ICAO

Doc 9868

PROCEDURES FOR AIR NAVIGATION SERVICES

Training

Third Edition, 2020

This edition incorporates all amendments approved by the Council prior to 8 June 2020 and supersedes on 5 November 2020, all previous editions of Doc 9868.

INTERNATIONAL CIVIL AVIATION ORGANIZATION

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AMENDMENTS

Amendments are announced in the supplements to the *Products and Services Catalogue;* the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

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No.	Date	Entered by
1–7	Incorporated in this Edition	

CORRIGENDA		
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[1] Within Amendment 6 to the PANS-TRG, which is applicable in 2022, Competency-based training and assessment for remote pilot licence (RPL) had a reserved Chapter 6. Amendment 7 to the PANS-TRG, applicable in 2020, will maintain Competency-based training and assessment for remote pilot licence (RPL) space reserved under Chapter 8. Therefore, at its applicability in 2022, Amendment 6 to the PANS-TRG should highlight this change.

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FOREWORD

1. HISTORICAL BACKGROUND

1.1 The *Procedures for Air Navigation Services — Training* (PANS-TRG) are the result of the evolution of the work initiated by the Flight Crew Licensing and Training Panel (FCLTP) on the implementation of the training required for the pilot licences and ratings found in Annex 1 — *Personnel Licensing*, including the multi-crew pilot licence (MPL).

1.2 The FCLTP, at its first meeting (Montréal, 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 first amendment to the PANS-TRG was issued in 2011, 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), including those personnel with licensed or authorized privileges.

1.4 There is industry-wide consensus that, in order to reduce aircraft hull loss and fatal accident rates, a strategic review of recurrent training for airline pilots is necessary. Consequently, procedures for evidence-based training (EBT), developed by the IATA Training and Qualifications Initiative, were introduced in Amendment 2 to the PANS-TRG issued in 2013 and are intended as a means of assessing and training key areas of flight crew performance in a recurrent training system. In addition, qualifications of the instructor were expanded.

1.5 Between 2006 and 2010, aeroplane accidents resulting from a loss of control in flight (LOC-I) event were the leading cause of fatalities in commercial aviation. Recognizing the need to identify and effectively implement mitigating strategies, the prevention of aeroplane upsets quickly became an ICAO priority. Following extensive studies of the LOC-I phenomena, in collaboration with civil aviation authorities (CAAs), aviation accident investigative bodies, LOC-I focus groups, industry associations, original equipment manufacturers and subject matter experts from around the world, it became readily apparent that deficiencies in current training practices were contributing factors in most aeroplane upset-related accidents. Consequently, Amendment 3 to the PANS-TRG improved the existing ICAO Standards and Recommended Practices (SARPs) and supporting guidance material by introducing aeroplane upset prevention and recovery training (UPRT) requirements.

1.6 In 2015, the Next Generation of Aviation Professionals Task Force developed competency frameworks for air traffic controllers (ATCOs) and air traffic safety electronics personnel (ATSEP) to support the progressive implementation of competency-based training and assessment practices for air traffic management (ATM) personnel. This second edition of the PANS-TRG has been restructured and divided into different parts dealing with each category of personnel.

1.7 Amendment 5 was initially developed by the ICAO Competencies Task Force which was established in 2014 to review and clarify the existing competency-related definitions and concepts in ICAO provisions and organize them in a conceptual framework that would illustrate the relationships between the concepts.

1.8 In 2016, the Remotely Piloted Aircraft System Panel (RPASP) developed competency frameworks for remote pilots, RPAS instructors and remote pilot licence (RPL) examiners to complement SARPs being incorporated into Annex 1, Chapter 2, in a new subpart B. RPAS provisions were introduced into PANS-TRG in Amendment 6.

1.9 In 2018, the Secretariat, with the assistance of the Competency-based Training and Assessment Task Force, developed Amendment 7 to align the existing material in the PANS-TRG with Amendment 5 to the PANS-TRG and to update some references and procedures. Notable changes include the introduction of new ICAO competency frameworks.

2. SCOPE AND PURPOSE

2.1 The PANS-TRG is complementary to the SARPs. The PANS-TRG generally addresses competency-based training and assessment programmes that stakeholders may choose to implement.

2.2 The PANS-TRG's purpose is to support the training and qualification of personnel conducting activities affecting safety and for whom there are detailed SARPs in Annexes or procedures in PANS with requirements for such training and qualification.

2.3 The PANS-TRG specifies, in greater detail than in the SARPs, the actual procedures to be applied by training organizations when providing training for aeronautical personnel. This edition contains procedures for the development and implementation of various competency-based training and assessment programmes designed to meet the Annex 1 requirements for pilots, including the MPL, the RPL[1], the type rating and pilot instructors, and the AMMTE licence, as well as those flight crew training programmes developed under the EBT concept, which provides an alternative means of satisfying the recurrent training requirements of Annex 6 — *Operation of Aircraft,* Part I — *International Commercial Air Transport — Aeroplanes*. It also details the methodologies to successfully introduce aeroplane UPRT training at the commercial pilot (aeroplane) and MPL levels, as well as providing UPRT in a flight simulation training device at the commercial air transport pilot and type rating level to support the UPRT provisions promulgated in Annex 1 and Annex 6, Part I. The PANS-TRG also specifies procedures for the harmonized implementation of training procedures for ATM personnel and flight operations officers/flight dispatchers.

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 are 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, they 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

The implementation of the PANS-TRG 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 (ATOs) and others associated with the development and implementation of a training programme for the MPL, RPL, flight crew recurrent training, aeroplane UPRT, the AMMTE licence and ATM personnel.

[1] RPL applicable as of 3 November 2022.

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 provisions of 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 and assessment 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 and assessment. It may 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 and assessment 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

Part I — General procedures

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 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 and assessment 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.

6.2.2 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. Attachment A provides general considerations that should be taken into account when implementing competency-based training and assessment programmes including the relationship between competencies and tasks. Attachment B describes knowledge, skills and attitudes. Attachment C provides a generic methodology to design competency-based training and assessment based on the "analyse, design, develop, implement and evaluate (ADDIE)" principles.

6.3 *Chapter 3 — Qualifications of course developers and instructors*

Annex 1 contains Standards for the issuance of the flight instructor rating and for granting authorizations to flight instructors and flight simulation training device instructors. This chapter and its attachment contain the qualifications to be held, and the competencies to be demonstrated by instructors and course developers employed in a competency-based

training and assessment programme. In competency-based programmes, instructor competencies are made explicit, and instructors have to demonstrate these competencies throughout the training process and in their knowledge of the subject matter and training course content.

Part II — Training and assessment for aircraft operational personnel

6.4 Section 1 — Flight crew training and assessment

6.4.1 Chapter 1 — ICAO Competency Framework for Aeroplane Pilots

This chapter provides the procedures for establishing a competency-based training and assessment programme for aeroplane pilots, including an ICAO competency framework and a list of pilot tasks by phases of flight. The training programmes cover the various licences, ratings and recurrent training (the instructor rating or authorization and a designated pilot examiner require additional competencies).

6.4.2 *Chapter 2 — Competency-based training and assessment 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 are to be followed in addition to those outlined in Part I, Chapter 2, using an adapted competency model based on the ICAO competency framework for aeroplane pilots. It provides guidelines for the implementation of an MPL training programme and an MPL training scheme. The attachments to this chapter contain guidance material on: the structure of the MPL training programme; examples of training specifications; and the tasks to be performed by MPL examiners and inspectors.

6.4.3 *Chapter 3 — Evidence-based training (EBT)*

This chapter is intended to provide guidance to CAAs, operators and ATOs in the recurrent training of pilots and remote pilots.

6.4.4 *Chapter 4 — Upset prevention and recovery training (UPRT)*

This chapter is intended to provide procedures to CAAs, operators and ATOs related to the delivery of UPRT for aeroplane pilots. This training is required for the MPL, the type-rating and the training of commercial air transport pilots, and is highly recommended for the CPL(A).

6.4.5 *Chapter 5 — Competency-based training and assessment of flight crew personnel for the type rating*

This chapter outlines the principles and procedures that are applicable to the development and implementation of a competency-based training and assessment programme for the type rating, in the aeroplane category.

6.4.6 *Chapter 6 — Threat and error management*

This chapter describes the threat and error management model and provides the procedures applicable to all pilots.

6.4.7 *Chapter 7 — The ICAO pilot instructor and evaluator competency framework*

This chapter provides the procedures for establishing a competency-based training and assessment programme for pilot instructors and evaluators, including an ICAO competency framework.

6.4.8 *Chapter 8 — Competency-based training and assessment for the remote pilot licence*

Chapter 8 outlines the principles and procedures that are applicable to the development and implementation of a remote pilot competency-based training and assessment programme.

6.4.9 *Chapter 9 — Other flight crew members*

[Reserved]

6.4.10 *Chapter 10 — Flight validation pilots*

[Reserved]

6.5 Section 2 — Cabin crew

[Reserved]

6.6 Section 3 — Flight operations officers/flight dispatchers

This section provides the procedures for establishing a competency-based training and assessment programme for flight operations officers/flight dispatchers, including an ICAO competency framework.

Part III — Training and assessment for aircraft maintenance personnel

6.7 *Chapter 1 — Competency-based training and assessment for aircraft maintenance personnel*

This part outlines the principles and procedures for the development and implementation of a competency-based training and assessment programme for aircraft maintenance personnel in order to focus training and assessment on how an AMTEM is expected to competently perform on the job. The goal of competency-based training and assessment is to provide a competent workforce for personnel working in aircraft maintenance including those with certification privileges. The *Manual on Training of Aircraft Maintenance Personnel* (Doc 10098) contains guidance material on the design and development of an aircraft maintenance personnel training programme as well as examples of training objectives. Implementation of competency-based training and assessment programmes for AMTEM personnel is optional. Annex 1, Appendix 2, 3.1 enables the use of such competency-based training and assessment programmes as an alternative means of compliance with the Annex 1 experience requirements.

6.8 *Chapter 2 — Competency-based training as applicable to maintenance licences and privileges*

This Chapter provides material on the implementation of a competency-based approach to training and assessment for personnel working in aircraft maintenance, including those with certification privileges. This material is complementary to those provided in Part I, Chapter 2. Furthermore, the material will be useful to Licensing Authorities responsible for approving training programmes at approved maintenance organizations (AMOs) and approved training organizations (ATOs) for maintenance personnel.

6.9 *Chapter 3 — The ICAO AMTEM developer, instructor and assessor qualification framework*

[Reserved]

Part IV — Training and assessment for air traffic management personnel

6.10 *Chapter 1 — General provisions for competency-based training and assessment for air traffic management (ATM) personnel*

This chapter outlines the general principles and procedures to be followed in the design and implementation of competency-based training and assessment for ATM personnel. Implementation of competency-based training and assessment programmes for ATM personnel is optional.

6.11 *Chapter 2 — Competency-based training and assessment for air traffic controllers (ATCOs)*

This chapter outlines the principles and procedures that are applicable to the development and implementation of ATCO competency-based training and assessment and to be followed, in addition to those outlined in Part I, Chapter 2, by training organizations or air navigation services providers (ANSPs) opting for a competency-based approach. This chapter also contains the ICAO competency framework for Air Traffic Controllers. The use of such a competency framework is not an obligation but is recommended in order to achieve the best performance in ATCO training. The *Manual on Air Traffic Controller Competency-based Training and Assessment* (Doc 10056) contains guidance material on the design and development of an ATCO training programme as well as examples of training objectives.

