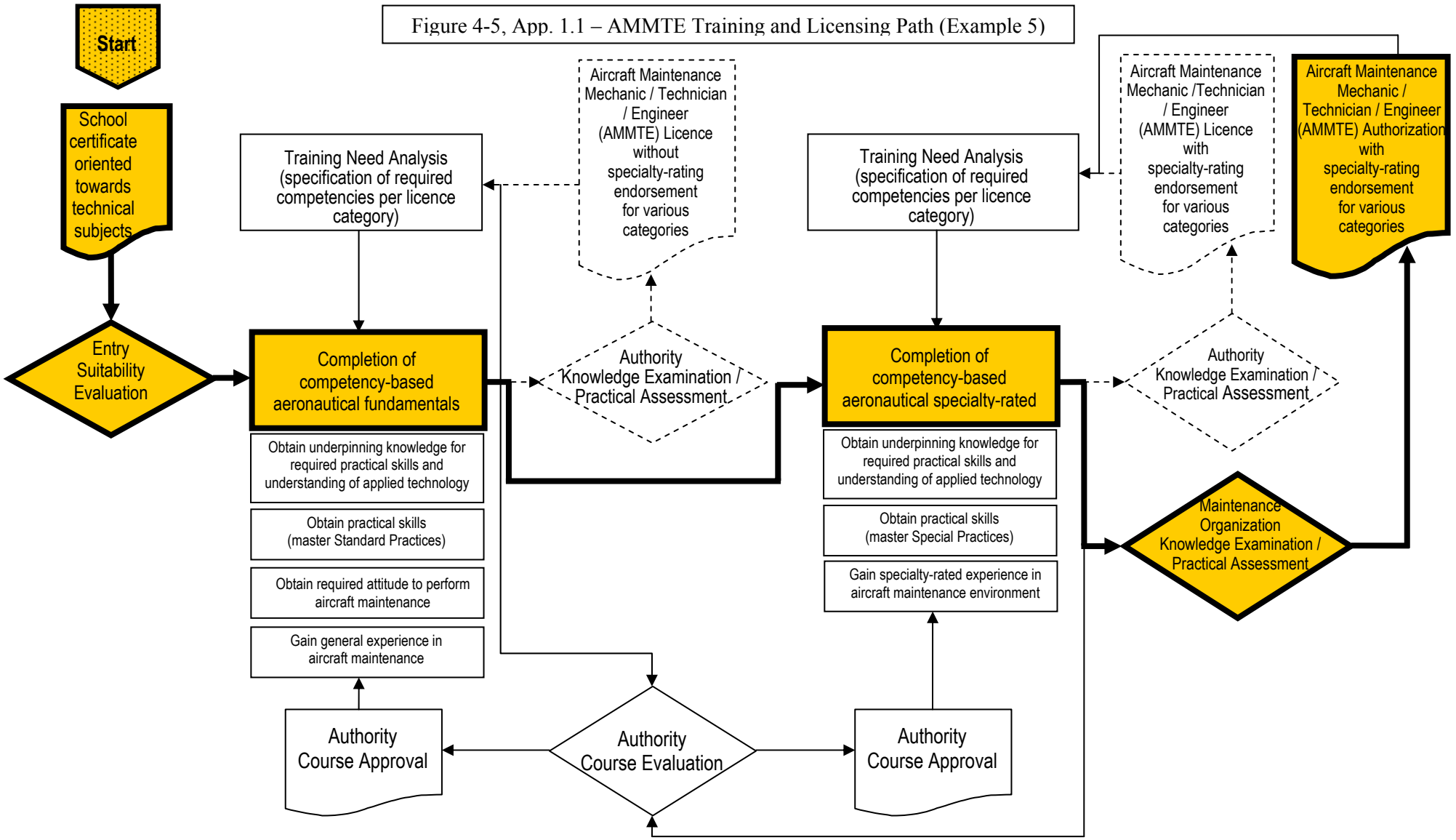
2.4.1.4 Person attending fundamentals/basic training and receiving a Basic Licence, then attending training for specialty-rating and receiving a specialty-rated endorsement on the Licence after a successful examination/assessment by the Licensing Authority as a pre-requisite for an additional specialty-rated AMO Authorization after a successful AMO examination/assessment.

Figure 4-4, App. 1.1 – AMMTE Training and Licensing Path (Example 4)



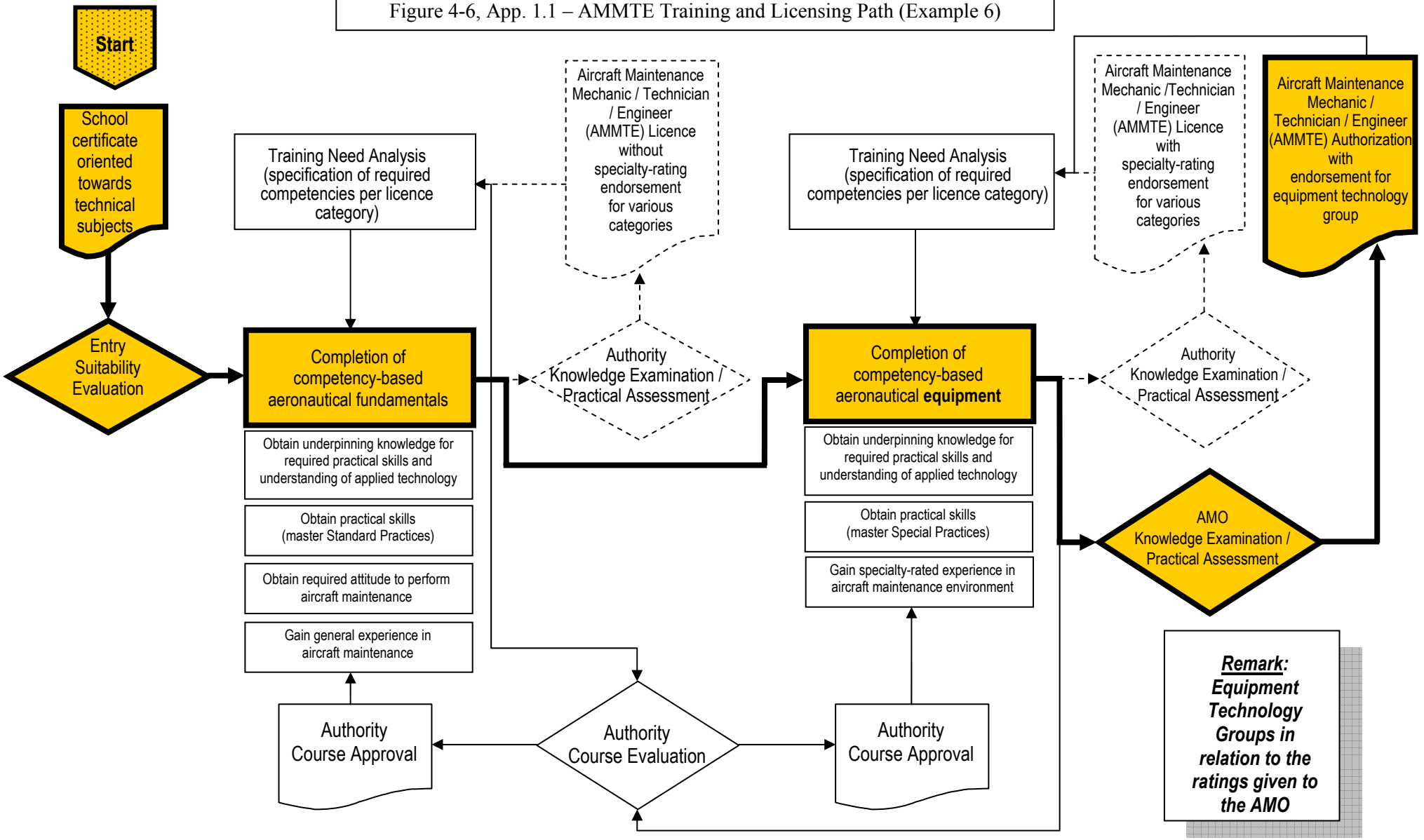
2.4.1.5 Person attending fundamentals/basic training, then attending training for specialty-rating and receiving a specialty-rated AMO Authorization after a successful AMO examination/assessment.

Figure 4-5, App. 1.1 – AMMTE Training and Licensing Path (Example 5)



2.4.1.6 Person attending fundamentals/basic training, then attending an equipment technology group training and receiving an equipment technology group AMO Authorization after a successful AMO examination/assessment.

Figure 4-6, App. 1.1 – AMMTE Training and Licensing Path (Example 6)



Appendix 2 to Chapter 4. Aircraft Maintenance Competency Units, Competency Elements and Performance Criteria

1. Introduction

1.1 Aircraft maintenance involves a wide range of tasks performed in maintenance organizations whose scope of work varies broadly. Some maintenance organizations perform the full range of aircraft and component maintenance while others are specialized. Depending on the type of maintenance organization, personnel will require different sets of competencies.

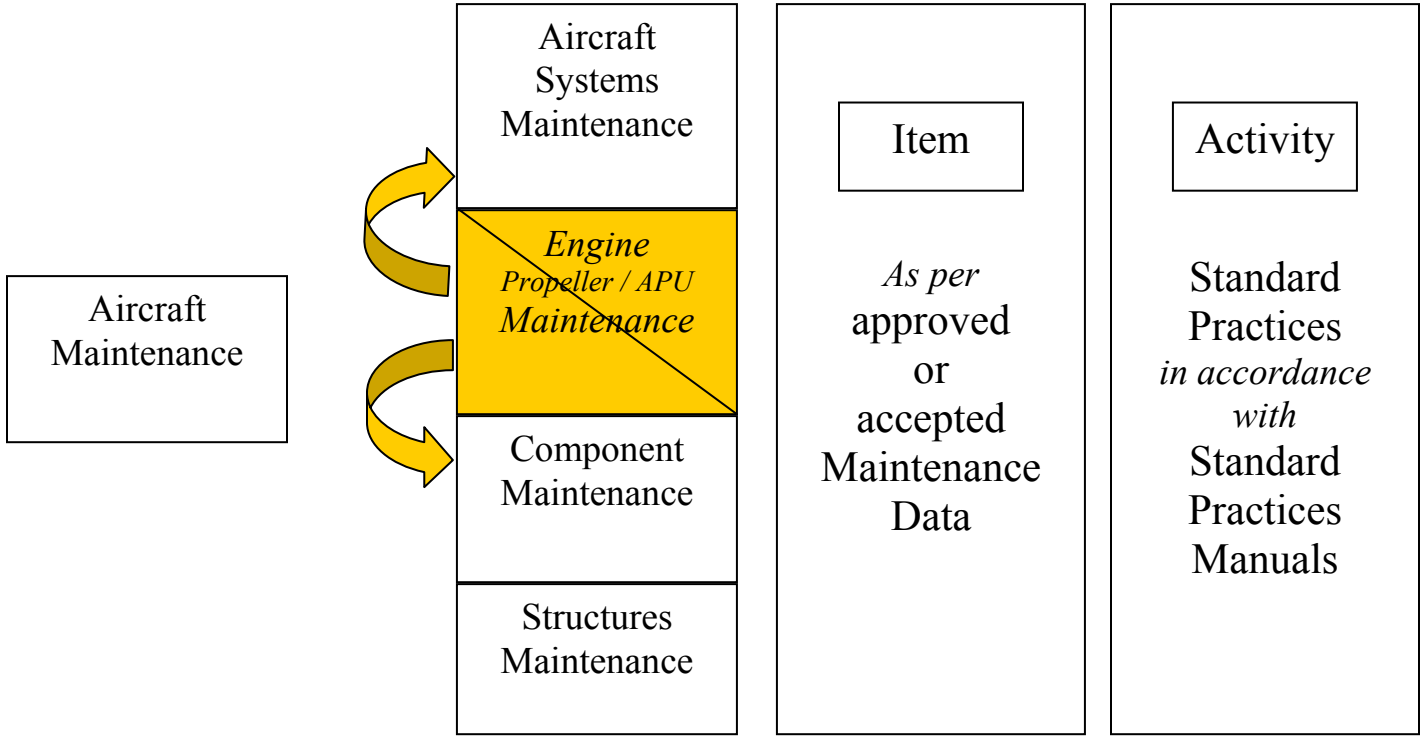
1.2 The following competency frameworks were developed to accommodate the different types of maintenance tasks and organizations. The frameworks list the competencies for three domains: aircraft systems maintenance, aircraft structures maintenance, aircraft components maintenance. The frameworks were developed by combining the existing generic information found in aircraft and engine maintenance manuals, structural repair manuals, component maintenance manuals and the actions described in standard practices documentation. Figure 4, App 2.1, aircraft maintenance domains, illustrates the basis on which the competency frameworks were developed.