6.12 *Chapter 3 — Competency-based training and assessment for ATC on-the-job training instructors (OJTIs)*

This chapter outlines the principles and procedures that are applicable to the development and implementation of OJTI competency-based training and assessment and to be followed in addition to those outlined in Part I, Chapter 2 of PANS-TRG by training organizations or air navigation services providers (ANSPs) opting for a competency-based approach. This chapter also contains ICAO competency framework for ATC on-the-job-training instructors (OJTIs). The use of such a competency framework is not an obligation but is recommended to achieve the best performance in ATC on-the-job-training instructors (OJTIs) training.

6.13 *Chapter 4 — Competency-based training and assessment for air traffic safety electronics personnel (ATSEP)*

This chapter outlines the principles and procedures that are applicable to the development and implementation of ATSEP competency-based training and assessment and to be followed in addition to those outlined in Chapter 1 by training organizations or ANSPs opting for a competency-based approach. Chapter 4 also contains the ICAO competency framework for the ATSEP. The use of such a competency framework is not an obligation but is recommended to achieve the best performance in ATSEP training. The *Manual on Air Traffic Safety Electronics Personnel Competency-based Training and Assessment* (Doc 10057) contains guidance material on the design and development of an ATSEP training programme as well as examples of training objectives.

Part V — Training and assessment for aerodrome personnel

[Reserved]

Part VI — Training and assessment for other aviation personnel

[Reserved]

Table A. Amendments to the PANS-TRG

Amendment	*Source(s)*	*Subject(s)*	*Approved* *Applicable*
1st Edition (2006)	Flight Crew Licensing and Training Panel (2005)	*Procedures for Air Navigation Services — Training* (PANS-TRG)	19 July 2006 23 November 2006
1	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)	New Chapter 4, supported by additional definitions, containing procedures to facilitate the implementation of competency-based training and assessment for aircraft maintenance personnel.	13 May 2011 25 August 2011
2	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)	New Chapter 5 containing procedures supporting the implementation of the concept of evidence-based training (EBT), consisting of: a) the applicability, background and philosophy of EBT; and b) reference to guidance material providing the detailed means of implementation. The amendment also expands the qualifications of instructors in the current Chapter 5.	4 January 2013 2 May 2013
3	Secretariat	Amendment concerning the introduction of provisions regarding upset prevention and recovery training (UPRT) for aeroplane pilots.	23 April 2014 13 November 2014
2nd Edition (2016) 4	Secretariat; Next Generation of Aviation Professionals (NGAP) Air Traffic Management (ATM) Group	Amendment concerning restructuring and inclusion of competencies for air traffic controllers (ATCOs) and air traffic safety electronics personnel (ATSEP).	14 August 2015 10 November 2016
5	ICAO Competencies Task Force	Revised definitions for terms related to competencies, a description of how competency-related concepts are interlinked and a generic methodology to design competency-based training and assessment.	13 July 2017 5 November 2020
6	Fifth and sixth meetings of the Remotely Piloted Aircraft Systems Panel (RPASP/5 and RPASP/6)	Regulatory structure for the issuance of remote pilot licences and the provision of a global framework for the regulation of remotely piloted aircraft systems (RPAS) licensing	6 August 2018 3 November 2022
7 (Third Edition)	ICAO Competency-based Training and Assessment Task Force (CBTA-TF) and the Secretariat	Amendment concerning: new definitions; introduction of air traffic control on-the-job training instructors provisions; and minor updates to existing provisions.	8 June 2020 5 November 2020

Procedures for
Air Navigation Services

TRAINING

Part I

GENERAL PROCEDURES

Part I

GENERAL PROCEDURES

This part contains three chapters:

Chapter 1 contains the definitions and acronyms and their technical meanings as used in this document. In some cases, the terms are defined in other ICAO documents.

Chapter 2 outlines the general provisions for competency-based training and assessment and outlines the general principles and procedures to be followed in the design and implementation of a competency-based approach to training and assessment. Attachment A provides general considerations that should be taken into account when implementing competency-based training and assessment programmes including the relationship between competencies and tasks. Attachment B describes knowledge, skills and attitudes. Attachment C provides a generic methodology to design competency-based training and assessment based on the ADDIE principles.

Chapter 3 contains the qualifications to be held by course developers and instructors employed in a competency-based training and assessment programme.

Chapter 1

DEFINITIONS AND ACRONYMS

1.1 DEFINITIONS

When the following terms are used in this document, they have the following meanings:

Adapted competency model. A group of competencies with their associated description and performance criteria adapted from an ICAO competency framework that an organization uses to develop competency-based training and assessment for a given role.

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

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.

Appropriate airworthiness requirements. The comprehensive and detailed airworthiness codes established, adopted or accepted by a Contracting State for the class of aircraft, engine or propeller under consideration.

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

Approved training organization (ATO). An organization approved by and operating under the supervision of a Contracting State in accordance with the requirements of Annex 1 to perform approved training.

Assessment. The determination by an instructor, assessor or evaluator as to whether a candidate meets a required competency standard under given conditions, by collecting evidence from observable behaviours. Assessment takes place during instruction and evaluation.

Assessment (evidence) guide. A guide that provides detailed information in the form of evidence that an instructor or an evaluator can use to determine whether a candidate meets the requirements of the competency standard.

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

Note.— The competency frameworks of Part III, Chapter 1 use references to the ATA chapters numbering, due to its widespread use in civil aviation.

Basic training. Training which is generic in nature but essential in the role of particular activities.

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.

Competency. A dimension of human performance that is used to reliably predict successful performance on the job. A competency is manifested and observed through behaviours that mobilize the relevant knowledge, skills and attitudes to carry out activities or tasks under specified conditions.

Competency-based training and assessment. Training and assessment that are characterized by a performance orientation, emphasis on standards of performance and their measurement, and the development of training to the specified performance standards.

Competency standard. A level of performance that is defined as acceptable when assessing whether or not competency has been achieved.

Conditions. Anything that may qualify a specific environment in which performance will be demonstrated.

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.

Criterion-referenced test. A test, the measurement of which is compared with an objective standard (and not against another measurement).

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 an operational person that leads to deviations from organizational or the operational person's intentions or expectations.

*Note — See Chapter 1 of Annex 19 —*Safety Management *for a description of operational personnel.*

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

Note.— See Part II, Section 1, Chapter 6 and Circular 314 — Threat and Error Management (TEM) in Air Traffic Control *for a description of undesired states.*

Evaluator. A person authorized to conduct the formal and final summative assessment of a trainee's performance.

Event. A combination of a task or a sub-task and the conditions under which the task or sub-task is to be performed.

Facilitation technique. An active training method, which uses effective questioning, listening and a non-judgemental approach and is particularly effective in developing skills and attitudes, assisting trainees to develop insight and their own solutions and resulting in better understanding, retention and commitment.

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 programme 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.

ICAO competency framework. A competency framework, developed by ICAO, is a selected group of competencies for a given aviation discipline. Each competency has an associated description and observable behaviours.

Instructional systems design (ISD). A formal process for designing training which includes analysis, design and production, and evaluation.

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

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

Maintenance defect reporting sheet. 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 record. Record that sets out the details of the maintenance carried out on an aircraft, engine, propeller or associated part.

Maintenance release. A document which contains a certification confirming that the maintenance work to which it relates has been completed in a satisfactory manner, in accordance with appropriate airworthiness requirements.

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 change to the type design of an aircraft, engine or propeller.

Note.— A modification may also include the embodiment of the modification which is a maintenance task subject to a maintenance release. Further guidance on aircraft maintenance – modification and repair is contained in the Airworthiness Manual *(Doc 9760).*

Monitoring. A cognitive process to compare an actual to an expected state.

Note.— Monitoring is embedded in the competencies for a given role within an aviation discipline, which serve as countermeasures in the threat and error management model. It requires knowledge, skills and attitudes to create a mental model and to take appropriate action when deviations are recognized.

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 methods may include but are not limited to ultrasonic, magnetic-particle, liquid penetrant, radiographic, eddy-current testing and structural health monitoring.

Observable behaviour (OB). A single role-related behaviour that can be observed and may or may not be measurable.

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

Performance criteria. Statements used to assess whether the required levels of performance have been achieved for a competency. A performance criterion consists of an observable behaviour, condition(s) and a competency standard.

Pilot flying (PF). The pilot whose primary task is to control and manage the flight path. The secondary tasks of the PF are to perform non–flight path related actions (radio communications, aircraft systems, other operational activities, etc.) and to monitor other crewmembers.

Pilot monitoring (PM). The pilot whose primary task is to monitor the flight path and its management by the PF. The secondary tasks of the PM are to perform non–flight path related actions (radio communications, aircraft systems, other operational activities, etc.) and to monitor other crewmembers.

Rating. An authorization entered on or associated with a licence and forming part thereof, stating special conditions, privileges or limitations pertaining to such licence.

Remote pilot station (RPS)[1]. The component of the remotely piloted aircraft system containing the equipment used to pilot the remotely piloted aircraft.

Remotely piloted aircraft (RPA)*. An unmanned aircraft which is piloted from a remote pilot station.

Remotely piloted aircraft system (RPAS)*. A remotely piloted aircraft, its associated remote pilot stations, the required command and control links and any other components as specified in the type design.

Repair. The restoration of an aircraft, engine, propeller or associated part to an airworthy condition in accordance with the appropriate airworthiness requirements, after it has been damaged or subjected to wear.

[1] Applicable as of 3 November 2022.

Scenario (event-set). Relatively independent segment of training made up of several events.

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.

Special standard practices/maintenance procedures manual. Manual 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 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 manual. Manual 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.

Standard wiring practices manual (SWPM). Manual 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).

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

Note.— See Chapter 1 of Annex 19 — Safety Management *for a description of operational personnel.*

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

Note.— See Part II, Section 1, Chapter 6 and Circular 314 — Threat and Error Management (TEM) in Air Traffic Control *for a description of undesired states.*

Training for a particular maintenance rating. Training aimed at developing the set of particular competencies required to perform maintenance tasks on a 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.

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.

Training objective. A clear statement that is comprised of three parts, i.e. the desired performance or what the trainee is expected to be able to do at the end of training (or at the end of particular stages of training), the performance standard that must be attained to confirm the trainee's level of competence, and the conditions under which the trainee will demonstrate competence.