1.3 It is not envisaged that one person should achieve all competencies listed in the frameworks. Students shall achieve the competencies selected by the Licensing Authority and/or approved maintenance organization for a specific function.

1.4 The competency frameworks were developed with the following assumptions:

- they are targeted to aircraft maintenance mechanics/technicians/engineers and/or aircraft component maintenance mechanics/technicians/engineers, working within the scope of aircraft and engine maintenance manuals, structural repair manuals and component maintenance manuals;
- they are applicable in aircraft line, base and workshop maintenance; and
- they apply to large aeroplanes (>5 700 kg) powered by turbine engines and components thereof.

Figure 4. App 2.1. Aircraft Maintenance Domains



Note.– Depending on the scope of work, the engine maintenance, including the propeller or APU maintenance, may be accomplished using either the framework for the aircraft systems maintenance domain or the framework for the component maintenance domain.

2. Competency Units, Competency Elements and Performance Criteria for Aircraft Systems Maintenance Personnel

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
1 Perform Fault Isolation	
1.0 Recognize and manage potential threats and errors	
1.1 Prepare for fault isolation – collect fault data	
1.1.1 Collect fault data from aircraft Technical Log Book, (printed or electronic), pilot or maintenance report.	MOPM
1.1.2 Collect data from aircraft recorders / in-flight transmitted records (maintenance messages).	
1.1.3 Collect fault data from Maintenance Defect Reporting Sheet.	MOPM
1.2 Verify fault data	
1.2.1Perform inspection to verify physical status.	MM
1.2.2 Perform operational test to verify operational status.	MM
1.2.3 Perform functional test to verify functional status.	MM
1.2.4 Perform check to verify to what degree the fault hampers the designed task fulfilment of the faulty system components.	MM
1.2.5 Record all fault findings.	MOPM
1.3 Develop fault isolation procedure	
1.3.1 Consult the fault isolation section of the Maintenance Manual (MM) for fault isolation procedure availability.	MM
1.3.2 Select fault isolation procedure if available.	MOPM
1.3.3 If fault isolation procedure not available, perform fault isolation in accordance with generic standard practices, if possible.	MOPM
1.3.4 If fault isolation procedure not available and cannot be performed in accordance with generic practice, contact the engineering department for development of the fault isolation procedure.	MOPM
1.4 Perform fault isolation procedure	
1.4.1 Perform fault isolation procedure step by step.	MM
1.4.2 Record results of each step of fault isolation procedure.	MOPM
1.4.3 Continue fault isolation procedure until fault cause has been identified.	MM
1.5 Define fault rectification procedure	
1.5.1 Consult Minimum Equipment List (MEL) to determine whether operation with existing fault is still possible.	MEL
1.5.2 Consult Configuration Deviation List (CDL) / Dispatch Deviation Procedures Guide (DDPG) to determine whether operation with existing fault is still possible.	CDL

1.5.3 Determine whether operation may be continued without immediate fault rectification, if allowed by the MEL. If yes – perform, if required: Operational and/or maintenance procedure as per MEL Operational and/or maintenance procedure as per CDL / DDPG Continue Operation – go to 1.5.4 **If no – go to 1.5.4**	MOPM
1.5.4 Prepare fault rectification order.	MOPM
1.6 Complete fault isolation	
1.6.1 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
2. Perform Maintenance Practices	
2.0 Recognize and manage potential threats and errors	
2.1 Identify the maintenance practice to be accomplished	
2.1.1 Identify whether any step in a maintenance task procedure requires either: • Generic Standard Practices Manual (SPM) application; • Specialty-rated standard maintenance practice application – as per MM chapters 20, 60 or 70; • Maintenance practice application – as per Page Block 200 in each ATA chapter of the MM; • Special maintenance practice application – as per Special Maintenance Procedure Manual (SMPM) (e.g. Non-destructive testing (NDT), welding etc.).	MM
2.2 Perform maintenance procedure	
2.2.1 Perform standard practice – should be possible to be performed without necessity of consulting a manual (competence has been acquired through study / experience and been successfully assessed within the AMO, by which the performing person is employed).	SPM
2.2.2 Perform maintenance practice as per MM procedure.	MM
2.2.3 Perform special maintenance procedure as per Special Maintenance Practice Manual.	SMPM
2.3 Complete maintenance practice	
2.3.1 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
3 Perform Service	
3.0 Recognize and manage potential threats and errors	
3.1 Prepare for service	
3.1.1 Read related maintenance instruction.	MM
3.1.2 Prepare required tools.	MM
3.1.3 Prepare required equipment.	MM
3 1.4 Prepare maintenance records.	MOPM
3.1.5 Instruct supporting staff.	MOPM
3.1.6 Get access to component / assembly.	MM
3.1.7 Locate component / assembly.	MM
3.2 Apply safety precautions / maintenance practices	
3.2.1 Identify whether any step in a maintenance task procedure requires either: • Generic SPM application; • Specialty-rated standard maintenance practice application – as per MM chapters 20, 60 or 70; or • Maintenance practice application – as per Page Block 200 in each ATA chapter of the MM.	MM
3.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	
3.2.3 Tag all flight deck and external control devices which are involved in the safety precautions.	MM
3.3 Perform service of component / assembly / system	
3.3.1 Check for required medium to be serviced (e.g. fluid specifications).	MM
3.3.2 Check fill status of component / assembly / system.	MM
3.3.3 Record fill status of component / assembly / system.	MOPM
3.3.4 Identify required fill status of component / assembly / system.	MM
3.3.5 Calculate required refill quantity to add.	MOPM
3.3.6 Connect fill equipment to fill openings / ports.	MM
3.3.7 Operate fill / overfill valves.	MM
3.3.8 Add required refill quantity.	MM
3.3.9 Record refill quantity.	MOPM
3.3.10 Disconnect fill equipment – close and secure fill openings / ports.	MM
3.4 Apply safety precautions in service area	
3.4.1 Clean service port area.	MOPM
3.4.2 Perform visual inspection.	MOPM
3.4.3 Remove all tools and equipment, check work area for left-over	MOPM

objects.	
3.4.4 Re-check fill status.	MOPM
3.5 Complete service	
3.5.1 Restore aircraft to Normal status. Close service area, un-tag all flight and external control devices involved in the safety precautions and restore normal power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic) - set control devices into their Normal Position.	MM
3.5.2 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
4 Remove component / assembly	
4.0 Recognize and manage potential threats and errors	MOPM
4.1 Prepare for removal	
4.1.1 Read related maintenance instruction.	MM
4.1.2 Prepare required tools.	MM
4.1.3 Prepare required equipment.	MM
4.1.4 Prepare maintenance records.	MOPM
4.1.5 Instruct supporting staff.	MOPM
4.1.6 Get access to component / assembly.	MM
4.1.7 Locate component / assembly.	MM
4.1.8 Take and record any required measurements.	MM
4.2 Apply safety precautions / maintenance practices	
4.2.1 Identify whether any step in a maintenance task procedure requires either: • Generic SPM application; • Specialty-rated standard maintenance practice application – as per MM chapters 20, 60 or 70; or • Maintenance Practice application – as per Page Block 200 in each ATA chapter of the MM.	MM
4.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	
4.2.3 Tag all flight deck and external control devices which are involved in the safety precautions.	MM
4.3 Disconnect all connections to the system(s)	
4.3.1 Disconnect electrical connectors (be aware of remaining voltage – capacitors).	MM
4.3.2 Disconnect hydraulic lines (be aware of leakage and remaining pressure).	MM

4.3.3 Disconnect pneumatic ducts and lines (be aware of remaining pressure).	MM
4.3.4 Disconnect all other supply lines (fuel, water, oxygen, etc) (be aware of leakage and remaining pressure).	MM
4.3.5 Disconnect mechanical control linkages, cables and rods (be aware of spring loaded linkages and attached dampers).	MM
4.3.6 Disconnect bonding jumpers.	MM
4.4 Secure component / assembly before removal	
4.4.1 Attach hoist to the component / assembly.	MM
4.4.2 Support component / assembly.	MOPM
4.5 Loosen and remove connecting elements from support structure	
4.5.1 Loosen and remove all attachment nuts and bolts.	MM
4.5.2 Loosen and remove all attachment fasteners.	MM
4.5.3 Loosen and remove all attachment clamps and Quick Attach-Detach devices.	MM
4.6 Move component / assembly out of work area	
4.6.1 Use hoist to lower component / assembly from area.	MM
4.6.2 Transfer component / assembly out of area.	MOPM
4.7 Apply safety precautions in removal area	
4.7.1 Clean removal area.	MOPM
4.7.2 Perform visual inspection.	MOPM
4.7.3 Remove all tools and equipment, check work area for left-over objects.	MOPM
4.8 Complete removal	
4.8.1 Remove and discard seals and gaskets.	MOPM
4.8.2 Drain component / assembly.	MM
4.8.3 Store component / assembly in cradle, container or shelf, stack.	MM
4.8.4 Install covers on electrical connectors, lines, ducts and openings to keep out unwanted materials.	MOPM
4.8.5 Restore aircraft Close removal area, un-tag all flight and external control devices involved in the safety precautions and restore normal power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic) - set control devices into their Normal Position.	MM
4.8.6 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
5 Install component / assembly	
5.0 Recognize and manage potential threats and errors	MOPM
5.1 Prepare for installation	
5.1.1 Read related maintenance instruction.	MM
5.1.2 Prepare required tools.	MM
5.1.3 Prepare required equipment.	MM
5.1.4 Prepare maintenance records.	MOPM
5.1.5 Assign required duplicated inspections.	MOPM
5.1.6 Instruct supporting staff.	MOPM
5.1.7 Get access to component / assembly installation area.	MM
5.1.8 Locate component / assembly installation position.	MM
5.2 Apply safety precautions / maintenance practices	
5.2.1 Identify whether any step in a maintenance task procedure requires either: • Generic SPM application; • Specialty-rated standard maintenance practice application – as per MM chapters 20, 60 or 70; or • Maintenance Practice application – as per Page Block 200 in each ATA chapter of the MM.	MM
5.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	
5.2.3 Tag all flight deck and external control devices which are involved in the safety precautions.	MM
5.3 Perform pre-installation activities	
5.3.1 Get component / assembly out cradle, container, shelf or stack.	MOPM
5.3.2 Check Certificate of Release to Service of component / assembly and perform visual inspection.	MOPM
5.3.3 Remove covers from electrical connectors, lines, ducts and openings.	MOPM
5.3.4 Install seals and gaskets and apply grease and sealing.	MM
5.3.5 Fill or pre-charge component / assembly with oil, hydraulic fluid, fuel, nitrogen.	MM
5.4 Move component / assembly into installation area	
5.4.1 Attach hoist to component / assembly.	MM
5.4.2 Lift component / assembly into installation area.	
5.5 Insert, attach, tighten / torque / fasten and secure connecting elements to support structure	
5.5.1 Insert, tighten / torque and secure all attachment nuts and bolts.	MM

5.5.2 Insert, fasten and secure all attachment fasteners.	MM
5.5.3 Attach, tighten / torque and secure all attachment clamps and QAD devices.	MM
5.6 Connect all connections to the system(s)	
5.6.1 Connect electrical connectors (be aware of remaining voltage – capacitors).	MM
5.6.2 Connect hydraulic lines (be aware of leakage and remaining pressure).	MM
5.6.3 Connect pneumatic ducts and lines (be aware of remaining pressure).	MM
5.6.4 Connect all other supply lines (fuel, water, oxygen, etc) (be aware of leakage and remaining pressure).	MM
5.6.5 Connect mechanical control linkages, cables and rods (be aware of spring loaded linkages and attached dampers).	MM
5.6.6 Connect bonding jumpers.	MM
5.7 Perform adjustments (see 7)	
5.7.1 Perform adjustments.	MM
5.7.2 Take and record measurements.	MM
5.8 Apply safety precautions in installation area	
5.8.1 Clean installation area.	MOPM
5.8.2 Perform visual inspection.	MOPM
5.8.3 Remove all tools and equipment, check work area for left-over objects.	MOPM
5.8.4 Perform required duplicated inspections.	MOPM
5.9 Apply safety precautions in flight deck / Activation	
5.9.1 Unlock mechanical control devices.	MM
5.9.2 Un-tag all flight deck and external control devices which were involved in the safety precautions.	MM
5.10 Complete installation	
5.10.1 Perform leak test (see 7).	MM
5.10.2 Perform operational test (see 7).	MM
5.10.3 Perform functional test (see 7).	MM
5.10.4 Restore aircraft to Normal status – Close installation area and restore normal power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic) - set control devices into their Normal Position.	MM
5.10.5 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
6 Adjust	
6.0 Recognize and manage potential threats and errors	MOPM
6.1 Prepare for adjustment	
6.1.1 Read related maintenance instruction.	MM
6.1.2 Prepare required tools.	MM
6.1.3 Prepare required equipment.	MM
6.1.4 Prepare maintenance records.	MOPM
6.1.5 Assign required duplicated inspections.	
6.1.6 Instruct supporting staff.	MOPM
6.1.7 Get access to component / assembly.	MM
6.1.8 Locate component / assembly.	MM
6.2 Apply safety precautions / maintenance practices	
6.2.1 Identify whether any step in a maintenance task procedure requires either: • Generic SPM application; • Specialty-rated standard maintenance practice application – as per MM chapters 20, 60 or 70; or • Maintenance practice application – as per Page Block 200 in each ATA chapter of the MM.	MM
6.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	
6.2.3 Tag all flight deck and external control devices which are involved in the safety precautions.	MM
6.3 Perform adjustment.	
6.3.1 Install measuring devices (gages, fixtures, templates, etc).	MM
6.3.2 Take and record existing measurements / parameters. Perform Test (see 7- Operate component / assembly as required).	MM
6.3.3 Compare measurements / parameters taken with measurements specified for operational efficiency and integrity of system, sub-system, assembly or component.	MM
6.3.4 In case of measurement / parameter deviations from specified tolerances perform adjustment to be in compliance with specification.	MM
6.4 Apply safety precautions in adjustment area and flight deck	
6.4.1 Clean adjustment area.	MOPM
6.4.2 Perform visual inspection.	MOPM
6.4.3 Perform required duplicated inspections.	MOPM
6.4.4 Remove all tools and equipment, check work area for left-over objects.	MOPM
6.4.5 Unlock mechanical control devices.	MM

6.4.6 Un-tag all flight deck and external control devices which were involved in the safety precautions.	MM
6.5 Complete Adjustment	
6.5.1 Restore aircraft to Normal status – Close adjustment area and restore normal power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic) - set control devices into their Normal Position.	MM
6.5.2 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
7 Test	
7.0 Recognize and manage potential threats and errors	MOPM
7.1 Prepare for operational test	
7.1.1 Read related maintenance instruction.	MM
7.1.2 Prepare maintenance records.	MOPM
7.1.3 Instruct supporting staff.	MOPM
7.1.4 Get access to control and monitoring devices of system / sub-system / assembly / component.	MM
7.1.5 Identify whether any step in a maintenance task procedure requires maintenance practice application – as per Page Block 200 in each ATA chapter of the MM.	MM
7.2 Perform operational test	
7.2.1 Establish power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic).	MM
7.2.2 Operate system / sub-system / assembly / component through its various positions and conditions using on-board control devices.	MM
7.2.3 Monitor system / sub-system / assembly / component positions and conditions using on-board monitoring devices.	MM
7.2.4 Compare monitored system / sub-system / assembly / component positions and conditions with normal specified operational positions and conditions and record any deviations.	MM
7.3 Complete operational test	
7.3.1 Restore aircraft to Normal status – Deactivate power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic) - set control devices into their Normal Position.	MM
7.3.2 Establish and sign maintenance records.	MOPM
7.4 Prepare for functional / system test	
7.4.1 Read related maintenance instruction.	MM

7.4.2 Prepare required tools.	MM
7.4.3 Prepare required equipment.	MM
7.4.4 Prepare maintenance records.	MOPM
7.4.5 Assign required duplicated inspections.	MOPM
7.4.6 Instruct supporting staff.	MOPM
7.4.7 Get access to component / assembly.	MM
7.4.8 Locate component / assembly.	MM
7.5 Apply safety precautions / maintenance practices	
7.5.1 Identify whether any step in a maintenance task procedure requires either: • Generic SPM application; • Specialty-rated standard maintenance practice application – as per MM chapters 20, 60 or 70; or • Maintenance practice application – as per Page Block 200 in each ATA chapter of the MM.	MM
7.5.2 Identify whether any safety precautions are required for the maintenance task and apply them.	
7.5.3 Tag all flight deck and external control devices which are involved in the safety precautions.	MM
7.6 Perform functional / system test.	
7.6.1 Install measuring devices and test equipment (gages, fixtures, templates, testers, etc).	MM
7.6.2 Establish power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic).	MM
7.6.3 Operate system / sub-system / assembly / component through the various positions and conditions of the functional test programme using on-board control devices and/or supplemental test equipment.	MM
7.6.4 Monitor system / sub-system / assembly / component positions and conditions using on-board monitoring devices and/or supplemental test equipment.	MM
7.6.5 Compare monitored system / sub-system / assembly / component positions and conditions with minimum acceptable system or unit design specifications and record any deviations.	MM
7.7 Apply safety precautions in test area and flight deck	
7.7.1 Perform visual inspection.	MOPM
7.7.2 Remove all tools and equipment, check work area for left-over objects.	MOPM
7.7.3 Unlock mechanical control devices.	MM
7.7.4 Un-tag all flight deck and external control devices which were involved in the safety precautions.	MM
7.8 Complete functional / system test	
7.8.1 Restore aircraft to Normal status – Close test area and restore normal power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic) - set control	MM

devices into their Normal Position.	
7.8.2 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
8 Inspect	
8.0 Recognize and manage potential threats and errors	MOPM
8.1 Prepare for inspection	
8.1.1 Read related maintenance instruction.	MM
8.1.2 Prepare required tools.	MM
8.1.3 Prepare required equipment.	MM
8.1.4 Prepare maintenance records.	MOPM
8.1.5 Instruct supporting staff.	MOPM
8.1.6 Get access to inspection area.	MM
8.1.7 Locate inspection items.	MOPM
8.2 Apply safety precautions / deactivation	
8.2.1 Identify whether any step in a maintenance task procedure requires either: • Generic SPM application; • Specialty-rated standard maintenance practice application – as per MM chapters 20, 60 or 70; or • Maintenance practice application – as per Page Block 200 in each ATA chapter of the MM.	MM
8.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	
8.2.3 Tag all flight deck and external control devices which are involved in the safety precautions.	MM
8.3 Perform inspection	
8.3.1 Clean inspection area.	MM
8.3.2 Remove paint as required.	MM
8.3.3 Identify inspection criteria per inspection item.	MOPM
8.3.4 Prepare record sheet for inspection results (including limits and tolerances).	MM
8.3.5 Identify items which need to be removed from aircraft for inspection.	MM
8.3.6 Remove items from aircraft which require “bench” inspection.	MM
8.3.7 Perform general visual inspection – examine for signs of physical damage, corrosion, leaks, correct installation, missing items – use judgement for deviation from normal condition.	MOPM
8.3.8 Perform detailed visual inspection – use inspection tools for examination of wear, play, leaks, corrosion and compare measurements	MM

with specified limits and tolerances (permitted wear dimensions).	
8.3.9 Record inspection results / deviations / defects.	MOPM
8.4 Apply safety precautions in inspection area and flight deck	
8.4.1 Remove all tools and equipment, check work area for left-over objects.	MOPM
8.4.2 Unlock mechanical control devices.	MM
8.4.3 Un-tag all flight deck and external control devices which were involved in the safety precautions.	MM
8.5 Complete inspection	
8.5.1 Re-install items that had been removed from the aircraft for inspection.	MM
8.5.2 Restore aircraft to Normal status – Close inspection area and restore normal power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic) - set control devices into their Normal Position.	MM
8.5.3 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
9 Check	
9.0 Recognize and manage potential threats and errors	MOPM
9.1 Prepare for the check	
9.1.1 Read related maintenance instruction.	MM
9.1.2 Prepare required tools.	MM
9.1.3 Prepare required equipment.	MM
9.1.4 Prepare maintenance records.	MOPM
9.1.5 Instruct supporting staff.	MOPM
9.1.6 Get access to component / assembly.	MM
9.1.7 Locate component / assembly.	MM
9.2 Apply safety precautions / maintenance practices	
9.2.1 Identify whether any step in a maintenance task procedure requires either: • Generic SPM application; • Specialty-rated standard maintenance practice application – as per MM chapters 20, 60 or 70; or • Maintenance practice application – as per Page Block 200 in each ATA chapter of the MM.	MM
9.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	
9.2.3 Tag all flight deck and external control devices which are	MM

involved in the safety precautions.	
9.3 Perform check	
9.3.1 Identify check criteria.	MOPM
9.3.2 Prepare record sheet for check results (including check procedure, limits and tolerances).	MM
9.3.3 Verify that the condition and installation of the item to be checked is within specified limits and tolerances (check service indicators, filters, visual indicators, BITE indicators, torque values, etc.).	MM
9.3.4 Check as per MM instruction that the item to be checked performs its designed specific tasks within the specified limits and tolerances (operate the item / set the item into certain conditions and monitor its positions and functions).	MM
9.3.5 Record check results / deviations.	MOPM
9.4 Apply safety precautions in check area and flight deck	
9.4.1 Clean check area.	MOPM
9.4.2 Perform visual inspection.	MOPM
9.4.3 Remove all tools and equipment, check work area for left-over objects.	MOPM
9.4.4 Unlock mechanical control devices.	MM
9.4.5 Un-tag all flight deck and external control devices which were involved in the safety precautions.	MM
9.5 Complete check	
9.5.1 Restore aircraft to Normal status – Close check area and restore normal power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic) - set control devices into their Normal Position.	MM
9.5.2 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
10 Clean	
10.0 Recognize and manage potential threats and errors	MOPM
10.1 Prepare for cleaning	
10.1.1 Read related maintenance instruction.	MM
10.1.2 Prepare required tools.	MM
10.1.3 Prepare required equipment.	MM
10.1.4 Prepare maintenance records.	MOPM
10.1.5 Instruct supporting staff.	MOPM
10.1.6 Get access to area / component / assembly.	MM
10.1.7 Locate component / assembly.	MM

10.2 Apply safety precautions / maintenance practices	
10.2.1 Identify whether any step in a maintenance task procedure requires either: • Generic SPM application; • Specialty-rated standard maintenance practice application – as per MM chapters 20, 60 or 70; or • Maintenance practice application – as per Page Block 200 in each ATA chapter of the MM.	MM
10.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	
10.2.3 Tag all flight deck and external control devices which are involved in the safety precautions.	MM
10.3 Perform cleaning	
10.3.1 Identify materials located in cleaning area.	MM
10.3.2 Protect items which should not get into contact with cleaning agent.	MOPM
10.3.3 Identify and select which required and allowed cleaning agents are to be used in relation to the material of the item to be cleaned.	MM
10.3.4 Identify and select required and allowed cleaning method (manual cleaning, machine cleaning).	MM
10.3.5 Verify whether paint has to be removed before cleaning – if required, remove paint.	MM
10.3.6 Perform cleaning process – remove contamination.	MM
10.3.7 Dry cleaned area immediately following cleaning process.	MOPM
10.3.8 Re-lubricate and protect cleaned area as required (after any required inspection).	MM
10.4 Apply safety precautions in cleaning area	
10.4.1 Perform visual inspection.	MOPM
10.4.2 Remove all tools and equipment, check work area for left-over objects.	MOPM
10.4.3 Unlock mechanical control devices.	MM
10.4.4 Un-tag all flight deck and external control devices which were involved in the safety precautions.	MM
10.5 Complete cleaning	
10.5.1 Restore aircraft to Normal status − Close cleaning area and restore normal power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic) - set control devices into their Normal Position.	MM
10.5.2 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference

11 Paint	
11.0 Recognize and manage potential threats and errors	MOPM
11.1 Prepare for painting	
11.1.1 Read related maintenance instruction.	MM
11.1.2 Prepare required tools.	MM
11.1.3 Prepare required equipment.	MM
11.1.4 Prepare maintenance records.	MOPM
11.1.5 Instruct supporting staff.	MOPM
11.1.6 Get access to area / component / assembly.	MM
11.1.7 Locate component / assembly.	MM
11.2 Apply safety precautions / maintenance practices	
11.2.1 Identify whether any step in a maintenance task procedure requires either: • Generic SPM application; • Specialty-rated standard maintenance practice application – as per MM chapters 20, 60 or 70; or • Maintenance practice application – as per Page Block 200 in each ATA chapter of the MM.	MM
11.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	
11.2.3 Tag all flight deck and external control devices which are involved in the safety precautions.	MM
11.3 Perform painting	
11.3.1 Identify materials located in stripping / painting area.	MM
11.3.2 Attach stencils / mask items to protect items which should not get into contact with stripper / primer / paint.	MOPM
11.3.3 Identify and select required and allowed stripper / primer / paint in relation to material of item to be stripped / painted.	MM
11.3.4 Identify and select required and allowed stripping / painting method (manual, spray, machine method).	MM
11.3.5 Verify whether paint has to be removed before painting.	MM
11.3.6 Perform stripping / mechanical paint removal process, as required.	MM
11.3.7 Clean and dry stripping / paint removal area.	MOPM
11.3.8 Check that temperature and humidity are suitable for priming / painting process.	MM
11.3.9 Perform priming / painting process.	MM
11.3.10 Dry priming / painting area.	MM
11.3.11 Verify whether finish / coating for painted area is required – if required, apply finish / coating.	MM
11.4 Apply safety precautions in painting area	