1.2 ACRONYMS

AD	Airworthiness directive
ADDIE	Analyse, design, develop, implement and evaluate
AMM	Aircraft maintenance manual
AMTEM	Aircraft maintenance technician/engineer/mechanic
AMO	Approved maintenance organization
AMTO	Approved maintenance training organization
ANSP	Air navigation services provider
APU	Auxiliary power unit
ATC	Air traffic control
ATCO	Air traffic controller
ATM	Air traffic management
ATO	Approved training organization
ATSEP	Air traffic safety electronics personnel
BITE	Built-in test equipment
CAA	Civil aviation authority

CBTA	Competency-based training and assessment
CE	Competency element
CMM	Component maintenance manual
CPL(A)	Commercial pilot licence (aeroplane)
CRM	Crew resource management
CRS	Certificate of return to service
DDPG	Dispatch deviation procedures guide
EBT	Evidence-based training
FIM	Fault isolation manual
FOO	Flight operations officer/flight dispatcher
FSTD	Flight simulation training device
ICAs	Instruction for continued airworthiness
IOE	Initial operating experience
ISD	Instructional systems design
KSA	Knowledge, skills and attitudes
LOC-I	Loss of control in flight
LOSA	Line operations safety audit
LWTR	Licence without type rating (an aircraft maintenance technician/engineer/mechanic licence)
MEL	Minimum equipment list
MM	Maintenance manual
MMEL	Master minimum equipment list
MOPM	Maintenance organization’s procedures manual
MPL	Multi-crew pilot licence
MRM	Maintenance resource management
NDT	Non-destructive testing
OB	Observable behaviour
OEM	Original equipment manufacturer

OJT	On-the-job training
OJTI	On-the-job training instructor
PC	Performance criteria
QA	Quality assurance
QS	Quality system
RPA[2]	Remotely piloted aircraft
RPAS*	Remotely piloted aircraft system
RPL*	Remote pilot licence
RPS*	Remote pilot station
SARPs	Standards and Recommended Practices
SMPM	Special maintenance procedures manual
SMS	Safety management system
SOP	Standard operating procedure
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 technician/engineer/mechanic licence)
UPRT	Upset prevention and recovery training

[2] Applicable as of 3 November 2022.

Chapter 2

GENERAL PROVISIONS FOR COMPETENCY-BASED TRAINING AND ASSESSMENT

2.1 INTRODUCTION

2.1.1 The goal of competency-based training and assessment is to provide a competent workforce for the provision of a safe and efficient air transportation system. In order to focus training and assessment on how an aviation professional is expected to competently perform on the job, a description of this performance in the particular operational and environmental context is needed. The adapted competency model, with its associated performance criteria, provides a means of assessing whether trainees achieve the desired performance.

2.1.2 The provisions in this chapter:

a) describe the relationships between key concepts in competency-based training and assessment;

b) outline the general principles and procedures to be followed in the design and implementation of competency-based training and assessment; and

c) are applicable to all subsequent chapters of this document.

2.1.3 The ICAO competency frameworks in Parts II to IV of this document, as well as those in ICAO manuals, are generic models. Organizations implementing competency-based training and assessment in a given aviation discipline shall adapt the corresponding competency frameworks provided in Parts II to IV to reflect their specific local environment and requirements. Additional considerations to be taken into account when implementing a competency-based training and assessment approach can be found in Attachment A to this chapter.

2.2 PRINCIPLES OF COMPETENCY-RELATED TRAINING AND ASSESSMENT

2.2.1 Relevant competencies are clearly defined for a particular role within an aviation discipline.

2.2.2 There is an explicit link between competencies and training, required performance on the job, and assessment.

2.2.3 Competencies are formulated in a way that ensures they can be trained for, observed and assessed consistently in a wide variety of work contexts for a given aviation profession or role.

2.2.4 Trainees successfully demonstrate competency by meeting the associated competency standard.

2.2.5 Each stakeholder in the process including the trainee, instructor, training organization, operator, service provider and regulator has a common understanding of the competency standards.

2.2.6 Clear performance criteria are established for assessing competence.

2.2.7 Evidence of competent performance is valid and reliable.

2.2.8 Instructors' and assessors' judgements are calibrated to achieve a high degree of inter-rater reliability.

2.2.9 Assessment of competencies is based on multiple observations across multiple contexts.

2.2.10 To be considered competent, an individual demonstrates an integrated performance of all the required competencies to a specified standard.

2.3 ASSUMPTIONS

In this document, it is assumed that:

a) all tasks performed by an aviation professional require the application of a relevant set of competencies;

b) competencies are defined for each aviation function/profession/role (pilots, cabin crew, air traffic controllers, air traffic safety electronics personnel, designated medical examiners, dispatchers, etc.) and applied to the individual; and

c) aviation professionals apply a set of competencies in a given role throughout their career (e.g. private, commercial, multi-crew and airline transport pilots will demonstrate the same set of competencies but with different degrees of performance).

2.4 STRUCTURE OF AN ICAO COMPETENCY FRAMEWORK

2.4.1 In ICAO, a competency framework is structured as shown in Table I-2-1.

Table I-2-1. Structure of an ICAO competency framework

ICAO competency	*Description*	*Observable behaviour (OB)*
ICAO Competency 1	Description 1	OB 1
		OB 2
		OB n
ICAO Competency 2	Description 2	OB 1
		OB 2
		OB n
ICAO Competency n	Description n	OB 1
		OB 2
		OB n

2.4.2 The subsequent parts of this document contain ICAO competency frameworks for the different aviation disciplines. For example, one of the competencies for an air traffic controller in the ICAO competency framework is "communication" and can be described and broken down in observable behaviours as shown in Table I-2-2.

Table I-2-2. Example of a competency in an ICAO competency framework

ICAO competency	*Description*	*Observable behaviour (OB)*
Communication	Communicate effectively in all operational situations	Selects communication mode that takes into account the requirements of the situation
		Speaks clearly, accurately and concisely
		Uses appropriate vocabulary and expressions to convey clear messages
		Uses standard radiotelephony (RT) phraseology
		Adjusts speech techniques to suit the situation
		Demonstrates active listening and provides feedback
		Uses plain language when RT phraseology does not exist or the situation requires it
		Uses eye contact, body movements and gestures that are consistent with verbal messages

2.5 STRUCTURE OF ADAPTED COMPETENCY MODELS

The purpose of competency-based training and assessment is to train and assess the capacity of an individual to perform at the standard expected in an organizational workplace. Therefore, organizations electing to implement competency-based training and assessment in a discipline covered in this document shall adapt the corresponding ICAO competency framework to suit their context by developing an adapted competency model to include the elements in Table I-2-3.

Table I-2-3. Elements of an adapted competency model

Adapted competency	*Description*	*Performance criteria*		
		Observable behaviour (OB)	*Competency assessment*	
Adapted competency 1	Description 1	OB 1	Final competency standard	Conditions
		OB 2		
		OB n		
Adapted competency 2	Description 2	OB 1		
		OB 2		
		OB n		
Adapted competency n	Description n	OB 1		
		OB 2		
		OB n		

2.6 COMPONENTS OF A COMPETENCY-BASED TRAINING AND ASSESSMENT PROGRAMME

2.6.1 A training specification describes the purpose of training, the task list and the requirements that shall be fulfilled when designing the training.

2.6.2 An adapted competency model is a group of competencies with their associated description and performance criteria adapted from an ICAO competency framework that an organization uses to develop competency-based training and assessment for a given role.

2.6.3 An assessment plan provides the process and tools for gathering valid and reliable evidence at different stages during training.

2.6.4 A training plan describes the training required to achieve the competencies. It includes but is not limited to a syllabus (including knowledge, skills and attitudes (KSA), milestones, lesson plans and schedules). See Attachment B to this chapter for a description of KSA.

2.6.5 Training and assessment materials and resources (i.e. human, material and organizational resources) include everything needed to implement training and assessment plans.

2.6.6 Figure I-2-1 illustrates the various components needed to build a competency-based training and assessment programme.

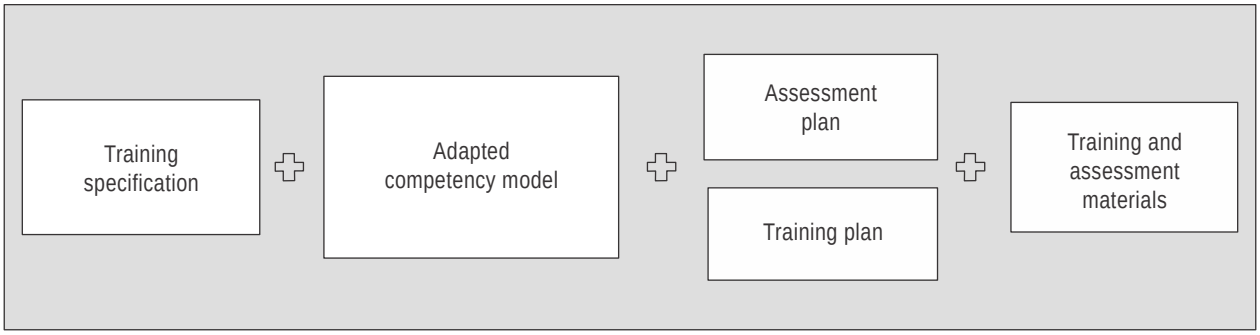

Figure I-2-1. Competency-based training and assessment components

2.7 INSTRUCTIONAL SYSTEMS DESIGN

It is recognized that there are several valid instructional systems design (ISD) models that may be used to design competency-based training and assessment. They can serve as a basis to derive the components of competency-based training and assessment as described above. The analyse, design, develop, implement and evaluate (ADDIE) framework is generic to all ISD models. See Attachment C to this chapter for a detailed description of an ADDIE methodology.

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Attachment A to Chapter 2

GENERAL CONSIDERATIONS RELATED TO COMPETENCY-BASED TRAINING AND ASSESSMENT

1. Benefits of competency-based training and assessment

The main benefit of a competency-based approach to training and assessment is its potential to encourage and enable individual aviation professionals to reach their highest level of operational capability while ensuring a basic level of competence as a minimum standard.

2. Challenges

The evolution in the understanding of how people learn and the growing complexity resulting from the introduction of new technologies and operating methods present continuous challenges to the approach to training, especially within limited timeframes and budgets. Some of these challenges are to:

a) ensure that what is trained is relevant to the job;

b) achieve a more effective ratio between learning opportunities and checking/assessment. This implies a shift towards more learning opportunities;

c) ensure the integration of knowledge, skills and attitudes (KSA) needed to perform effectively;

d) ensure that the full potential of training tools and methodologies is exploited;

e) support continuous learning and performance improvement over the span of an aviation professional's career;

f) achieve transfer of KSA across contexts and operational situations; and

g) establish sufficient, well-trained and competent teachers/instructors.

Competency-based training and assessment can be used to address many of these challenges.

3. Relationship between competencies and tasks

3.1 Traditional approaches to training development involve the decomposition of jobs into tasks. For each task there is a related objective, an assessment and associated elements in a training plan. A limitation of this approach is that each task must be taught and assessed. In complex systems or when jobs evolve rapidly, it may not be possible to teach and assess each task. Moreover, learners may demonstrate the ability to perform tasks in isolation without being competent in their job.

3.2 Competency-based training and assessment is based on the concept that competencies are transferable. In the design of a competency-based training and assessment programme, a limited number of competencies are defined. Typically, an activity will involve several competencies and competencies apply across a variety of activities and contexts. In the design of training and assessments, tasks and activities are incorporated because they are good candidates for facilitating, developing or assessing a competency or competencies. Specific tasks may be used to develop specific competencies. Lack of specific competencies may be identified as root causes of the failure of the performance of a task.