11.4.1 Perform visual inspection.	MOPM
11.4.2 Remove all tools and equipment, check work area for left-over objects.	MOPM
11.4.3 Unlock mechanical control devices.	MM
11.4.4 Un-tag all flight deck and external control devices which were involved in the safety precautions.	MM
11.5 Complete painting	
11.5.1 Restore aircraft to Normal status − Close painting area and restore normal power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic) - set control devices into their Normal Position.	MM
11.5.2 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
12. Repair	
12.0 Recognize and manage potential threats and errors	MOPM
12.1 Prepare for repair	
12.1.1 Read related fault report.	MOPM
12.1.2 Verify fault and add information to fault report if it is incomplete.	MOPM
12.1.3 Read related maintenance instruction.	MM
12.1.4 Prepare repair scheme as per maintenance instruction.	MOPM
12.1.5 Procure required materials.	MM
12.1.2 Prepare required tools.	MM
12.1.3 Prepare required equipment.	MM
12.1.4 Prepare maintenance records.	MOPM
12.1.5 Instruct supporting staff.	MOPM
12.1.6 Get access to component / assembly.	MM
12.1.7 Locate component / assembly.	MM
12.2 Apply safety precautions / maintenance practices	
12.2.1 Identify whether any step in a maintenance task procedure requires either: • Generic SPM application; • Specialty-rated standard maintenance practice application – as per MM chapters 20, 60 or 70; or • Maintenance practice application – as per Page Block 200 in each ATA chapter of the MM.	MM
12.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	
12.2.3 Tag all flight deck and external control devices which are	MM

involved in the safety precautions.	
12.3 Perform repair	
12.3.1 Identify areas / component that can be adversely effected during the performance of the repair process.	MOPM
12.3.2 Protect areas / components which can be adversely effected during the performance of the repair process.	MOPM
12.3.3 Perform repair scheme step by step and verify during the process that no limit / tolerance is exceeded.	MM
12.3.4 Clean the repair area.	MOPM
12.3.5 Verify at the end of the repair process that the physical integrity of the repaired parts is in an airworthy condition and that the parts fulfil their designed specific tasks.	MM
12.4 Apply safety precautions in repair area	
12.4.1 Perform visual inspection.	MOPM
12.4.2 Remove all tools and equipment, check work area for left-over objects.	MOPM
12.4.3 Unlock mechanical control devices.	MM
12.4.4 Un-tag all flight deck and external control devices which were involved in the safety precautions.	MM
12.5 Complete repair	
12.5.1 Restore aircraft to Normal status − Close repair area and restore normal power supply to system / sub-system / assembly / component (electric, hydraulic, pneumatic) - set control devices into their Normal Position.	MM
12.5.2 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
13. Perform MEL and CDL/DDPG Procedures (Minimum Equipment List (MEL) / Configuration Deviation List (CDL) / Dispatch Deviation Procedures Guide (DDPG)	
13.0 Recognize and manage potential threats and errors	MOPM
13.1 Prepare for procedure performance	
13.1.1 Read related fault report.	MOPM
13.1.2 Verify fault and add information to fault report if it is incomplete.	MOPM
13.1.3 Identify system/ sub-system / assembly / component which cause(s) the fault as per fault isolation process.	MM
13.1.4 Consult with the flight crew for details about experienced fault (if possible) and details about the planned flight mission.	MOPM
13.1.5 Consult MEL to determine whether the flight mission can be	MMEL

performed with existing fault.	MEL
13.1.6 Consult CDL/DDPG to determine whether the flight mission can be performed with missing assembly / component.	DDPG
13.1.7 Remove faulty assembly / component when necessary.	MM
13.1.8 Ensure that application of MEL / CDL/DDPG repair deferral in addition to other existing deferred fault rectifications is not affecting the aircraft's airworthiness.	Tech Log
13.1.9 Consult with flight crew to confirm they will accept application of MEL / CDL/DDPG – to defer fault rectification – for the planned flight mission.	MOPM
13.1.10 Check whether MEL / DDPG operational or maintenance procedure has to be performed.	MEL DDPG
13.1.11 Ensure that the flight crew is aware of and understand the need to perform the MEL / CDL/DDPG operational procedure.	MOPM
13.1.12 Read related maintenance instruction.	MM
13.1.13 Prepare required tools.	MM
13.1.14 Prepare required equipment.	MM
13.1.15 Prepare maintenance records.	MOPM
13.1.16 Instruct supporting staff.	MOPM
13.1.17 Get access to component / assembly.	MM
13.1.18 Locate component / assembly.	MM
13.2 Perform MEL or CDL/DDPG maintenance procedure	
13.2.1 Perform MEL maintenance procedure.	MM
13.2.2 Perform CDL/DDPG maintenance procedure.	MM
13.3 Apply safety precautions in work area	
13.3.1 Perform visual inspection.	MOPM
13.3.2 Remove all tools and equipment, check work area for left-over objects.	MOPM
13.3.3 Remove/unlock mechanical control devices which have not been installed as part of any MEL / CDL/DDPG - lock-out procedure.	MM
13.3.4 Un-tag all flight deck and external control devices which were involved in the safety precautions and which have not been installed as part of any MEL / CDL/DDPG - lock-out procedure.	MM
13.4 Complete MEL / CDL/DDPG procedure	
13.4.1 Restore aircraft to acceptable status in accordance with MEL / CDL/DDPG conditions and limitations . Close work area and set control devices into MEL / CDL/DDPG required position. (set those which are not related to the MEL / CDL/DDPG procedure into their normal position).	MM
13.4.2 Establish and sign maintenance records.	MOPM Tech Log

3. Competency Units, Competency Elements and Performance Criteria for Aircraft Structure Maintenance Personnel

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
1 Perform aircraft structural repair inspection	
1.0 Recognise and manage potential threats and errors	MOPM
1.1 Prepare for inspection	
1.1.1 Read related aircraft structural repair inspection instruction.	SRM
1.1.2 Prepare required tools.	MM/SRM
1.1.3 Prepare required equipment.	MM/SRM
1.1.4 Prepare maintenance records.	MOPM
1.1.5 Instruct supporting staff.	MOPM
1.1.6 Gain access to inspection area.	MM/SRM
1.1.7 Locate inspection items.	MOPM
1.2 Apply safety precautions / Deactivation	
1.2.1 Identify whether any step in a maintenance task procedure requires either: • Generic Standard Practices Manual application; • Specialty-rated Standard Maintenance Practice application – as per MM chapters 20, 60 or 70; • Maintenance Practice application – as per Page Block 200 in each ATA chapter of the MM.	MM/SRM
1.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	MM/SRM
1.2.3 Tag all flight deck and external control devices which are involved in the safety precautions.	MM/SRM
1.3 Perform aircraft structural repair inspection	MM/SRM
1.3.1 Clean area to be inspected. E.g. doors, skin plates, fairings, floor structure, stringers, stiffeners, flaps, etc.	MM/SRM
1.3.2 Remove paint and other finishing materials as required.	MM/SRM
1.3.3 Identify inspection criteria for the structural component or area, and apply aerodynamic smoothness measurement criteria to all surfaces being inspected.	SRM
1.3.4 Refer to the appropriate ATA chapter for specific instructions related to the area to be inspected. E.g. doors, fuselage, nacelles/pylons, stabilizers, windows, wings, etc.	SRM
1.3.5 Prepare record sheet for inspection results (including limits and tolerances).	MM/SRM
1.3.6 Identify items which need to be removed from aircraft for inspection.	MM/SRM
1.3.7 Remove items from aircraft which require bench inspection.	MM/SRM

1.3.8 Perform general visual inspection – examine for signs of physical damage, heat, corrosion, leaks, correct installation, missing items – use judgement for deviation from normal condition.	MOPM
1.3.9 Perform detailed visual inspection – use inspection tools for examination of wear, play, leaks, corrosion and compare measurements with given limits and tolerances (permitted wear dimensions).	MM
1.3.10 Where applicable, perform non destructive testing (NDT) inspection.	SRM
1.3.11 Apply maintenance instruction appropriate to the inspection type and consult inspection instructions at Page Blocks 101/102 as necessary.	SRM
1.3.12 Record inspection results; including observations, deviations, and defects.	MOPM
1.4 Apply safety precautions in structural repair and flight deck areas	
1.4.1 Remove all tools and equipment and check work area for left-over objects.	MOPM
1.4.2 If applicable, un-lock mechanical control devices.	MM
1.4.3 If applicable, un-tag all flight deck and external control devices which were involved in the safety precautions.	MM
1.5 Complete aircraft structural repair Inspection	
1.5.1 Re-install items that have been removed from the aircraft for inspection.	MM
1.5.2 Restore aircraft to Normal status and close inspection area.	MM
1.5.3 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
2 Perform structural damage investigation, cleanup, and aerodynamic smoothness check	
2.0 Recognise and manage potential threats and errors	MOPM
2.1 Prepare to perform damage investigation, cleanup, and aerodynamic smoothness check	
2.1.1 Read related maintenance instruction.	MM/SRM
2.1.2 Prepare required tools.	MM/SRM
2.1.3 Prepare required equipment.	MM/SRM
2 1.4 Prepare maintenance records.	MOPM
2.1.5 Instruct supporting staff.	MOPM
2.1.6 Gain access to structural area to be investigated.	MM
2.1.7 Locate structural area or component.	MM/SRM
2.1.8 Where necessary, remove structural part from aircraft before performing damage investigation.	MM/SRM
2.2 Apply safety precautions / maintenance practices	
2.2.1 Identify whether any step in a maintenance task procedure requires either:	MM/SRM

• Generic Standard Practices Manual application; • Specialty-rated Standard Maintenance Practice application – as per MM chapters 20, 51, 60 or 70; • Maintenance Practice application – as per Page Block 200 in each ATA chapter of the MM.	
2.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	MM/SRM
2.2.3 Tag all flight deck and external control devices which are involved in the safety precautions.	MM/SRM
2.3 Determine structural damage classification	SRM
2.3.1 Using the ATA chapter index, locate the chapter, section, and table of contents that refers to the damaged part.	SRM
2.3.2 Refer to the topic addressing allowable damage limits/Page Block 101, and determine applicability for part/structure in question.	SRM
2.3.3 Examine the part/structural component for damage tolerance/limits and record findings/observations.	MOPM/SRM
2.4 Determine damage repair applicability	SRM
2.4.1 Refer to the *identification page* for the damaged structural part affected, and determine the *action* or *repair* for the damaged area under review.	SRM
2.4.2 Determine if part has a reference to a repair within the manual, either in the chapter concerned or in another chapter and record damage classification.	SRM
2.4.3 Use the applied classification to determine repair procedure.	SRM
2.4.4 Document and record structural damage details: include length, width, diameter, orientation and any additional dimensions defining the damage or repair geometry (if applicable – depth of dent, etc.).	SRM
2.4.5 Use defect recording form to register damage findings and observations.	MOPM
2.5 Perform structural surface cleanup	
2.5.1 Refer to the specific section of the ATA chapter that applies to the area to be cleaned.	SRM
2.5.2 Access area to be cleaned and set up for cleaning activity with necessary tools and equipment.	SRM
2.5.3 Isolate and prepare area to be cleaned and protect adjacent structural parts and components from cleaning solvents, chemicals, or other specified cleaning materials/solutions.	SRM
2.5.4 Perform cleanup process as detailed in the referenced ATA chapter for the type of material being cleaned.	SRM
2.5.5 Follow step by step procedures for cleaning application and respect applicable warning and caution related to application.	SRM
2.5.6 Apply cleaning materials to structural area being cleaned and remove any excess from surface being cleaned.	SRM
2.5.7 Remove cleaning material once application time period has been reached.	SRM

2.5.8 Neutralize solvent, chemicals, or other cleaning materials with appropriate neutralizing materials as specified in the ATA chapter for the structural component.	SRM
2.6 Perform aerodynamic smoothness check	
2.6.1 Ensure that surface area has been properly cleaned and is free of contaminants.	SRM
2.6.2 Refer to applicable section of the ATA chapter to determine applicable limitations for the structural area being checked.	SRM
2.6.3 Prepare for surface measurement by selecting the appropriate tools and equipment to measure the structural surface area.	SRM
2.6.4 Perform measurement over entire structural area to check for degree of smoothness against allowable limitations listed in the reference tables located in the applicable ATA chapter.	SRM
2.6.5 Check for loose rivets, fasteners, or other attachment hardware.	SRM
2.6.6 Record any data that is found to be beyond limits such as; dents, depressions, heat deformation, pitting, cracks, delamination, or other structural anomalies that fall outside of the smoothness limits.	SRM
2.6.7 Close-up area and remove any tools or equipment used in the aerodynamic smoothness check.	SRM
2.7 Apply safety precautions in activity area	
2.7.1 Re-install items that have been removed from the aircraft to accommodate performance of damage investigation.	MM
2.7.2 Perform visual inspection.	SRM
2.7.3 Remove all tools and equipment; check that work area is clean and free of objects.	SRM
2.8 Complete structural damage investigation, cleanup, and aerodynamic smoothness check	
2.8.1 Restore aircraft to Normal status and close out the area if no further activities are required.	SRM
2.8.2 Complete and sign maintenance records where necessary.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
3. Perform special process application	
3.0 Recognize and manage potential threats and errors	MOPM
3.1 Apply safety precautions / maintenance practices	
3.1.1 Identify whether any step in a maintenance task procedure requires either: • Generic Standard Practices Manual application; • Specialty-rated Standard Maintenance Practice application – as per MM chapters 20, 51, 60 or 70;	MM/SRM

• Maintenance Practice application – as per Page Block 200 in each ATA chapter of the MM; • Special Maintenance Practice application – as per Special Maintenance Procedure Manual (e.g. NDT, welding etc.).	
3.1.2 Identify and apply safety precautions required for the maintenance/inspection task.	MM/SRM
3.1.3 Where necessary, tag all flight deck and external control devices which are involved in the safety precautions.	MM/SRM
3.1.4 Perform Special Maintenance Procedure as per Special Maintenance Practice Manual.	SMPM
3.2 Identify type and form of special process to be applied	SRM
3.2.1 Refer to applicable section of ATA chapter, Structures – General and identify process to be applied.	SRM
3.2.2 Review pertinent data, procedures, tables, and application process associated with the selected process (e.g. protective treatment; corrosion prevention; special coatings; paint coatings; sealing; or other selected special process).	SRM
3.3 Apply special process	SRM
3.3.1 Where necessary, remove structural part from aircraft before proceeding with process application.	SRM
3.3.2 Refer to Page Block 201 in ATA chapter to address specific structural element to be processed, review applicability status, and special tools/equipment requirements.	SRM
3.3.3 Confirm process applicability and effectivity for aircraft or structure to be processed.	SRM
3.3.4 Observe all cautions and warnings related to the use of chemicals and cleaning materials, sealants, and adhesives.	SRM
3.3.5 Become familiar with specific data references, and application limitations for the selected process/activity.	SRM
3.3.6 Apply the special process to the affected area as detailed in the application instructions for: protective treatment; corrosion prevention; special coatings; paint coatings; sealing; or other selected special process.	SRM
3.4 Complete application of special process	
3.4.1 Re-install items that have been removed from the aircraft to accommodate application of special process.	MM
3.4.2 Remove all tools and special equipment used to support the special process activity.	SRM
3.4.3 Clean and close out area; remove all tools and equipment from reworked area.	SRM
3.4.4 Complete and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
4. Perform metal rework/testing	
4.0 Recognize and manage threats and errors	MOPM
4.1 Apply safety precautions / maintenance practices	
4.1.1 Identify whether any step in a maintenance task procedure requires either: • Generic Standard Practices Manual application; • Specialty-rated Standard Maintenance Practice application – as per MM chapters 20, 51, 60 or 70; • Maintenance Practice application – as per Page Block 200 in each ATA chapter of the MM; • Special Maintenance Practice application – as per Special Maintenance Procedure Manual (e.g. NDT, welding etc.).	MM/SRM
4.1.2 Identify whether any safety precautions required are for the maintenance/inspection task and apply them.	MM/SRM
4.1.3 Where necessary, tag all flight deck and external control devices which are involved in the safety precautions.	MM/SRM
4.1.4 Perform Special Maintenance Procedure as per Special Maintenance Practice Manual.	SMPM
4.2 Prepare for metal rework and testing	SRM
4.2.1 Identify metal rework or testing to be performed.	SRM
4.2.2 Refer to applicable section of ATA chapter, Structures – General – and identify re-work activity to be applied.	SRM
4.2.3 Review pertinent data, procedures, tables, and application process associated with the selected metal re-work process (e.g. heat treatment, forming, bending, cutting, heat damage evaluation, hardness and conductivity testing, prestressing of components, or flap peening).	SRM
4.2.4 Clean and prepare area for rework or testing activity.	
4.2.5 If structural component needs to be removed from the aircraft to facilitate rework or testing activity - refer to applicable ATA chapter maintenance procedures before removing structural part.	MM/SRM
4.3 Perform metal rework or testing	
4.3.1 Refer to Page Block 201 in ATA chapter to address specific structural element to be processed, and review aircraft applicability status.	SRM
4.3.2 Confirm process applicability and effectivity for aircraft or structure to be processed.	SRM
4.3.3 Become familiar with step by step procedure for process application and observe all safety precautions, data references, and application limitations.	SRM
4.3.4 Select tools and special equipment required to perform rework or testing activity.	SRM

4.3.5 Perform NDT inspection before starting any repair to confirm absence of cracks or deformities.	SRM
4.3.6 Perform NDT inspection before and after applying forming techniques to sheet metal repairs.	SRM
4.3.7 Perform metal rework or testing activity as detailed in the applicable section of the ATA chapter associated with the metal rework activity (e.g. heat treatment, forming, bending, joggling, cutting, heat damage evaluation, hardness and conductivity testing, prestressing of components, and flap peening).	SRM
4.4 Apply safety precautions in activity area	
4.4.1 Remove all tools and equipment; clean area.	SRM
4.4.2 Perform visual inspection for remaining objects.	SRM
4.5 Complete metal rework and testing activities	
4.5.1 Re-install items that have been removed from the aircraft to accommodate metal rework or testing activities.	MM
4.5.2 Complete maintenance records and documentation.	MOPM/SRM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
5. Perform structural repair	
5.0 Recognise and manage potential threats and errors	MOPM
5.1 Prepare for structural repair	
5.1.1 Read related maintenance instruction including relevant ATA chapter Page Blocks 101/201.	SRM
5.1.2 Prepare required tools.	SRM
5.1.3 Prepare required equipment.	SRM
5.1.4 Prepare maintenance records.	MOPM
5.1.5 Instruct supporting staff.	MOPM
5.1.6 Gain access and locate structural component to be repaired.	SRM
5.1.7 Take and record any required measurements.	SRM
5.2 Apply safety precautions / maintenance practices	MM/SRM
5.2.1 Identify whether any step in a maintenance task procedure requires either: • Generic Standard Practices Manual application; • Specialty-rated Standard Maintenance Practice application – as per MM chapters 20, 60 or 70; • Maintenance Practice application – as per Page Block 200 in each ATA chapter of the MM.	MM/SRM
5.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	MM/SRM
5.2.3 Tag all flight deck and external control devices which are involved in	MM/SRM

the safety precautions.	
5.3 Determine structural repair effectivity	
5.3.1 Consult applicable section of the ATA chapter and Page Blocks 101 and 201 to determine repair eligibility status.	SRM
5.3.2 Apply damage category data. E.g. *allowable, repairable or replaceable.*	SRM
5.3.3 Determine effectivity status applicable to the structural area to be repaired by referring to the aircraft make, model, series and serial number and to the status of aircraft modifications, service bulletins, etc.	SRM
5.3.4 Identify allowable repair scheme options and select appropriate repair for the type of structure, such as sheet metal, honeycomb, composites, etc.	SRM
5.3.5 Become familiar with all special processes or procedures applicable to the type of material being repaired, such as metal, composite, etc.	SRM
5.3.6 Identify and select replacement parts and materials to be used in the repair process.	SRM
5.3.7 Identify areas / component that can be adversely affected during the performance of the repair process.	SRM
5.3.8 Protect areas / components which can be adversely affected during the performance of the repair process.	SRM
5.4 Perform structural repair	
5.4.1 If a structural component is to be removed, refer to appropriate section of ATA chapter for removal and installation procedures.	SRM
5.4.2 Access and apply repair scheme specification data per Page Block 201 and other applicable chapter references (data, tables, etc.).	SRM
5.4.3 Perform the selected repair scheme – step by step, and verify during the repair process that no limit / tolerance is exceeded.	SRM
5.4.4 Where repairs are performed on honeycomb panels, graphite aramid, fibreglass, polyimide glass fabric and other composite materials - be mindful of safety procedures while handling toxic or hazardous materials.	SRM
5.4.5 Verify at the end of the repair process that the physical integrity of the repaired area meets structural integrity specifications.	SRM
5.4.6 Perform balancing of structural component if applicable (e.g. aileron, elevator, rudder, etc).	SRM
5.5 Apply finishing to structural repair	
5.5.1 Clean the repaired area.	SRM
5.5.2 Refer to repair specification and apply finishing, sealing, or paint protection as detailed in the repair specification for metal or composite surface to be finished.	SRM
5.5.3 Maintain aerodynamic smoothness/limitations called for in the repair specification; e.g. application of fasteners, rivets, etc.	SRM
5.5.4 Reference applicable ATA chapters (52-57) when applying finishes to composite materials, such as glassfiber reinforced plastic, carbonfiber reinforced plastic, or aramidfiber reinforced plastic.	SRM
5.6 Apply safety precautions in repair area	
5.6.1 Re-install items that have been removed from the aircraft to accommodate performance of structural repair activities.	MM

5.6.2 Perform visual inspection.	MOPM
5.6.3 Remove all tools and equipment, check work area for left-over objects.	MOPM
5.6.4 Un-lock mechanical control devices.	MM
5.6.5 Un-tag all flight deck and external control devices which were involved in the safety precautions.	MM
5.7 Complete structural repair	
5.7.1 Clean and close out area.	SRM
5.7.2 Complete and sign maintenance records.	MOPM

4. Competency Units, Competency Elements and Performance Criteria for Aircraft Component Maintenance Personnel

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
1 Perform testing fault isolation	
1.0 Recognize and manage potential threats and errors	
1.1 Prepare for testing and fault isolation – collect fault data	
1.1.1 Collect fault data from aircraft technical log book – (printed or electronic) pilot or maintenance reports – if available.	MOPM
1.1.2 Collect data from aircraft recorders / in-flight transmitted records (maintenance messages) – if available.	MOPM
1.1.3 Collect fault data from maintenance defect sheet – if available.	MOPM
1.1.4 Collect fault data from repair order.	MOPM
1.2 Verify fault data	
1.2.1 Perform inspection to verify physical status of the component.	MOPM
1.2.2 Identify available component-specific tests and test procedures.	CMM
1.2.3 Select component-specific tests and test procedures appropriate to the available fault data – if necessary identify progressive levels of testing (manual tests and automatic tests).	CMM
1.2.4 Consult maintenance instructions for the relevant test procedures, including diagrams and schematics.	CMM
1.2.5 .Identify test equipment and material required to perform planned tests.	CMM
1.2.6 Prepare test set-up data, test input and output parameters, and parameter limits; prepare test record.	CMM
1.2.7 Progressively perform the return-to-service test to verify or identify / isolate the fault(s) of the complete component and its individual subassemblies, and to identify the required maintenance actions to restore the component into a serviceable condition.	CMM
1.2.7a If build-in-test equipment (BITE) is provided for a component,	CMM

perform this test first. Determine whether the component needs further test (detailed performance test) or repair. Erase BITE memory after test, if applicable.	
1.2.8 Record all test results and fault findings.	MOPM
1.3 Define fault rectification procedure	
1.3.1 Make decision whether operation can be continued without fault rectification. 1.3.1.a If yes – Return component back to service. • Issue component tag with certificate of return to service (CRS) – Serviceable tag. 1.3.1.b If not - Prepare fault rectification order.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
2. Perform disassembly	
2.0 Recognize and manage potential threats and errors	
2.1 Identify the extent of necessary disassembly	
2.1.1 Identify the extent of disassembly necessary to get access to any faulty sub-assembly.	CMM
2.2 Prepare for disassembly	
2.2.1 Consult disassembly instructions.	CMM
2.2.2 Prepare tools, fixtures, equipment, and consumable items as required per disassembly instruction.	CMM
2.2.3 Review special tool procedures if applicable.	CMM
2.3 Apply safety precautions / maintenance practices	
2.3.1 Identify the proper application to follow for all steps in the maintenance task procedure: • Generic Standard Shop Practices Manual application; • Special procedures application – as per CMM.	MOPM
2.3.2 Identify whether any safety precautions are required for the maintenance task and apply them.	MOPM
2.4 Perform disassembly	
2.4.1 Perform disassembly as per CMM procedure – step-by-step instructions in a logical sequence to the extent required, with minimum disturbance of other serviceable parts in the component.	CMM
2.4.2 Keep parts in matched sets where required.	CMM
2.4.3 Document the maintenance records for references during re-assembly – items like shims and spacer location or wiring routing.	MOPM