4. Best practices that support competency-based approaches to training and assessment

To gain the maximum value and achieve efficiencies, competency-based approaches should incorporate training best practices as follows:

a) organizations encourage and support learning in formal and informal settings at different stages in an aviation professional's work life;

b) training programmes focus on the quality of what trainees do and achieve during training rather than on the prescribed amount of time aviation professionals spend training;

c) training focuses on accommodating an individual trainee's needs and provides flexibility; and

d) the highest quality and level of consistency of instruction is provided and particular attention is given to coaching, facilitation and mentoring.

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Attachment B to Chapter 2

KNOWLEDGE, SKILLS AND ATTITUDES

1. General

In order to display certain observable behaviours and demonstrate the achievement of performance criteria, aviation professionals call on relevant knowledge, skills and attitudes (KSA) appropriate to a specific role and context. This ability will vary depending on the level of experience and expertise of the aviation professional.

2. Knowledge

2.1 Knowledge is specific information required to enable a learner to develop and apply the skills and attitudes to recall facts, identify concepts, apply rules or principles, solve problems, and think creatively in the context of work.

2.2 Knowledge is an outcome of the learning process, whether learning occurs in formal or informal settings. There are different types of knowledge: declarative (e.g. facts and raw data), procedural (e.g. categorized/ contextualized and application of conditional if-then rules), strategic (e.g. synthesis, inference to guide resource allocation for decision making, problem solving and behavioural action), and adaptive (e.g. generalization, innovation and invention).

3. Skills

3.1 A skill is an ability to perform an activity or action. It is often divided into three types: motor, cognitive and metacognitive skills.

3.2 A motor skill is an intentional movement, involving a motor or muscular component, that must be learned and voluntarily produced to proficiently perform a goal-oriented task.

3.3 A cognitive skill is any mental skill used in the process of acquiring knowledge, such as reasoning, perception and intuition.

3.4 A metacognitive skill relates to the ability of learners to monitor and direct their own learning processes ("thinking about thinking"); for example, planning how to approach a given learning task, monitoring comprehension and evaluating progress toward the completion of a task.

4. Attitudes

Attitude is a persistent internal mental state or disposition that influences an individual's choice of personal action toward some object, person or event and that can be learned. Attitudes have affective components, cognitive aspects and behavioural consequences. To demonstrate the "right" attitude, a learner needs to "know how to be" in a given context.

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Attachment C to Chapter 2

DESIGN OF COMPETENCY-BASED TRAINING AND ASSESSMENT

1. General

This attachment provides a step-by-step guide for organizations intending to establish competency-based training and assessment that is specific to their environment and requirements. It makes use of the ICAO competency framework and the ADDIE model.

2. Overview of competency-based training and assessment workflows

2.1 The five competency-based training and assessment workflows using the ADDIE model are presented in Figure I-2-C-1:

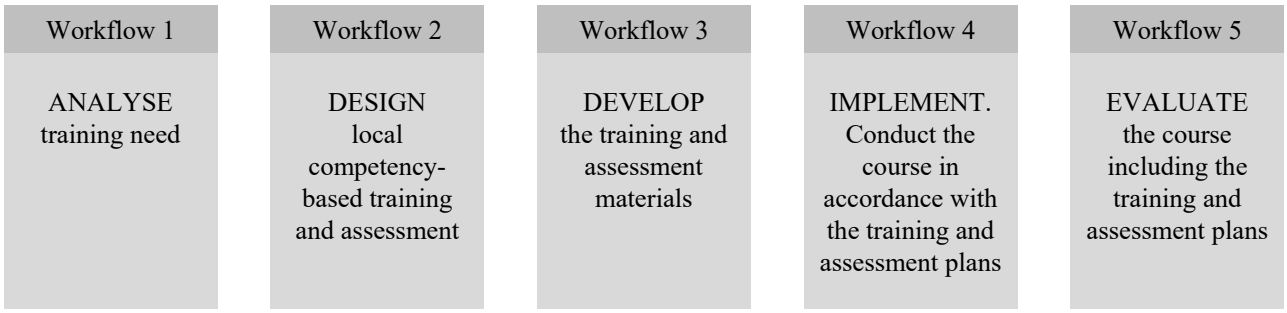

Figure I-2-C-1. Competency-based training and assessment workflows

2.2 The workflows relate to the components of competency-based training and assessment programmes presented in Figure I-2-1. Workflows 1 and 2 establish the training specification, adapted competency model, assessment plan and training plan that will be used to develop and conduct the training course (as outlined in Workflows 3 and 4). Workflow 5 reviews the effectiveness of the training and assessment conducted and recommends improvements, as appropriate.

2.3 This attachment focuses on Workflows 1 and 2. An overview of the remaining workflows is also provided (see sections 5, 6 and 7 of this attachment). A stepped approach is used for Workflows 1 and 2 and details:

a) the inputs required;

b) the process to be worked through; and

c) the outputs achieved on completion of each process.

Note.— The output of Workflow 1 becomes one of the inputs for Workflow 2.

3. Workflow 1: Analyse training need

3.1 The need to develop training may be triggered in various ways; however, the training designer typically receives some form of training request that provides details on what should be trained and why it is necessary.

3.2 The first step in the development of a competency-based training and assessment programme is to conduct a training needs analysis (see Figure I-2-C-2). During training needs analysis, the purpose of the training is considered in relation to the local operational, technical, regulatory and organizational requirements on the training course that will eventually be delivered. A training specification is developed that details the requirements that need to be fulfilled when designing the training.

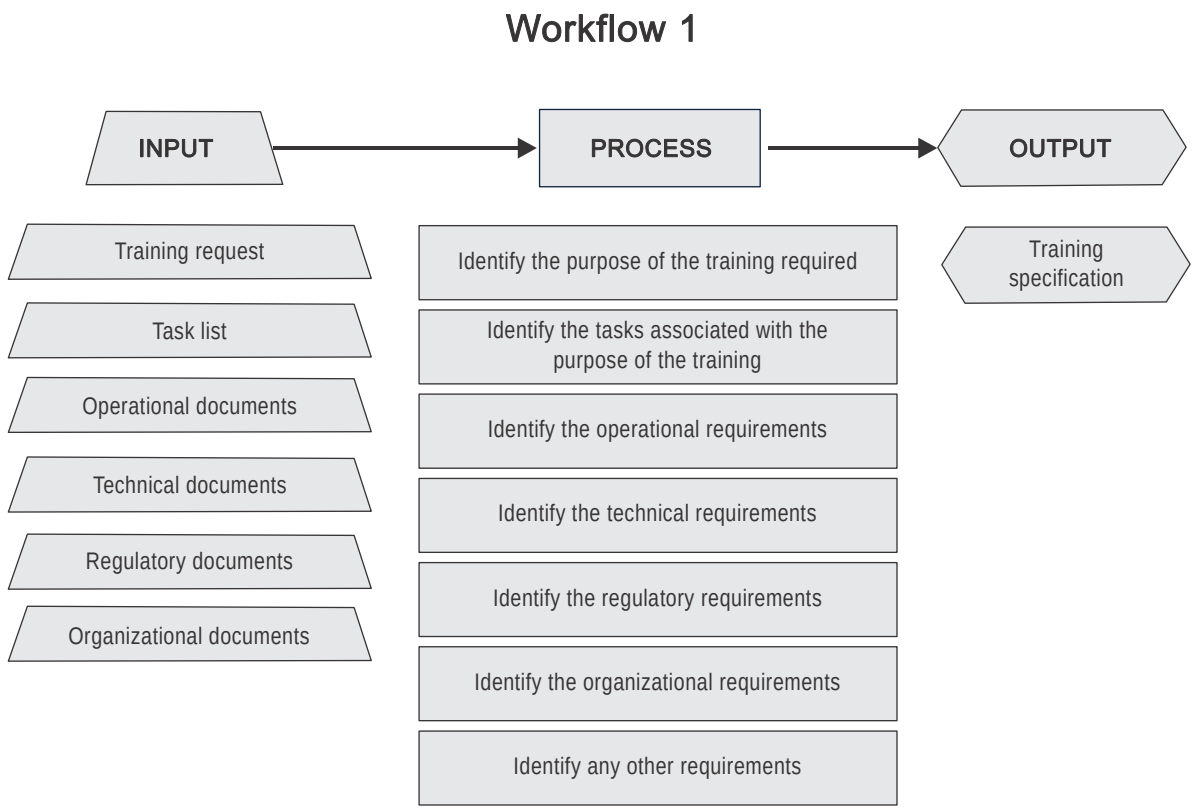

Figure I-2-C-2. Workflow 1 — Analyse training need

3.3 The training specification should provide sufficient detail to answer the questions below.

3.3.1 Purpose

3.3.1.1 What is the purpose of the training?

Note.— This is taken directly from the training request. There is considerable variation in the amount of detail that is provided in a training request but typically it will indicate the purpose of the training as a minimum.

3.3.1.2 What is(are) the phase(s) of training (e.g. initial, unit, refresher, recurrent and/or conversion training)?

3.3.1.3 What qualification, if any, will the trainee achieve on successful completion of the training?

Note.— In some instances a formal qualification will be achieved at the end of the training (e.g. aerodrome control rating or validation on XYZ sector). In other instances this is not the case (e.g. after routine refresher training).

3.3.2 Tasks

What are the tasks associated with the purpose of the training?

Note.— For the purposes of defining the training specification, only a task list is required. This task list may be extracted from an existing job and task analysis or may be taken from the operations manual that has listed the various roles and responsibilities in the operations environment. In some instances, this task list may need to be developed.

3.3.3 Operational requirements

3.3.3.1 Which operational procedures will be applied?

3.3.3.2 In what operational environment will the training take place?

3.3.3.3 Which non-routine situations are necessary for successful completion of the training?

3.3.3.4 What is the configuration of the working environment?

3.3.4 Technical requirements

What specific operational (or simulated operation) systems and/or equipment are necessary to achieve the purpose of the training?

3.3.5 Regulatory requirements

3.3.5.1 Which rules and regulations are applicable?

3.3.5.2 Are there any regulatory requirements that will affect the following aspects of the training design:

a) duration;

b) content;

c) assessment procedures;

d) course approval; or

e) other (equipment, qualifications of instructors, trainee-to-instructor ratios, etc.)?

Note 1.— This is recorded in the training specification to ensure that such issues are considered during the training design.

Note 2.— Typical regulatory requirements may include minimum number of hours of experience in the operational environment under supervision (e.g. Annex 1 — Personnel Licensing*), minimum list of knowledge subjects to be covered, etc.*

3.3.6 Organizational requirements

What organizational requirements may impact training?

Note.— In some instances, an organization may wish to achieve additional objectives that are required to be included or emphasized in the training (e.g. strategic objectives such as reducing delays or customer focus).

3.3.7 Other requirements

What other requirements may impact training?

Note.— This question captures any other requirements that may not have been covered in the previous questions (e.g. more than one language to be used).

3.3.8 Simulator equipment

What simulation requirements, if any, are necessary to achieve the training outcome?

Note.— Either state the type of simulator (e.g. part-task trainer, hi-fidelity simulator or operational controller working position emulator) or the simulator/manufacturer name.

4. Workflow 2 — Design local competency-based training and assessment

4.1 The purpose of Workflow 2 is to:

a) establish an adapted competency model that addresses the training specification identified in Workflow 1;

b) design an assessment plan that will be used to assess the competence of trainees; and

c) design the training plan that will enable the development and delivery of the training course.