2.5 Complete disassembly	
2.5.1 Complete and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
3 Clean	
3.0 Recognize and manage potential threats and errors	
3.1 Prepare for cleaning	
3.1.1 Consult the cleaning instructions or standard cleaning practices for the parts involved in the process.	CMM
3.1.2 Prepare any tools, fixtures, equipment, and consumable items as required per the cleaning instructions.	CMM
3.1.3 Review special tool procedures if applicable.	CMM
3.2 Apply safety precautions / maintenance practices	
3.2.1 Identify the proper application to follow for all steps in the maintenance task procedure: • Generic Standard Shop Practices Manual application; • Special procedures application – as per CMM.	MOPM
3.2.2 Identify whether any safety precautions are required for the maintenance task and ensure they are applied.	MOPM
3.3 Perform cleaning	
3.3.1 Identify materials located in cleaning area and of those parts to be cleaned.	CMM
3.3.2 Protect items which should not get into contact with cleaning agent.	MOPM
3.3.3 Identify and select required and allowed cleaning agents in relation to material of items to be cleaned.	CMM
3.3.4 Identify and select required and allowed cleaning method (manual cleaning, machine cleaning).	CMM
3.3.5 Verify whether paint has to be removed before cleaning – if required: remove paint.	CMM
3.3.6 Perform cleaning process – remove contamination.	CMM
3.3.7 Dry cleaning area immediately following cleaning process.	MOPM
3.4 Complete cleaning	
3.4.1 Establish and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
4. Perform inspection / check	
4.0 Recognize and manage potential threats and errors	MOPM
4.1 Prepare for inspection / check	
4.1.1 Consult inspection / check instructions or standard inspection / check practices for the parts involved in the process.	CMM
4.1.2 Prepare any tools, fixtures, equipment, and consumable items as required per inspection / check instructions.	CMM
4.1.3 Review special tool procedures if applicable.	CMM
4.2 Apply safety precautions / maintenance practices	
4.2.1 Identify the proper application to follow for all steps in the maintenance task procedure: • Generic Standard Shop Practices Manual application; • Special procedures application – as per CMM.	MOPM
4.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	CMM
4.3 Perform inspection / check	
4.3.1 Identify inspection criteria per inspection item as: • serviceability of parts and subassemblies; • reparability of parts (because of technical or economical reason); • specific inter-relationships between parts that perform a functional operation.	MOPM
4.3.2 Prepare record sheet for inspection results (including limits and tolerances for fits and clearances, nature and maximal allowable extent of defects).	CMM
4.3.3 Identify items which need special inspection procedures like non-destructive-testing (NDT).	CMM
4.3.4 Perform general visual inspection – examine for signs of physical damage, corrosion, leaks, correct installation, missing items – use judgement for deviation from normal condition.	CMM
4.3.5 Perform detailed visual inspection – use inspection tools for examination of wear, play, leaks, corrosion and compare measurements with given limits and tolerances (permitted wear dimensions).	CMM
4.3.6 Record inspection results / deviations / defects.	MOPM
4.4 Complete Inspection	
4.4.1 Record and scrap all parts which are not serviceable or repairable.	MOPM
4.4.3 Complete and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
5. Repair	
5.0 Recognize and manage potential threats and errors	MOPM
5.1 Prepare for repair	
5.1.1 Consult repair instructions or repair practices for the parts involved in the process.	CMM
5.1.2 Prepare any tools, fixtures, equipment, material and consumable items as required per repair instructions.	CMM
5.1.3 Review special tool procedures if applicable.	CMM
5.2 Apply safety precautions / maintenance practices	
5.2.1 Identify the proper application to follow for all steps in the maintenance task procedure: • Generic Standard Shop Practices Manual application; • Special procedures application – as per CMM.	MOPM
5.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	CMM
5.3 Perform repair	
5.3.1 Identify areas of possible restoration.	CMM
5.3.2 Identify specifications and repair instructions like: • surface finish; • concentricity; • squareness; • parallelism; • heat treatment range; • chamfers; • edge break radius tolerances; • shot peening; • plating.	CMM
5.3.3 Identify areas / parts that can be adversely affected during the performance of the repair process.	MOPM
5.3.4 Protect areas / parts which can be adversely affected during the performance of the repair process.	MOPM
5.3.5 Perform repair scheme step by step – verify during the process that no limit / tolerance is exceeded.	CMM
5.3.6 Clean the repair area.	MOPM
5.3.7 Verify at the end of the repair process that the physical integrity of the repaired parts is such that the parts are in an airworthy condition (in permitted dimensions) and that the parts fulfil their designed specific tasks.	CMM

5.4 Complete repair	
5.4.1 Complete and sign maintenance records.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
6. Perform assembly	
6.0 Recognize and manage potential threats and errors	MOPM
6.1 Prepare for assembly	
6.1.1 Consult assembly instructions or standard assembly practices for the parts involved in the process.	CMM
6.1.2 Prepare any tools, fixtures, equipment, material and consumable items as required per assembly instructions.	CMM
6.1.3 Review special tool procedures if applicable.	CMM
6.2 Apply safety precautions / maintenance practices	
6.2.1 Identify the proper application to follow for all steps in the maintenance task procedure: • Generic Standard Shop Practices Manual application; • Special procedures application – as per CMM.	MOPM
6.2.2 Identify whether any safety precautions are required for the maintenance task and apply them.	CMM
6.3 Perform assembly	
6.3.1 Perform assembly in accordance with step-by-step assembly instructions in a logical sequence. • Comply with any notes which have been recorded during disassembly for proper installation of parts. • Comply with assembly fits and clearances as found in the page block "Fits and Clearances". • Perform required adjustments. • Use proper torque values for all fasteners. • Comply with special requirements like parts in matched sets or wiring requirements (routing and connections). • Perform procedures for sealing, cementing, lubricating, etc. • Perform as required intermediate calibrations during the assembly process if they cannot be performed after final assembly and record calibration data. • Perform as required intermediate tests during the assembly process if they cannot be performed after final assembly and record test data.	CMM
6.3.2 Perform servicing of component through: • Identifying required media to be serviced (e.g. fluid or gas specifications); • Identifying required fill status of component / assembly;	CMM

• Connecting fill equipment to fill openings / ports and refilling with required fill quantity.	
6.3.3 Perform final calibration after completion of final assembly.	CMM
6.3.4 Record final calibration data.	
6.3.5 Perform final test after completion of final assembly.	CMM
6.3.6 Record final test data.	
6.4 Complete assembly	
6.4.1 Complete and sign maintenance records.	MOPM
6.4.2 Issue component tag with certificate of return to service (CRS) – Serviceable tag.	MOPM

X. Competency Unit **X.X Competency Element** **X.X.X Performance Criteria**	Reference
7. Perform storage (transportation)	
7.0 Recognize and manage potential threats and errors	MOPM
7.1 Prepare for storage	
7.1.1 Consult storage instructions or standard storage practices for the parts involved in the process.	CMM
7.1.2 Prepare any tools, fixtures, equipment, material and consumable items as required per storage instructions.	CMM
7.1.3 Get familiarised with special tool procedures if applicable.	CMM
7.2 Apply safety precautions / maintenance practices	
7.2.1 Identify the proper application to follow for all steps in the maintenance task procedure: • Generic Standard Storage Practices Manual application; • Special procedures application – as per CMM.	MOPM
7.2.2 Identify whether any safety precautions are required for the storage procedure and apply them.	CMM

Attachment A to Chapter 4. Competency-based Training for Aircraft Maintenance — Guidance on the Design and Development of a Competency-based Training Programme for Maintenance Personnel

1. Introduction

This Attachment to Chapter 4 describes how the principles and procedures of the ICAO course development methodology can be applied in the development of aircraft maintenance personnel training programme.

2. Design and development of an Aircraft Maintenance training programmes through ICAO course development methodology

2.1 The ICAO Course Development Methodology

The generic ICAO course development process is described in the Attachment to Chapter 2 of this document. For each phase of development, guidelines are provided for the development of aircraft maintenance training programmes.

2.2 Preliminary Analysis

2.2.1 In October 2007, the IATA Training and Qualifications Initiative was launched. During that meeting, the issue of a human resource shortage for aircraft maintenance mechanics/engineers/technicians was raised. It was envisaged that this issue would be especially critical in emerging economies. It was therefore necessary to respond to a high training demand without sacrificing quality or impacting safety.

2.2.2 The preliminary study was pursued during the ITQI Engineering and Maintenance Kick-off meeting conducted in January 2008. It was concluded during this meeting that ICAO licensing and training standards as well as associated national regulations had not kept up with developments in training methodologies and new aircraft technologies. A need to harmonize regulatory frameworks was also identified. It was agreed that the use of a competency based approach would support harmonization and that it should be accommodated in Annex 1.

2.3 Functional/task analysis

2.3.1. The aim of aircraft maintenance competency based training is to ensure that personnel perform maintenance tasks to defined standards. In order to derive the competencies to be achieved, a functional/task analysis was carried out for several generic maintenance functions.

2.3.2 Regardless of aircraft type, today's aircraft design requires a set of generic competencies. Standard Practices Manuals (SPM), issued by the manufacturers and suppliers of aeronautical equipment, describe the methods to be applied, tools and equipment to be used, and the standards to which these tasks have to be performed. These basic generic competencies have been organized in three categories: aircraft (and engine) systems maintenance, aircraft structure maintenance, and component maintenance.

2.3.3 In addition to these Standard Practices, there are core competencies that apply throughout maintenance work and that shall be trained and evaluated. These core competencies are related to:

- Maintenance resource management and threat and error management in maintenance;
- Work health and safety;
- Adherence to industrial standards and regulatory and company procedures.

2.3.4 The performance of specialty-rated maintenance tasks require the application of generic competencies acquired during fundamental training on specific aircraft and equipment. Assuming that generic competencies have been achieved, aircraft maintenance licence holders, after training on the specificities of the aircraft type and given appropriate maintenance instructions, shall be able to perform tasks within the scope of their licence/authorization privileges to given standards. This assumption is valid only if generic competencies have been properly examined and assessed.

2.3.5 If new Maintenance Practices or Special Maintenance Practices need to be applied, then additional competencies have to be acquired. These practices, which are specific to a type of equipment, are found in the appropriate Maintenance Instructions.

2.3.6 Beyond formal practical training, trainees will be required to undergo on the job training (OJT) under the supervision of qualified personnel in a maintenance environment for a certain time period. Only after successfully completing OJT can an authorization be issued to a candidate to perform specified maintenance work autonomously.

2.4 Population analysis

2.4.1 The target population for basic aircraft maintenance training is varied. Students bring a wide range of skills and abilities to aircraft maintenance. In order to ensure that fundamental maintenance training is effective, it is essential to determine whether potential trainees meet entry requirements and are well suited for the job. In this regard, Maintenance Organizations, in collaboration with AMTOs, may wish to establish entry requirements and selection criteria.

2.4.2 A competency-based approach to training for specialty-rating will also be useful, as it will allow maintenance organizations to compare the competencies that their personnel already hold against those that they should have to perform on specific aircraft or equipment. Personnel can then undergo training targeted to fill the competency gap identified by AMOs. This method can then increase efficiency in terms of training time and effort.

2.5 Curriculum design

2.5.1 Competency-based training and assessment of aircraft maintenance personnel is conducted in two steps: fundamental training and assessment (and licensing) conducted once; and training for specialty-rating and related assessments conducted multiple times as required. Recurrent training and assessment is also conducted to ensure that competencies of licence or authorisation holders remain valid.

2.5.2 Competency based training requires the integration of knowledge and practical skill training. Typically, knowledge and practical training have been designed and delivered independently. For example, knowledge training is delivered by a different set of instructors, in different training locations, and sometimes organizations, than practical skills training. Operational restrictions and resource constraints limit the extent to which knowledge and practical training can be conducted at the same

location, at the same time, by the same instructional personnel. Therefore the design of a training programme for aircraft maintenance personnel should take these restrictions into account and specify how knowledge and practical training can be integrated in an effective and efficient manner.

2.5.3 In any case, competency-based examinations and assessments shall verify that candidates combine the knowledge and practical skills necessary to perform maintenance tasks for which the training was designed. A candidate's successful completion of these examinations and assessments depends on a well thought-out integrated training programme.

2.5.4 The competency frameworks found in Appendix 2 to Chapter 4provide the basis from which training objectives should be derived for fundamental training and for training for specialty-rating. Curriculum design starts with the formulation of training objectives which correspond to the competency elements and performance criteria identified in the framework. (see Chapter 2, paragraph 5.2 and paragraph 2.6 below).

2.5.5 Whether for fundamental training or training for specialty-rating, the terminal and enabling objectives should define what the student needs to demonstrate in terms of skills, knowledge and attitude (SKAs) for aircraft (and engine) systems maintenance, aircraft structure maintenance, and component maintenance. The terminal objectives shall reflect what must be accomplished at the end of the training programme for the issuance of a licence and or authorisation. The difference between training objectives of fundamental training and of training for specialty-rating will lie in the conditions and standards under which trainees are to perform.

2.5.6 There will be a need to administer key progress tests to ensure that students acquire the necessary SKAs. Students who fail a progress test should receive remedial training until such time as they have mastered that particular module.

2.6 Developing training objectives for aircraft maintenance training

2.6.1 As described in Chapter 2, a training objective states the (observable) ***desired action*** or ***behaviours***, the (measurable) ***standard*** and the ***conditions*** relevant to what must be accomplished by the student during each phase of training prior to reaching the desired level of competency.

2.6.2 The ***action statement*** or the ***statement of behaviours***, the most important part of the training objective, should always be expressed with a verb that specifies definite, observable actions. The competency elements and performance criteria found in Appendix 2 to Chapter 4 provide useful sources of suitable action verbs. Action verbs have also been developed in other learning/training objective taxonomies (Bloom, B.S (1956); Harrow, A. (1972) and Simpson, E. (1972). Since these classifications were developed for general education purposes, however, they should only be used when a more domain-specific verb is not available.

2.6.3 Action verbs can be classified according to the different tasks or skills, knowledge and attitudes they represent, which facilitates the development of an effective and efficient learning path. AMTOs should choose or develop the classification that best suits their own circumstances.

2.6.4 Where an action verb has to be used to define a skill to infer a non-observable process, as is often the case when assessing maintenance resource management (MRM), an overt or observable synonym should be used as evidence that the process has been carried out.

2.6.5 A training objective should clearly identify the ***conditions*** under which an action must be performed. Conditions consist of the training equipment on which training or assessment is being conducted (e.g. synthetic training devices), the environmental factors, aircraft and component configuration, situational factors and regulatory framework. Simulator training affords an opportunity for instructors and examiners to select and manipulate the conditions under which the training and assessment of competencies take place. Conditions relevant to particular training objectives may be selected for the training or assessment of specific skills, knowledge and attitudes.

2.6.6 Training objectives will determine the design of the exercises and other units of training around which an aircraft maintenance training curriculum is constructed. They should be designed to facilitate the training and testing of MRM behaviours as integral features of each set of task related to competency units. Training with the aid of synthetic training devices or within the work environment will present different opportunities to structure learning activities so that they support the behaviours and conditions outlined by training objectives.

2.6.7 The training objective ***standard*** contains the criteria against which a student's performance is evaluated. In the case of the terminal objectives, these reflect the performance criteria developed against each of the aircraft maintenance competency elements. Licensing Authorities should ensure that these performance criteria are used in the preparation of examination and assessment guides or practical test standards. The standard will reflect the level of performance expected at each of the competency levels of the fundamental training schedule or of the training for specialty-rating schedule.

2.6.8 Training objective standards may be stated in the form of tolerances, constraints, limits, performance rates or qualitative statements. Where these criteria are contained in approved documents such as regulations, maintenance manuals, job cards, checklists or other approved maintenance instructions, only a reference to such documents in the standard section of the objective is needed.

2.6.9 In many instances, the action statement or statements of desired performance contained in training objectives established at different levels of competency can be exactly the same. The difficulty of the action to be performed and/or the standard against which it is to be judged will be impacted by the conditions under which this action is to be performed. For example, performing "lockwiring" on mock-ups in a well organised training workshop is much easier than performing "lockwiring" at night, at freezing point, on the ramp, in the wheel well.

2.6.10 Once training objectives have been developed, they must be sequenced and grouped into the training modules that make up the different phases of the training schedule. A number of principles apply to the sequencing of training objectives. Generally speaking, a logical approach is to follow the order in which the related tasks are carried out in the maintenance environment. Other considerations, however, such as the differences or commonalities between objectives in terms of the tasks involved, their levels of difficulty and the complexity of the conditions under which the actions have to be carried out, also come into play.

2.6.11 The following are examples of sequencing principles that usually apply: objectives that are typical/standard/normal come before objectives that are atypical/non-standard/abnormal and, in the learning sequence, objectives that are simple, easy, and with low task loads come before those that are complex, difficult and with high task loads. These principles, in general, govern the design of instructional materials contained in the modules of a training programme.

2.6.12 After defining the training objectives, the course developer will design the tests that need to be passed by the student at different points in the program. With respect to a competency-based maintenance training programme, ***mastery tests*** are those tests that correspond to terminal objectives. Additional

progress tests may be developed for the purpose of providing feedback on the student's progress towards achieving both the terminal objectives and the key enabling objectives. The aim of designing the mastery tests at this stage in the development of the programme, and prior to determining the actual content of the training, is to ensure that the test, and subsequently the content of the training, strictly correspond to the training objectives and to what the student is actually expected to do on the job.

2.6.13 All tests developed for a competency-based maintenance training program, whether mastery or progress tests, should be *criterion-referenced* tests and assessments; the criteria used to measure competence should be published in examination and assessment guides and/or practical test standards. All tests must be reliable and valid, both in terms of being an appropriate measure of the competency being tested and of obtaining consistent results.

2.7 Design of training modules

2.7.1 Upon sequencing and grouping the training objectives and designing the mastery and progress tests, the course developer will design the training units that constitute a training curriculum for a competency-based maintenance training programme. As defined in the ICAO course development methodology, the basic building block in this process is the ***module***. Each phase of a competency-based maintenance training programme will consist of a number of building blocks of instruction or modules which, in turn, contain the instructional events used for training. In line with the ICAO course development methodology, the module is structured so that the training objectives are presented at the very beginning of the module, and instructional events in respect to the presentation of content, the provision of practice and feedback and the assessment of achievement follow in logical order.

2.7.2 For the purpose of achieving the enabling objectives at the early phases of training, instructional events should be designed as varied and simplified versions of real aircraft maintenance activities. During later phases of training, instructional events can then be designed to increasingly reflect the complexity of aircraft maintenance activities.

2.8 Selection of modes of delivery, training techniques and training media

2.8.1 The training objectives will determine the modes of delivery and training techniques that are to be used in the different phases of training. The consistent delivery of training for a competency-based maintenance training programme demands the use of a mixture of validated, approved training materials. All competency-based maintenance training programmes should be conducted by an approved maintenance training organization, and conditions for obtaining the authorization should include having the necessary documentation, manuals and equipment for conducting the course. The approval requirements also cover the employment and training of course developers and instructors, including those employed by AMOs for practical skill training.

2.8.2 In respect to training techniques, competency-based maintenance training programmes should require both individualized and group instruction depending on the training tasks being carried out. Classroom instruction can be delivered with the aid of group lectures and individualized learning can be delivered through computer-based training and e-learning.

2.8.3 In general, the selection of media, as described in the ICAO course development methodology (Attachment to Chapter 2 refers) depends on its instructional appropriateness, economy, simplicity and availability. As part of the process of the approval of a maintenance training organization and the training

programme, Licensing Authorities should assess whether all facilities and training media are acceptable and appropriate for a competency-based maintenance training programme.

2.9 Production, developmental testing, validation, implementation and evaluation

2.9.1 The guidance provided up to this point has addressed the processes outlined for Phases 1 through 5 of the ICAO course development methodology. However, the process involved for the remaining Phases 6 through 9 in the development of a competency-based maintenance training programme presents a few elements that also require attention.

2.9.2 As outlined in the Attachment to Chapter 2, the output of Phase 6 results in all training materials being produced in such a manner as to allow any competent and suitably trained maintenance personnel to deliver the course. Consequently, a comprehensive, well-documented and formatted training programme does not differ from any other standardized training package.

2.9.3 Developmental testing is another important feature of Phase 6. In particular, mastery tests should go through developmental testing to ensure that they are valid and reliable. In the case of a competency-based maintenance training programme, this would include developmental testing of scenario-based mastery tests to ensure that they actually match the corresponding training objective.

2.9.4 The purpose of validation (i.e. ICAO course development Phase 7) is to ensure that training materials can effectively guide trainees to the successful performance of mastery tests leading to the issuance of a licence/authorization.

2.9.5 Post-training evaluation is the last phase of the ICAO course development methodology. In the Attachment to Chapter 2, the four levels of evaluation are described.

Attachment B to Chapter 4. Deriving Training Objectives for Aircraft Maintenance Personnel

1. General

1.1 Training objectives are derived from the job and task analysis used to develop the competency frameworks for aircraft maintenance personnel contained in Appendix 2 to Chapter 4. The tasks to be performed during aircraft maintenance can be classified into generic tasks and specialty-rated tasks. The competency frameworks make an inventory of these generic tasks that can be performed on any kind of aeronautical equipment.

1.2 Some generic tasks, such as installation of nuts and bolts, hydraulic pipes, electrical connectors, etc., are described as ”standard practices“ in ”Standard Practices Manuals” (SPM). These manuals specify what the task is, how it should be carried out and to which standards. These tasks, related to “standard practices“, have a correspondence in the competency framework - e.g. “*4.5.1 Loosen and remove all attachment nuts and bolts*“ or “*4.7.2 Perform visual inspection*“.

1.3 Other generic tasks are related directly to “maintenance administrative procedures” - e.g. “5.1.4 Prepare maintenance records“. While these tasks can be initially addressed generically, they will need to be reviewed when applied in an actual maintenance organization’s environment operating under specific regulations.

1.4 A third group of generic tasks is listed in the competency framework, consisting of “specialty-rated tasks”. Specialty-rated tasks consist of generic tasks that can only be performed on specific pieces of equipment – e.g. “Perform Functional Test“. Examples of specialty-rated tasks, performed on type-specific equipment, are operation of a system or component, monitoring of the operation, fault isolation, removal and installation of components, operational and functional testing, adjustments, etc. Specialty-rated tasks require underlying knowledge about system and component manufacture, assembly and function as well as cognitive skills tasks such as removal and installation, adjustments, repair, cleaning and painting consist of a set of standard practices (generic tasks) applied to a specific piece of equipment and therefore require additional psychomotor and cognitive skills.

1.5 To build the competency of a person being trained in aircraft maintenance, a twofold training programme, is required consisting of “basic/fundamental training” and “training for specialty-rating”.

1.6 Basic/fundamental training programmes are aimed at ensuring that trainees acquire the underpinning psychomotor skills needed for the performance of standard practices. Additionally, underpinning knowledge about representative aircraft systems, sub-systems and components, their build-up and functional features has to be acquired as a prerequisite for specialty-rating. This is normally done in “Basic/Fundamental Training Programmes“. Training programmes for specialty-rating are aimed at ensuring that trainees can apply generic skills and knowledge in relation to specific equipment and the acquisition of the necessary knowledge and cognitive and psychomotor skills.

2. Basic/Fundamental Training Objectives

2.1 A two-step approach should be used to derive training objectives for basic/fundamental training programmes. First, basic/fundamental training programmes are designed for a particular maintenance position (normally represented by a certain aircraft maintenance licence category as described in Annex 1, paragraph 4.2.2). Based on the scope of the licence to be obtained, corresponding groups of generic tasks (standard practices) are selected out of the appropriate “Standard Practices Manual“. All these groups of tasks

have been documented in the competency frameworks of Appendix 2 to Chapter 4 as competency units. For example, the standard practice "*Electrical connective devices repair*" corresponds to the competency unit "*12. Repair*".

2.2 From the various individual tasks ("competency elements") belonging to a competency unit, terminal training objectives can be derived. A sample would be "*circular connectors repair*". Then for each individual task, several sub-tasks are performed. These are described in the performance criteria. Enabling objectives can be derived from the performance criteria. Please refer to example 1 in the table below.

2.3. In developing the basic/fundamental training programmes, it will be important to specify the underpinning knowledge and cognitive skills required for successful achievement of the terminal and enabling training objectives. For training purposes, representative aircraft systems, sub-systems and their related components should be used and composed of those elements which are found in currently operated aircraft. These generic elements will be used to elaborate the generic knowledge and cognitive skill elements an aircraft maintenance person needs to master to support the performance of generic tasks and as a pre-requisite for training for specialty-rating.

3. Objectives of a Training for Specialty-Rating

3.1 Training objectives for a training programme for specialty-rating are based on the maintenance instructions for the particular piece of equipment concerned (e.g. aircraft maintenance manual, structural repair manual, component maintenance manual). A person holding a specialty-rated endorsement on his/her "aircraft maintenance licence or authorization" has to be competent to perform the tasks described in the instructions. All maintenance tasks listed in the maintenance instructions have therefore to be analyzed for their particular training requirements and the derivation of corresponding training objectives.