4.2 Workflow 2 is shown in two parts:

a) Part 1 deals with the design of the adapted competency model; and

b) Part 2 deals with the design of the assessment and training plans.

Note.— The processes for developing the assessment and training plans are iterative. The outputs, however, are separate. Consequently, Workflow 2, Part 2 incorporates processes and outputs for the assessment and the training plans.

4.3 Workflow 2, Part 1 — Design the adapted competency model

4.3.1 To design an adapted competency model, the appropriate ICAO competency framework is adapted to meet the organizational competency requirements using the information contained in the training specification. Figure I-2-C-3 illustrates the design process.

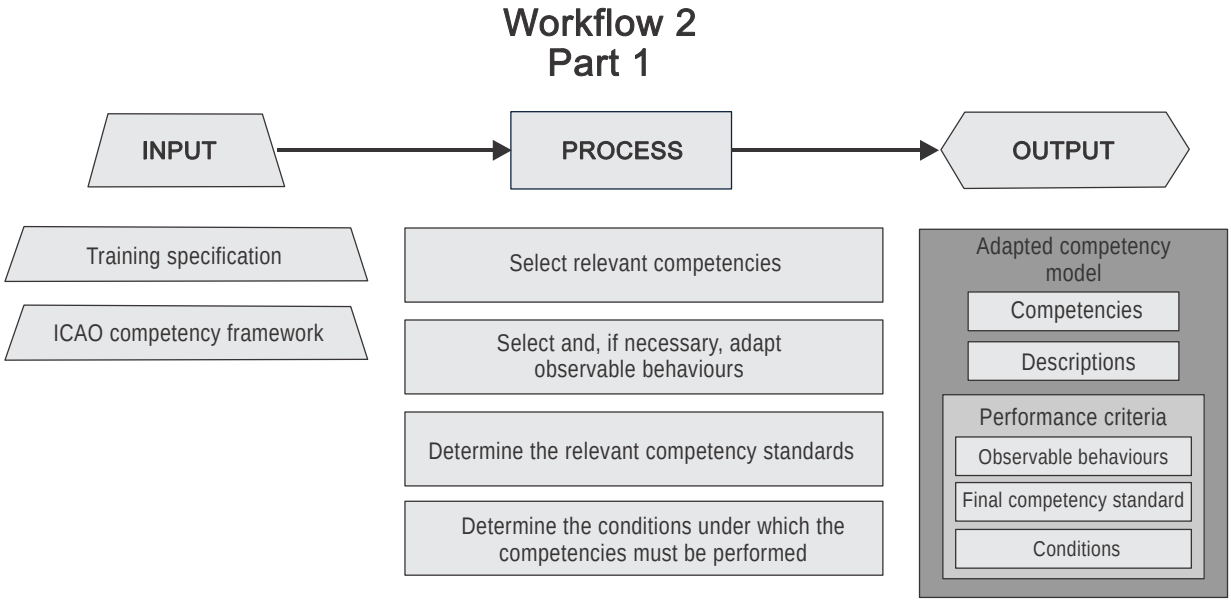

Figure I-2-C-3. Workflow 2, Part 1 — Design the adapted competency model

4.3.2 Selection of the competencies

ICAO competency frameworks provide a set of generic competencies that are necessary to perform in a given aviation discipline. Therefore, it is anticipated that the vast majority of adapted competency models will contain similar lists of competencies. Should it be decided to add or remove a competency, there should be a clear and justifiable reason to do so.

4.3.3 Selection and adaptation of the observable behaviours

ICAO competency frameworks provide a comprehensive list of observable behaviours associated with each of the competencies. The observable behaviours that are appropriate in the local environment should be selected and, if necessary, adapted.

4.3.4 Determining competency standards

Competency standards apply to all observable behaviours and relate to the standards and procedures, and rules and regulations, contained in such documents as national regulations, operations manuals, policies and procedures manuals. In some instances, there may be specific standards associated with a particular observable behaviour.

4.3.5 Determining conditions

4.3.5.1 The training specification completed in Workflow 1 may be used to identify some of the conditions that are specific to the environment in which performance will be demonstrated. Most of the conditions will apply generically to all of the observable behaviours that have been identified as part of the adapted competency model. However, in very few instances, specific conditions may be associated with some observable behaviours.

4.3.5.2 The conditions for the adapted competency model and the final competency standard are the same. As part of the progression towards the final competency standard, it may be necessary to establish interim competency standards. How the conditions are modified to establish interim competency standards is covered in 4.4.1.4.

4.3.5.3 There are different types of conditions that may be considered for the final competency standard: conditions relating to context (nature and complexity of the operational and environmental context); conditions relating to tools and systems or equipment; and conditions relating to the level of support or assistance a trainee can expect from the instructor or assessor.

4.3.5.4 During the early stages of training, trainees can expect active coaching and teaching from the instructor. However, as the trainee progresses towards the final competency standard and gains more confidence in performing independently, the instructor takes on a more passive role and may only give occasional advice on how to improve efficiency or intervene in instances where safety may be compromised.

4.3.5.5 Consequently, for this condition in the adapted competency model (i.e. the description of the final competency standard), the trainee would be expected to be performing independently without assistance from the instructor.

4.4 Workflow 2, Part 2 — Design the assessment and training plans

4.4.1 Issues to consider before developing assessment and training plans

When developing the assessment and training plans, it is important to consider:

a) the principles of competency-based assessment;

b) typical assessment methods;

c) the concept of milestones; and

d) final competency standard and interim competency standards.

The relationship between the adapted competency model and the training and assessment plans should also be understood (see 4.5).

4.4.1.1 Principles of assessment in a competency-based environment

In a competency-based environment the following principles apply:

a) *Clear performance criteria are used to assess competence*. The adapted competency model establishes these performance criteria.

b) *An integrated performance of the competencies is observed*. The trainee undergoing assessment must demonstrate all competencies and their seamless interaction with each other.

c) *Multiple observations are undertaken*. To determine whether or not a trainee has achieved the interim and/or final competency standard, multiple observations must be carried out.

d) *Assessments are valid*. All of the competencies that comprise the adapted competency model must be assessed. There must be sufficient evidence to ensure that the trainee achieves the competency and meets the interim competency standards and/or the final competency standard. The trainee must not be asked to provide evidence for or be assessed against activities that are outside the scope of the adapted competency model.

e) *Assessments are reliable*. All assessors should reach the same conclusion when performing an assessment. All assessors should be trained and monitored to achieve and maintain an acceptable level of inter-rater reliability.

4.4.1.2 Assessment methods

4.4.1.2.1 The primary method for assessing performance is the conduct of practical assessments which should serve to verify the integrated performance of competencies. It may be necessary to supplement practical assessments with other forms of evaluation. The supplemental evaluations may be included as a result of regulatory requirements and/or a decision that these methods are necessary to confirm that competence has been achieved.

4.4.1.2.2 Practical assessments take place in either a simulated or operational environment. There are two types of practical assessment: formative assessments and summative assessments. Formative and summative assessments are conducted based on 4.6.6 and 4.6.7.

4.4.1.2.2.1 *Formative assessments*

4.4.1.2.2.1.1 Formative assessments are a part of the learning process. Instructors provide feedback to the trainees on how they are progressing toward the interim or final competency standard. This type of assessment enables the trainees to progressively build on competencies already acquired and should aid learning by identifying gaps as learning opportunities. If trainees receive feedback or are assessed only at the end of the training, they will have no opportunity to use that information to improve their performance. The frequency and number of formative assessments may vary depending on the duration of the training and the syllabus structure and its assessment plan (see 4.6).

4.4.1.2.2.1.2 Formative assessments should serve to:

a) motivate trainees;

b) identify strengths and weakness; and

c) promote learning.

4.4.1.2.2.2 *Summative assessments*

4.4.1.2.2.2.1 Summative assessments provide a method that enables the instructor/assessor to work with a trainee to collect evidence of the competencies and performance criteria to be demonstrated with respect to the interim or final competency standard(s). Summative assessments are carried out at defined points during the training and/or at the end of training. During summative assessments, the decision is either "competent" or "not competent" with respect to the interim or final competency standard(s). However, this can be further developed into a more refined grading system with a scale of judgements to improve feedback for the trainee and training personnel.

4.4.1.2.2.2.2 Summative assessments that are conducted during the course to evaluate the progress of the trainee are typically carried out by the instructing team. It may be advantageous if the instructors conducting these assessments were different from the instructors who routinely work with the trainee. Summative assessments conducted at the end of training and that lead to the issue of a licence and/or rating have both legal and safety implications. Therefore, the personnel carrying out these assessments should have the necessary competencies to assess objectively and meet the authority's requirements. Such personnel should be provided with the tools necessary to collect evidence in a systematic and reliable manner in order to ensure inter-rater reliability.

4.4.1.2.3 The list of methods below that supplement practical assessments is not intended to be restrictive. Any suitable supplemental method for assessing competence may be used. Other methods may include projects and group assignments.

4.4.1.2.3.1 *Oral assessment*

4.4.1.2.3.1.1 Oral assessment is a method that may be used to supplement a summative assessment. Practical assessment has some limitations including:

a) it may not be possible to observe a representative cross-section of all the competencies and/or the operation; and

b) it is not feasible to enter into discussions with the trainees while they are undertaking the practical assessment.

4.4.1.2.3.1.2 The oral assessment provides the assessor with the opportunity to target those areas of performance that could not realistically be observed in the practical environment (e.g. emergencies or seasonal issues) and to refocus on actions observed during the practical assessment that may have been cause for concern.

4.4.1.2.3.1.3 Oral assessments may be conducted away from the practical environment. Oral assessments are usually scenario-based and are designed around situations that the assessor wants to explore further. The assessor explains the scenario and then asks the trainees to describe what actions they would take. After the trainees have described their actions, the assessor may ask further clarifying questions. The assessor then assesses the trainees' responses in relation to the adapted competency model.

4.4.1.2.3.2 *Examinations*

Examinations are used to evaluate theoretical knowledge and, to a lesser extent, the application of some basic skills. Examinations may be written or completed with the aid of digital equipment and/or online applications.

4.4.1.3 Milestones

4.4.1.3.1 When the duration or complexity of a course is such that it makes pedagogic sense to check that a trainee is progressing towards competence at an acceptable pace, the course may be divided into milestones. The course is divided into cohesive chunks or units of learning, organized into a logical sequence that generally progresses from the simple to the complex. Milestones are reached when both training and assessment are completed for each unit of learning.

4.4.1.3.2 Milestones are sequential; therefore, a trainee would need to successfully complete the training and assessment for the first milestone before proceeding to the next.

4.4.1.3.3 Milestones can be determined on the basis of, for example, the number of simulations or hours of on-the-job training (OJT) to be undertaken or on logical units of learning, meaning that the training that takes place in the simulated unit environment would be the first milestone and the training that takes place as OJT would be the second milestone.

4.4.1.4 Final and interim competency standards

4.4.1.4.1 On successful completion of an initial training course, the trainees will have achieved the final competency standard for that phase of training. This means that they will have successfully completed all the required training and assessments that have been determined as necessary to demonstrate the competencies and meet the performance criteria as described in the adapted competency model.

4.4.1.4.2 If a course has been divided into milestones, it will be necessary to define an interim competency standard for each milestone. For the practical assessments, this may be achieved by:

a) modifying the adapted competency model, especially the conditions and/or standards (e.g. limiting the traffic levels and/or the level of complexity); and

b) defining the degree of achievement expected for each performance criterion.

4.4.1.4.3 An interim competency standard is achieved when all the required assessments (including any examinations or other methods of assessment) for that milestone have been successfully achieved. Making significant modifications to the conditions of an adapted competency model to create an interim competency standard occurs more typically for training that will take place in a simulated environment. In a simulated environment it is possible to modify conditions such as operational complexity. During OJT there are fewer opportunities to modify the conditions. The most typical condition to modify during OJT is the level of support that is provided by the instructor.

4.4.1.4.4 Refresher and recurrent training are based on the assumption that trainees have already achieved competence and so it is unlikely that there would be a need to create interim competency standard(s).

4.4.1.4.5 During conversion training, the extent or complexity of the change and the duration of the training would be the determining factors as to whether it would be necessary to introduce milestones and interim competency standard(s).

4.4.1.4.6 Figure I-2-C-4 shows an example of a course that has been divided into two milestones. The interim competency standard for Milestone 1 was determined by modifying the conditions and standards of the adapted competency model. The final competency standard is directly linked to the adapted competency model, without any modifications to the conditions and/or standards.

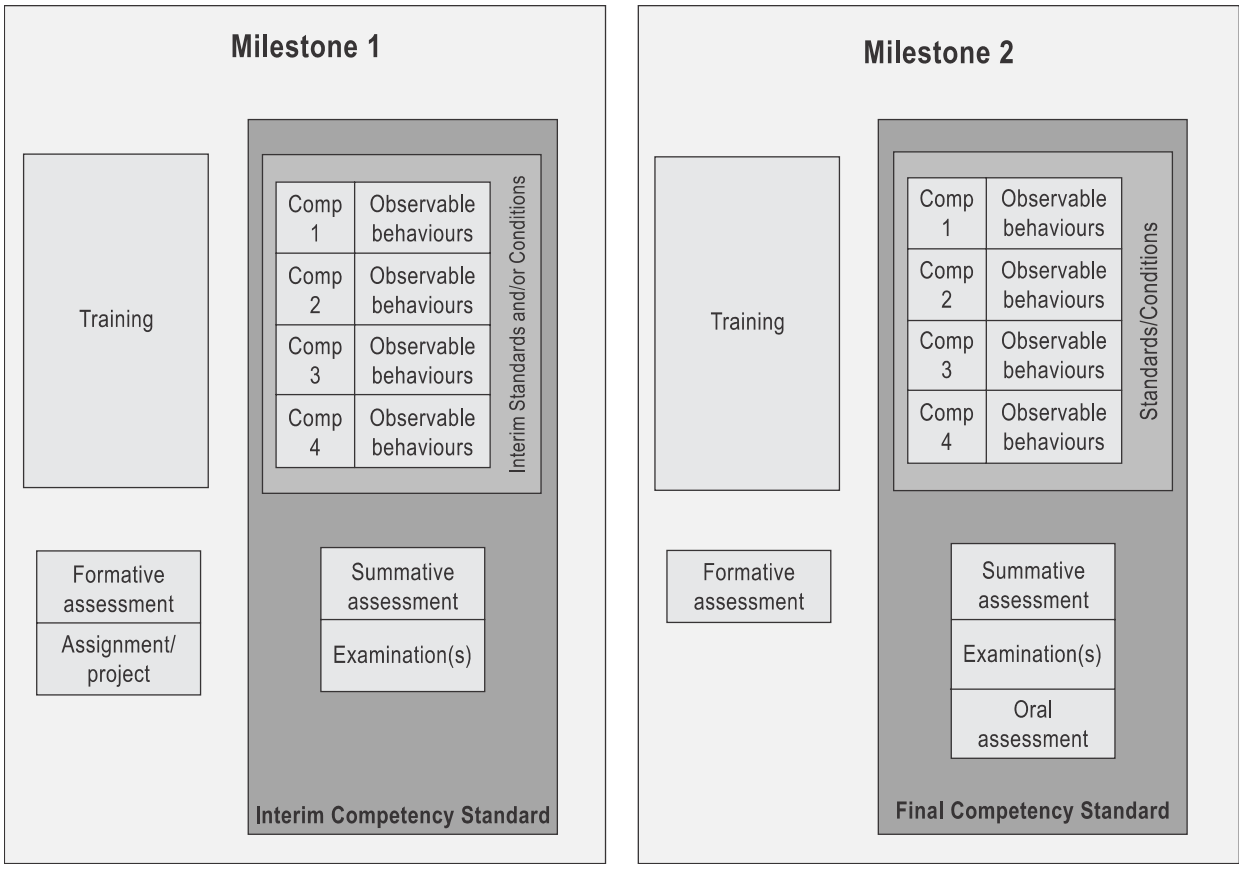

Figure I-2-C-4. Two milestones with an interim and a final competency standard

4.4.2 The assessment plan

4.4.2.1 The purpose of the assessment plan is to detail how competence is going to be determined. It supports the principles of assessment in a competency-based environment outlined in 4.4.1.1. The assessment plan details:

a) the final competency standard associated with the final milestone;

b) the interim competency standard associated with each milestone (if required);

c) the list of assessments (formative and summative assessments, examinations, oral assessments, etc.) required for each of the milestone(s) that has been defined;

d) when assessments should take place;

e) the tools to be used to collect evidence during practical assessment;

f) the pass marks for projects, examinations or oral assessments;

g) if required, the minimum number of formative assessments to be undertaken prior to starting summative assessments; and

h) the number of observations required to assess performance for the interim and final competency standards.

4.4.2.2 In this document, it is assumed that the organization has a training and procedures manual that describes the administrative procedures relating to:

a) which personnel may conduct assessments and their qualifications;

b) roles and responsibilities of personnel during the conduct of assessments;

c) assessment procedures (preparation, conduct and post-assessment);

d) conditions under which assessments are to be undertaken;

e) record-keeping; and

f) actions to be taken when a trainee fails to meet the competency standard(s) of the assessment.

4.4.3 The training plan

4.4.3.1 The purpose of the training plan is to detail:

a) the composition and structure of the course;

b) the syllabus;

c) the milestones (if required);

d) the modules, training events and their delivery sequence; and

e) the course schedule.

4.4.3.2 The training plan will be used by the training designer(s) to create the training and assessment materials. Figure I-2-C-5 illustrates the relationship between milestones and the assessment and training plans.

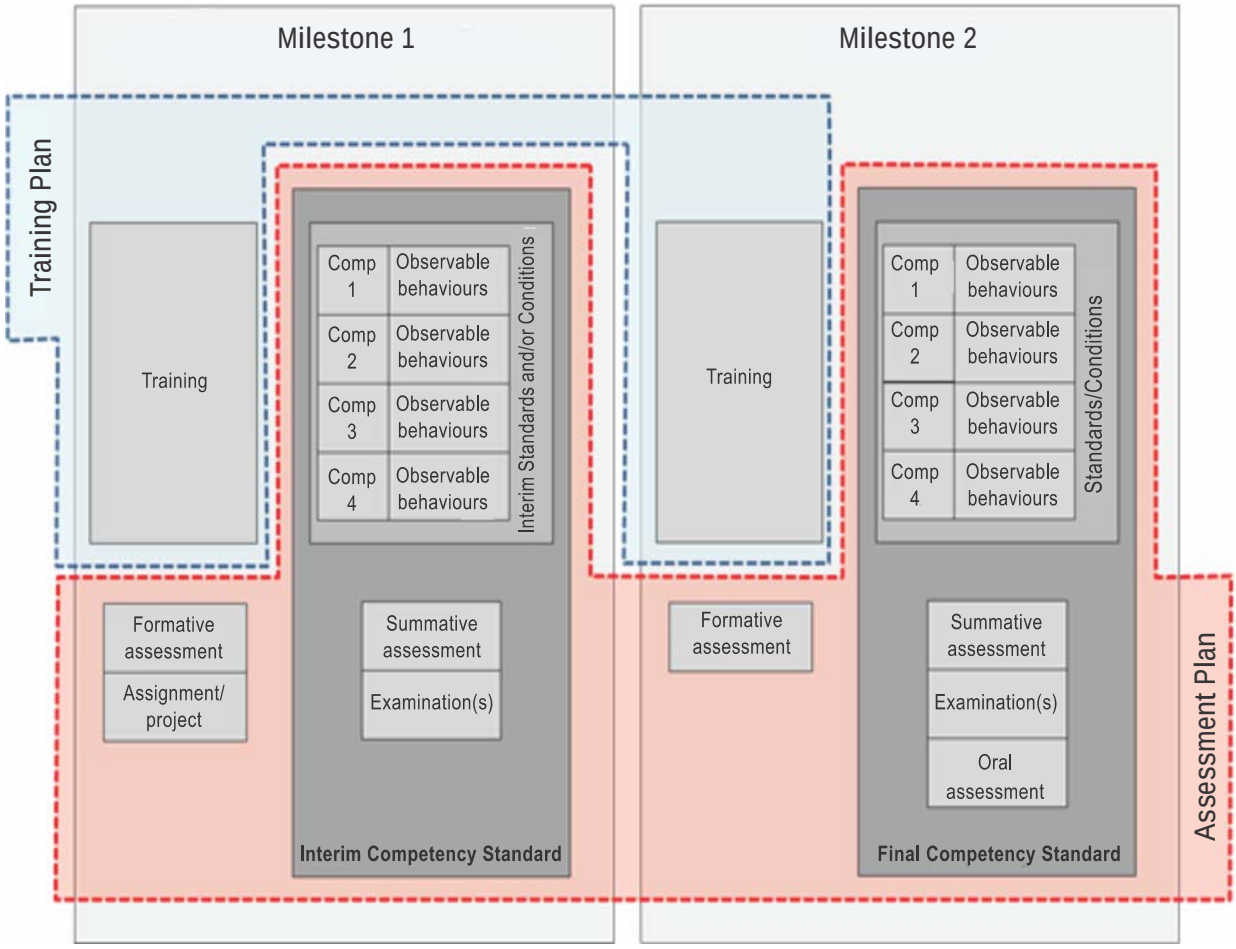

Figure I-2-C-5. Relationship between milestones and the assessment and training plans

4.5 Relationship between the adapted competency model and the assessment and training plans

4.5.1 The relationship between the adapted competency model and the training and assessment plans is fundamental to understanding how competency-based training and assessment works. Figure I-2-C-5 illustrates the relationship between milestones and the assessment and training plans.

4.5.2 The training specification developed in Workflow 1 (see Figure I-2-C-2) serves as the common basis for the development of the adapted competency model and the training and assessment plans. Generally, when developing the adapted competency model, the task list is used to aid the selection of the observable behaviours from the ICAO competency framework. The operational, technical, regulatory and organizational requirements aid the development of the conditions and standards that will apply to the competencies and observable behaviours.

4.5.3 The same task list and requirements are used to develop the training plan. The training plan is used to prepare the trainees to undertake assessment to determine if they are competent in accordance with the adapted competency model. The adapted competency model and the training plan are used to develop the assessment plan.