3.2 A sample task is shown below: "Removal and installation of a flow control and shutoff valve of a certain aircraft".

The task in this sample is described in the aircraft's maintenance manual and is composed of two competency units:

- Remove component/assembly
- Install component /assembly

3.3 The various sub-tasks as described in the aircraft maintenance manual and their correspondence to competency elements are listed in the table below. These sub-tasks again contain a series of steps (performance criteria).

3.4 Each of these specialty-rated "performance criteria" can be related to a generic one in the competency framework. If it relates to a standard practice, then no training objective needs to be defined since this objective would have been covered during basic/fundamental training. For those items, which cannot be related to standard practices, training objectives have to be defined as they are specific to training for specialty-rating.

Example 1. Competency-based Training for Aircraft Maintenance Personnel — Samples of Training Objectives for a Competency Unit in relation to generic (i.e. non-specialty-rated) standard practices: "Repair of a Wiring Circular Connector"

The competency standards for the various task elements are found in approved maintenance instructions. The training requirements are different depending on the specific manual (see listing below):

SPM – Standard practices manual	requires basic/fundamental training
SMPM – Special maintenance procedures manual	requires basic/fundamental training
SWPM – Standard wiring practices manual	requires basic/fundamental training
MM – Specialty-rated maintenance manual	requires training for specialty-rating
MOPM – Maintenance organization procedures manual	requires AMO organizational training

	Condition	Behaviour		Standard
Terminal objectives are sequenced according to the SPM		**Sequence as per SPM**	**Correspondence to competency framework**	
	• Repair of a wiring circular connector. • Task performance on a maintenance practical training mock-up.	**Repair Wiring Circular Connector**	**12. Repair**	SWPM
Terminal objective 1	As above.	**Prepare for task**	**2.1 Identify the need for maintenance practice**	
Enabling objective 1	As above.	Read related fault report.	12.1.1Read related fault report.	Training task instruction
Enabling objective 2	As above.	Verify fault and add information to fault report if it is incomplete.	12.1.2 Verify fault and add information to fault report if it is incomplete.	Training task instruction
Enabling objective 3	As above.	Identify part number of circular connector.	12.1.3 Read related maintenance instruction.	SWPM
Enabling objective 4	As above.	Consult reference tables.	12.1.3 Read related maintenance instruction.	SWPM
Enabling objective 5	As above.	Read circular connector chapters.	12.1.3 Read related maintenance	SWPM

	Condition	Behaviour		Standard
Terminal objectives are sequenced according to the SPM		**Sequence as per SPM**	**Correspondence to competency framework**	
			instruction.	
Terminal objective 2	As above.	Disconnect circular connector.	**4.3 Disconnect all connection to system(s)**	
Enabling objective 1	As above.	Disconnect and open circular connector. .	4.3.1 Disconnect electrical connectors (be aware of remaining voltage – capacitors).	SWPM
Terminal objective 3	As above.	Inspect circular connector.	**8.3 Perform inspection**	
Enabling objective 1	As above.	Visually inspect circular connector.	8.3.7 Perform general visual inspection – examine for signs of physical damage, corrosion, leaks, correct installation, missing items – use judgement for deviation from normal condition.	SWPM
Terminal objective 4	As above.	Prepare for repair.	**12.1 Prepare for Repair**	
Enabling objective 1	As above.	Select proper repair procedure from maintenance instruction.	12.1.4 Prepare repair scheme as per maintenance instruction.	SWPM
Enabling objective 2	As above.	Select proper material for repair.	12.1.5 Procure required materials.	SWPM
Enabling objective 3	As above.	Select proper tools for repair.	12.1.2 Prepare required tools.	SWPM
Terminal objective 5	As above.	Perform repair.	**12.3 Perform repair**	
Enabling objective 1	As above.	Perform all steps of repair procedure.	12.3.3 Perform repair scheme step by step – verify during the process that no limit / tolerance is exceeded.	SWPM
Enabling objective 2	As above.	Perform circular connector backshell maintenance.	12.3.3 Perform repair scheme step by step – verify during the process that no limit / tolerance is exceeded.	SWPM
Enabling objective 3	As above.	Extract circular connector contacts.	12.3.3 Perform repair scheme step by step – verify during the process that no limit / tolerance is exceeded.	SWPM
Enabling objective 4	As above.	Crimp circular connector contacts.	12.3.3 Perform repair scheme step	SWPM

	Condition	Behaviour		Standard
Terminal objectives are sequenced according to the SPM		**Sequence as per SPM**	**Correspondence to competency framework**	
			by step – verify during the process that no limit / tolerance is exceeded.	
Enabling objective 5	As above.	Insert contacts into circular connector.	12.3.3 Perform repair scheme step by step – verify during the process that no limit / tolerance is exceeded.	SWPM
Enabling objective 6	As above.	Assemble circular connector and relief strain on wires.	12.3.3 Perform repair scheme step by step – verify during the process that no limit / tolerance is exceeded.	SWPM
Enabling objective 7	As above.	Confirm the correct repair.	12.3.5 Verify at the end of the repair process that the physical integrity of the repaired parts is in an airworthy condition (in permitted dimensions) and that the parts fulfil their designed specific tasks.	SWPM
Terminal objective 6		Install circular connector.	**5.6 Connect all connections to system(s)**	
Enabling objective 1		Install circular connector in training mock-up.	5.6.1 Connect electrical connectors (be aware of remaining voltage – capacitors).	SWPM
Enabling objective 2		Lockwire circular connector.	5.6.1 Connect electrical connectors.	SWPM

Example 2. Competency-based Training for Aircraft Maintenance Personnel — Samples of Training Objectives in relation to specialty-rating for Competency Unit: *4. Remove Component / Assembly*

The following is an example of a competency unit applied to a task in a training programme for specialty-rating.

The competency standards for the various task elements are found in approved maintenance instructions. The training requirements are different depending on the specific manual (see listing below):

SPM – Standard practices manual — requires basic/fundamental training
SMPM – Special maintenance procedures manual — requires basic/fundamental training
SWPM – Standard wiring practices manual — requires basic/fundamental training
MM – Specialty-rated maintenance manual — requires training for specialty-rating
MOPM – Maintenance organization procedures manual — requires AMO organizational training

	Condition	Behaviour		Standard
Terminal objectives are sequenced according to the MM		**Sequence as per MM**	**Correspondence to competency framework**	
	• Flow control and shutoff valve – removal. Sample of a particular aircraft. • Task performance during "A-Check" in maintenance hangar.	**Remove component / assembly**	**4. Remove component / assembly**	SPM SMPM (e.g.SWPM) MM MOPM
Terminal objective 1	As above.	Prepare for removal.	4.1 Prepare for removal.	MM
Enabling objective 1	As above.	Get access to the flow control and shutoff valve: Open air conditioning access door.	4.1.6 Get access to component / assembly.	MM
Terminal objective 2	As above.	Apply safety precautions/ maintenance practices.	4.2 Apply Safety Precautions/ Maintenance Practices.	MM
Enabling objective 1	As above.	Remove pressure from the pneumatic system.	4.2.2 Identify whether any safety precautions are required for the maintenance task and apply them. 2.2.2 Perform maintenance practice as per MM procedure.	MM

	Condition	Behaviour		Standard
Terminal objectives are sequenced according to the MM		**Sequence as per MM**	**Correspondence to competency framework**	
Enabling objective 2	As above.	Set the L and R PACK switches to the OFF position.	4.2.2 Identify whether any safety precautions are required for the maintenance task and apply them. 2.2.2 Perform maintenance practice as per MM procedure.	MM
Enabling objective 3	As above.	Set the BLEED 1 and 2 switches to the OFF position.	4.2.2 Identify whether any safety precautions are required for the maintenance task and apply them. 2.2.2 Perform maintenance practice as per MM procedure.	MM
Enabling objective 4	As above.	Set the BLEED APU switch to the OFF position.	4.2.2 Identify whether any safety precautions are required for the maintenance task and apply them. 2.2.2 Perform maintenance practice as per MM procedure.	MM
Enabling objective 5	As above.	Open P6-4 circuit breaker on F/O electrical system panel.	4.2.2 Identify whether any safety precautions are required for the maintenance task and apply them. 2.2.2 Perform maintenance practice as per MM procedure.	MM
Enabling objective 6	As above..	Attach DO-NOT-OPERATE tags.	4.2.3 Tag all flight deck and external control devices which are involved in the safety precautions.	MOPM
Terminal objective 3a	As above.	Disconnect all connections to the system(s).	4.3 Disconnect all connections to the system(s).	MM
Enabling objective 1	As above.	Remove the air supply duct clamps.	4.3.3 Disconnect pneumatic ducts and lines.	SPM
Terminal objective 5a		Loosen and remove connecting elements from support structure.	4.5 Loosen and remove connecting elements from support structure.	MM
Enabling objective 1	As above.	Remove the air supply duct nut, washer, and bolt.	4.5.1 Loosen and remove all attachment nuts and bolts.	SPM

	Condition	Behaviour		Standard
Terminal objectives are sequenced according to the MM		**Sequence as per MM**	**Correspondence to competency framework**	
Enabling objective 2	As above.	Remove the washer between the tie rod and the flange of the air supply duct.	4.5.1 Loosen and remove all attachment nuts and bolts.	SPM
Terminal objective 6a	As above.	Move component / assembly out of installation area.	4.6 Move component / assembly out of installation area.	MM
Enabling objective 1	As above.	Remove the air supply duct.	4.6.2 Lift component / assembly out of installation area.	MOMP
Terminal objective 3b	As above.	Disconnect all connections to the system(s).	4.3 Disconnect all connections to the system(s).	MM
Enabling objective 1	As above.	Remove the 358 F duct clamps.	4.3.3 Disconnect pneumatic ducts and lines.	SPM
Terminal objective 6b	As above.	Move component / assembly out of installation area.	4.6 Move component / assembly out of installation area.	MM
Enabling objective 1	As above.	Remove the 358 F duct.	4.6.2 Lift component / assembly out of installation area.	MOMP
Terminal objective 3c	As above.	Disconnect all connections to the system(s).	4.3 Disconnect all connections to the system(s).	MM
Enabling objective 1	As above.	Remove the electrical connectors from the flow control and shutoff valve.	4.3.1 Disconnect electrical connectors (be aware of remaining voltage – capacitors).	SWPM
Enabling objective 2	As above.	Loosen the b-nut on the sense line.	4.3.3 Disconnect pneumatic ducts and lines.	SPM
Enabling objective 3	As above.	Remove the screw and washer that connect the bonding jumper to the structure.	4.3.6 Disconnect bonding jumpers.	SWPM
Terminal objective 4	As above.	Secure component / assembly before removal.	4.4 Secure component / assembly before removal.	MM MOPM
Enabling objective 1	As above.	Hold the valve as you remove the clamp.	4.4.2 Support component / assembly.	MOPM
Terminal objective 3d	As above.	Disconnect all connections to the	4.3 Disconnect all connections to	MM

	Condition	Behaviour		Standard
Terminal objectives are sequenced according to the MM		**Sequence as per MM**	**Correspondence to competency framework**	
		system(s).	the system(s).	
Enabling objective 1	As above.	Remove the flow control and shutoff valve clamp.	4.3.3 Disconnect pneumatic ducts and lines.	SPM
Terminal objective 6c	As above.	Move component / assembly out of installation area.	4.6 Move component / assembly out of installation area.	MM
Enabling objective 1	As above.	Remove the flow control and shutoff valve.	4.6 Move component / assembly out of installation area.	MM
Terminal objective 8	As above.	Complete removal.	4.8 Complete removal.	MOPM
Enabling objective 1	As above.	Put covers on the duct openings to keep out unwanted materials.	4.8.4 Install covers on electrical connectors, lines, ducts and openings to keep out unwanted materials.	MOPM

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ATTACHMENT B to State letter AN 12/48-10/50

RESPONSE FORM TO BE COMPLETED AND RETURNED TO ICAO TOGETHER WITH ANY COMMENTS YOU MAY HAVE ON THE PROPOSED AMENDMENTS

To: The Secretary General
International Civil Aviation Organization
999 University Street
Montréal, Quebec
Canada, H3C 5H7

(State) _____

Please make a checkmark (✓) against one option for each amendment. If you choose options "agreement with comments" or "disagreement with comments", **please provide your comments on separate sheets**.

	Agreement without comments	*Agreement with comments**	*Disagreement without comments*	*Disagreement with comments*	*No position*
Amendment to the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868) (Attachment A refers)					

*"Agreement with comments" indicates that your State or organization agrees with the intent and overall thrust of the amendment proposal; the comments themselves may include, as necessary, your reservations concerning certain parts of the proposal and/or offer an alternative proposal in this regard.

Signature: _____ Date: _____

— END —