4.5.4 The syllabus in the training plan is composed of training objectives derived from tasks and sub-tasks as well as the underlying KSA. However, when assessing whether competence has been achieved, the adapted competency model, not the syllabus, is referenced. Consequently, the performance criteria are used to assess if competence has been achieved, and the tasks/sub-tasks that are carried out by the trainee are the "vehicle" for enabling the assessment to be conducted. Figure I-2-C-6 illustrates the relationship between Workflows 1 and 2.

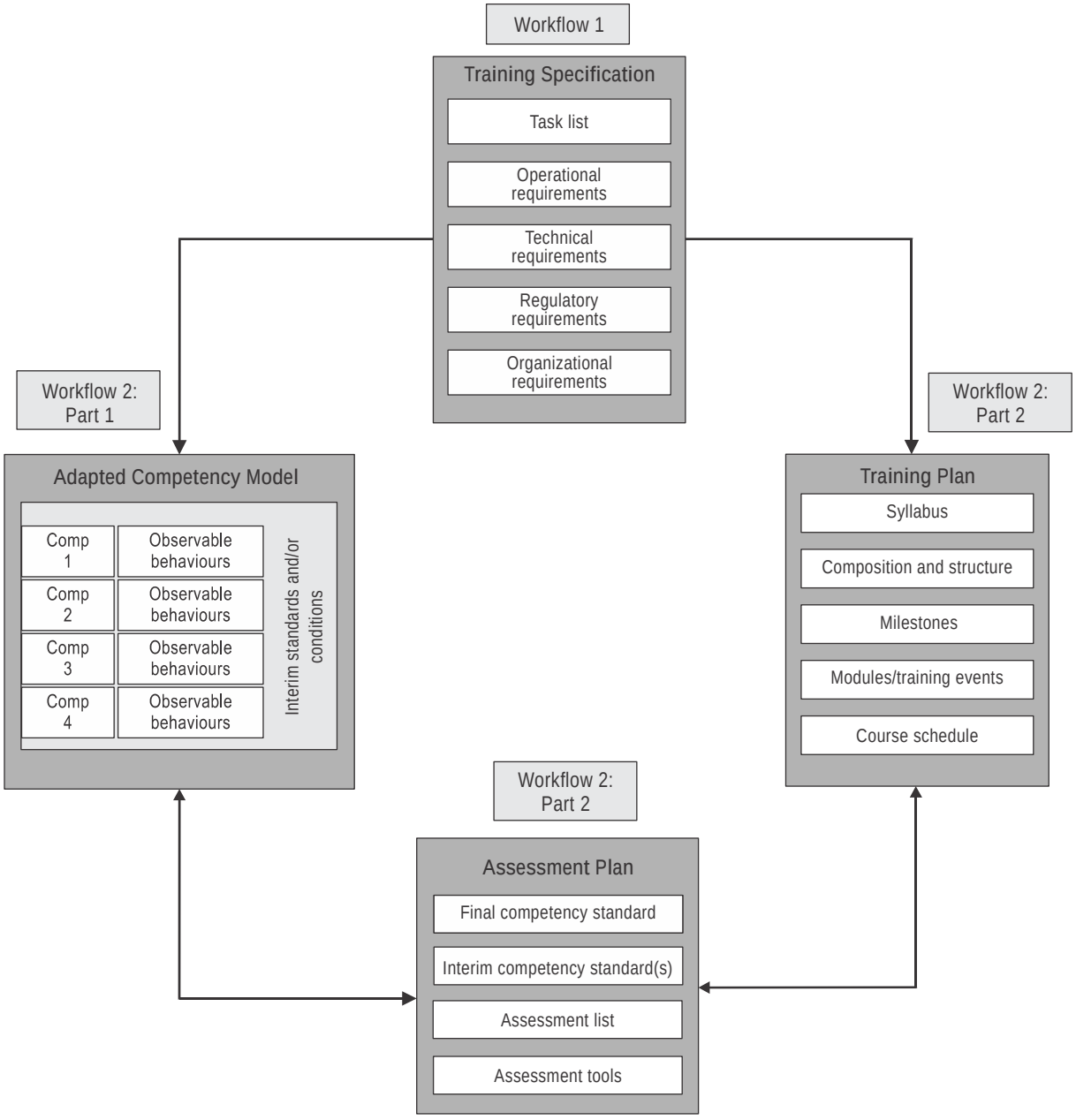

Figure I-2-C-6. Relationship between Workflows 1 and 2

4.6 Design process for assessment and training plans

4.6.1 Figure I-2-C-7 represents Part 2 of Workflow 2 and may be used to aid the design process.

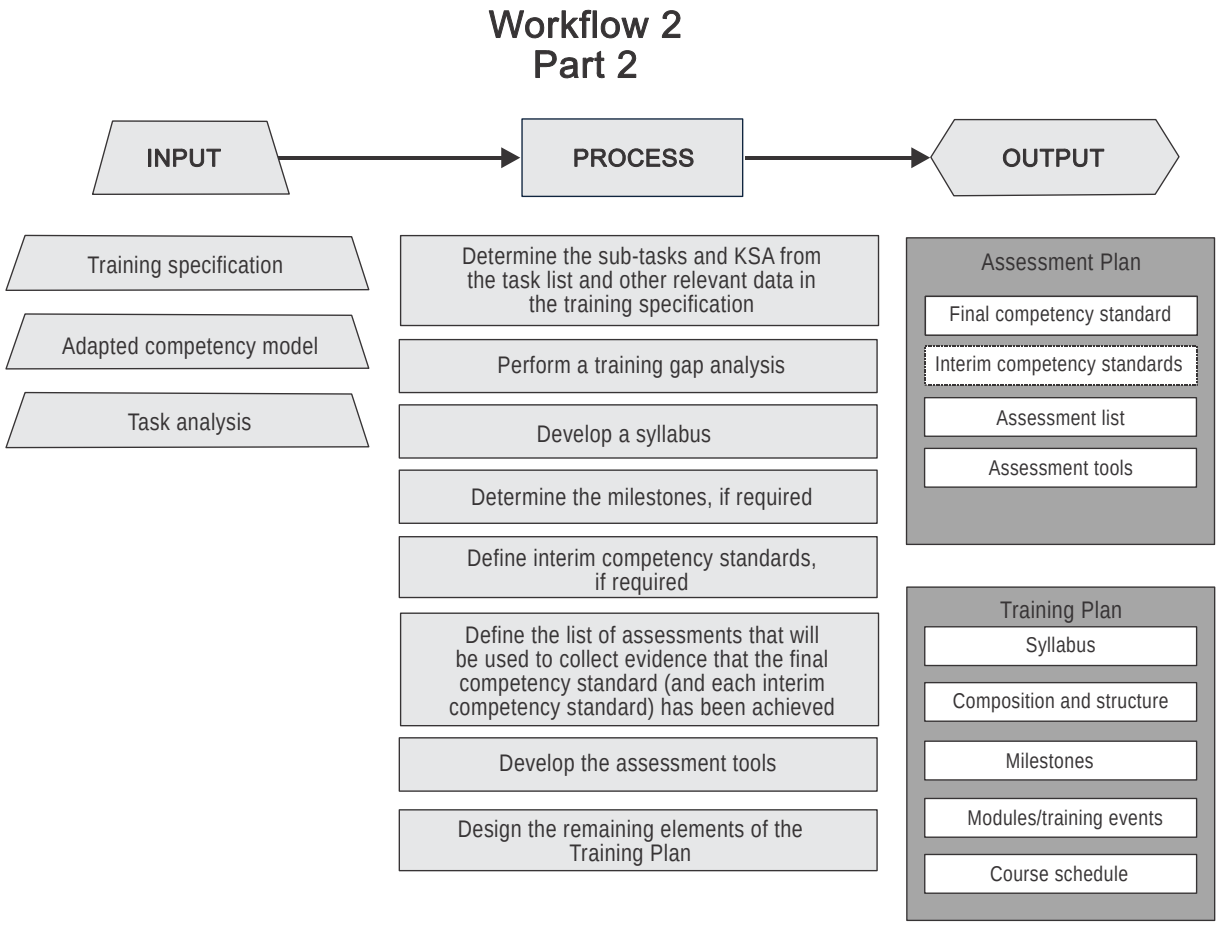

Figure I-2-C-7. Workflow 2, Part 2 — Design the assessment and training plans

4.6.2 Determining the sub-tasks and KSA

4.6.2.1 To develop the training, it is necessary to determine which tasks and sub-tasks the trainee will perform and the KSA required to do so. The task list has already been recorded in the training specification (Workflow 1). Therefore, the sub-tasks and KSA are determined on the basis of the task list in conjunction with the operational, technical, regulatory and organizational requirements.

4.6.2.2 It is not necessary to list a knowledge element, a skill element and an attitude element for each task; only the elements that are required are listed.

4.6.3 Perform training gap analysis

4.6.3.1 The training gap analysis is used to compare the tasks and sub-tasks required to be performed competently, the KSA (see 4.6.2.1) and the current level of the trainee population. The result of the training gap analysis will be used to develop the training objectives of the syllabus.

4.6.3.2 In some instances, it may not be possible to accurately analyse the target population (because they are not yet known). A baseline level of tasks/sub-tasks and KSA is assumed to exist, and the training will be developed on this assumption. Clearly, once the target population is known, it must be verified that the assumption is correct, and if not, adjustments should be made to the tasks/sub-tasks and KSA.

4.6.4 Develop syllabus

The syllabus is the list of tasks/sub-tasks and KSA that have been formulated into training objectives and structured in such a way that it will be possible to gauge the scale of the training and, in the next step, whether it will be necessary to introduce milestones or not. The syllabus is an element of the training plan.

4.6.5 Determine milestones and interim competency standards

Paragraphs 4.4.1.3 and 4.4.1.4 explain how milestones and interim competency standards are determined. The result of this process is a high-level description of the learning activities and environment for each milestone, their sequence, and a complete description of the interim competency standard associated with each milestone.

4.6.6 Define the list of assessments

The number of assessments required for each milestone and the methods that will be used are determined by the complexity of the training and any regulatory requirements.

4.6.7 Develop assessment tools

The following documents should be designed to support practical assessments:

a) *Evidence guide*. An evidence guide translates the performance criteria from the adapted competency model into practical examples of observations that instructors/assessors can expect to see. It is used to eliminate different interpretations among instructors/assessors and ensures that valid and reliable evidence is gathered. It details competencies, their associated observable behaviours and the expected performance that should be observed at the interim or final competency standard.

b) *Competency checklist*. A competency checklist details the competencies and performance criteria and is used to record achievements during each formative and summative assessment. The assessment plan details how many assessments should be completed for each milestone.

c) *Competency assessment form*. The competency assessment form is used to summarize the results of all the assessments that have been undertaken by a trainee and then decide whether the trainee has achieved either an interim competency standard or the final competency standard. The number and method(s) of assessment are described in the assessment plan. The competency assessment form must correlate with the assessment plan.

4.6.8 Design the training plan

The training plan is made up of the following elements:

a) *Composition and structure*. This is a high-level description of what will be trained (composition) and how the various elements of training relate to each other (structure). If the course covers only one type of training (e.g. aerodrome rating), the composition is simple. When a course is composed of more than one type of training (e.g. one course covering basic + aerodrome rating + approach surveillance rating), it will need to be explained how these types of training will relate to each other in terms of structure and sequence.

b) *Syllabus*. The syllabus is the list of training objectives that will need to be covered by the end of the course. The training objectives are derived from the tasks/sub-tasks and associated KSA identified in 4.6.2 and the training gap analysis as described in 4.6.3.

A syllabus does not prescribe the order or sequence of learning; it simply lists the training objectives. To facilitate the process of assigning training objectives to the various milestones, modules and training events, it is useful to structure a syllabus into logical groups of subjects.

c) *Milestones*. If it has been determined that milestones are necessary to structure the course, the assessment plan will already have defined the interim competency standards associated with each milestone and the final competency standard that needs to be achieved by the end of the last milestone. Training objectives from the syllabus are assigned to each milestone.

d) *Modules, training events and sequence*. Depending on the number, type and complexity of the training objectives, it may be helpful to further subdivide the training into modules (within an entire course or within all or some milestones, if milestones are required). This is illustrated in Figure I-2-C-8.

Whichever substructure is determined as appropriate (course, milestones or modules), training events are developed to support the sub-structure. Training events are the smallest units of learning and include classroom-based lessons, simulator exercises, web-based training exercises, case studies, etc. Training events contain the following information:

1) which objectives are grouped and taught together;

2) the number of periods needed to teach each group of objectives;

3) which method(s) should be used (lessons, case studies, individual simulation, briefing, self-study, etc.);

4) which media are used (e.g. simulators, visual aids or textbook);

5) the learning rate (i.e. self-paced, time-restricted or real-time); and

6) whether the training is delivered to individuals or in groups.

Training events should be sequenced into an order of delivery that takes into account sound pedagogic practice, the sub-structure defined and the assessment requirements. The training events are the template that the training designers use to create the training materials necessary to deliver the course.

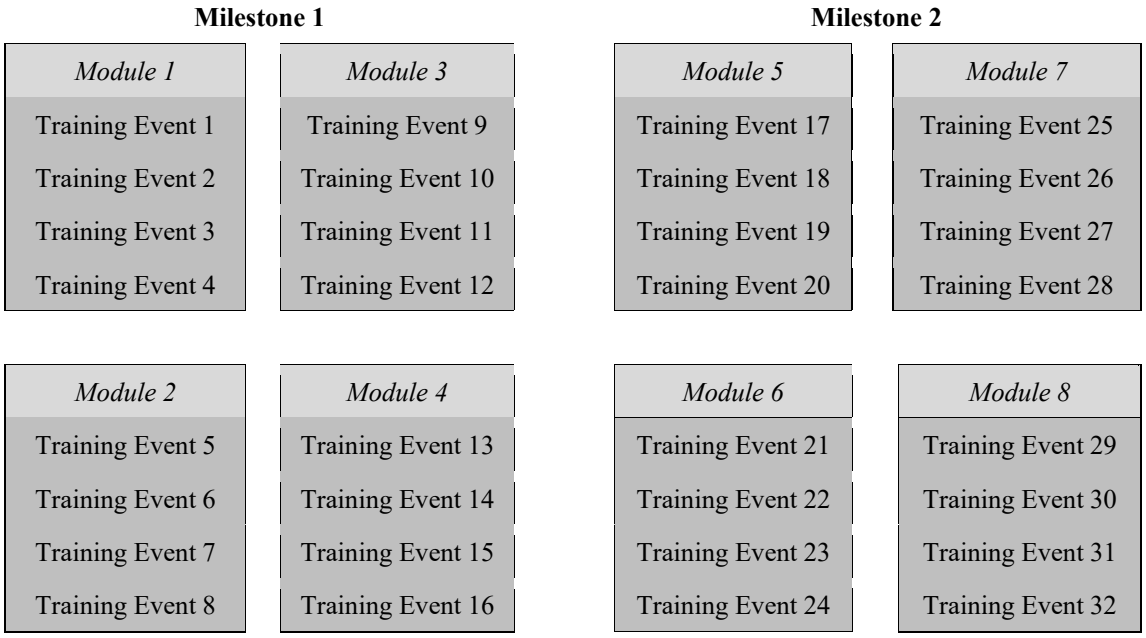

Figure I-2-C-8. Structure of the training plan

e) *Course schedule*. The course schedule indicates how the training events and assessments fit together into the total duration of the course.

5. Workflow 3 — Develop the training and assessment materials

During this step, all the training and assessment materials are developed based on the adapted competency model and the training and assessment plans. Training and assessment materials include but are not limited to training notes, exercise briefings, practical exercises, case studies, presentations, video clips, self-test quizzes, examinations, assessments and assessment tools. On completion of Workflow 3, the outputs should include all training and assessment materials, schedules and any other applicable training resources. Workflow 3 is illustrated in Figure I-2-C-9.

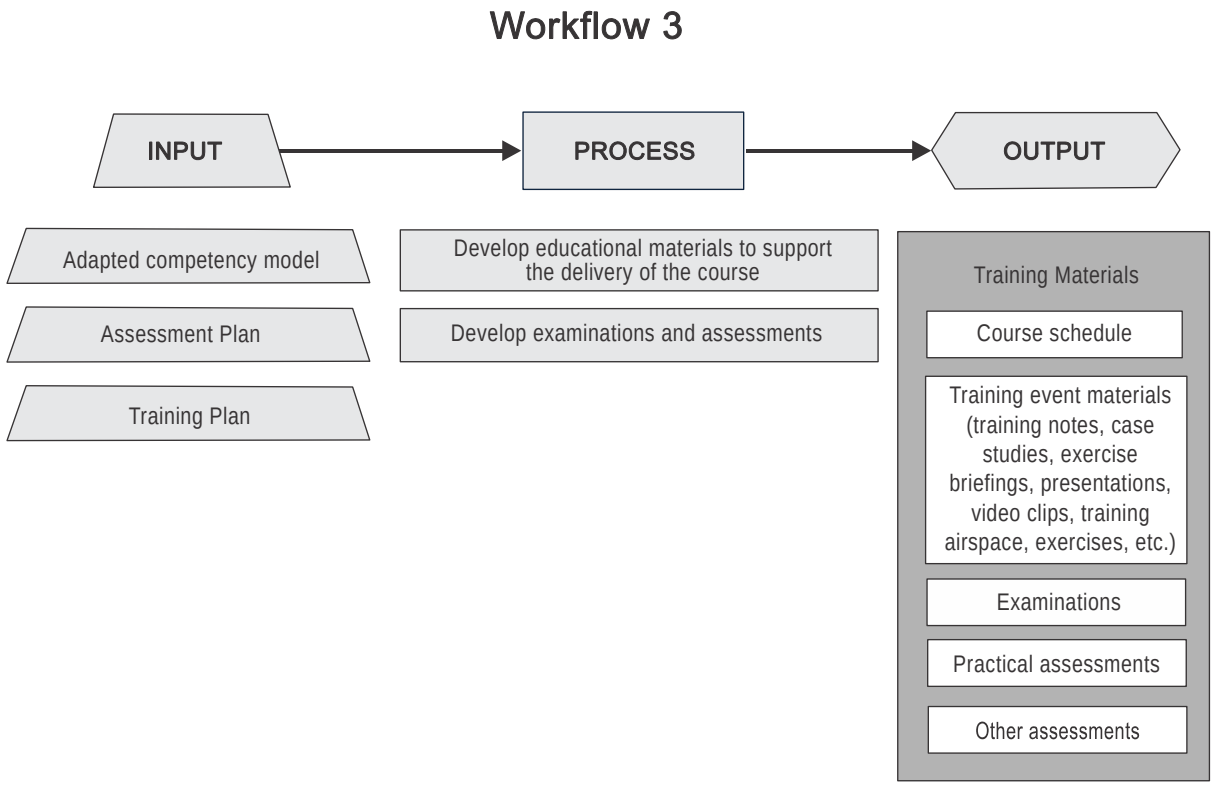

Figure I-2-C-9. Workflow 3 — Develop the training and assessment materials

6. Workflow 4 — Conduct the course in accordance with the training and assessment plans

Workflow 4, which illustrates the process of conducting the course in accordance with the training and assessment plans, is in Figure I-2-C-10.

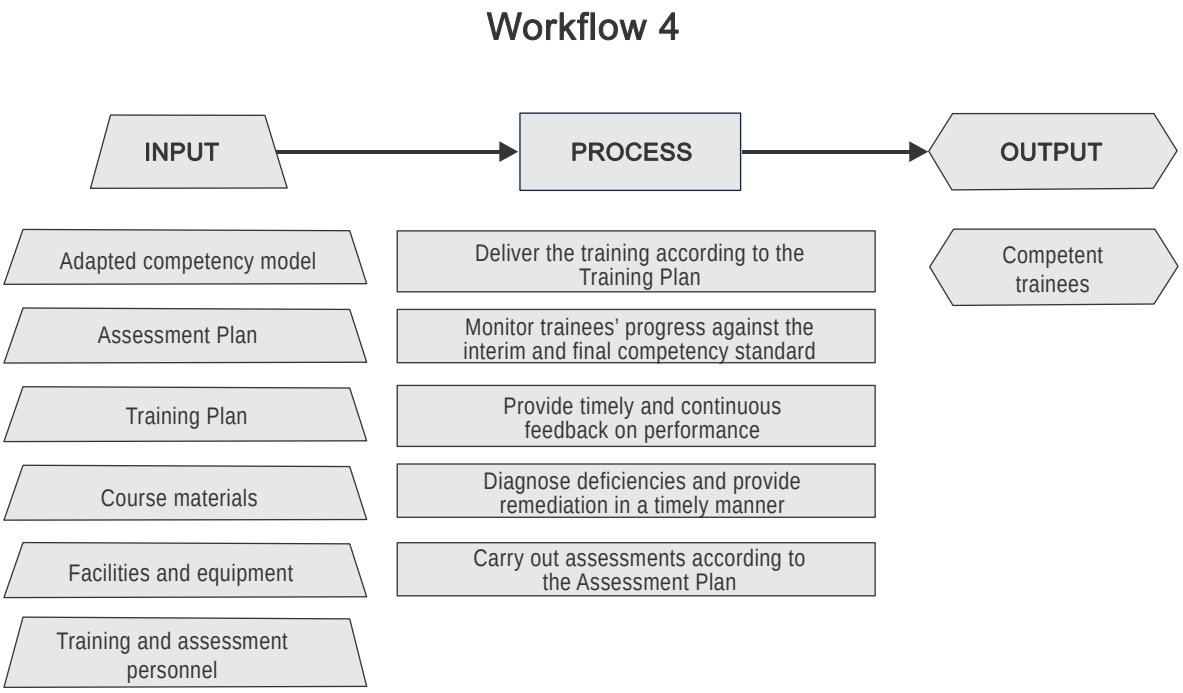

Figure I-2-C-10. Workflow 4 — Conduct the course in accordance with the training and assessment plans

7. Workflow 5 — Evaluate the course including the training and assessment plans

At the end of a period of training, feedback on performance on the job from trainees, instructors, assessors and employers is gathered to determine the effectiveness of the course in supporting the progression of learning towards competence in the workplace. Evaluation of the training and assessment plans should be based on valid and reliable evidence. This evaluation may lead to changes or improvements being made to the course. Figure I-2-C-11 illustrates the process of evaluating a course.

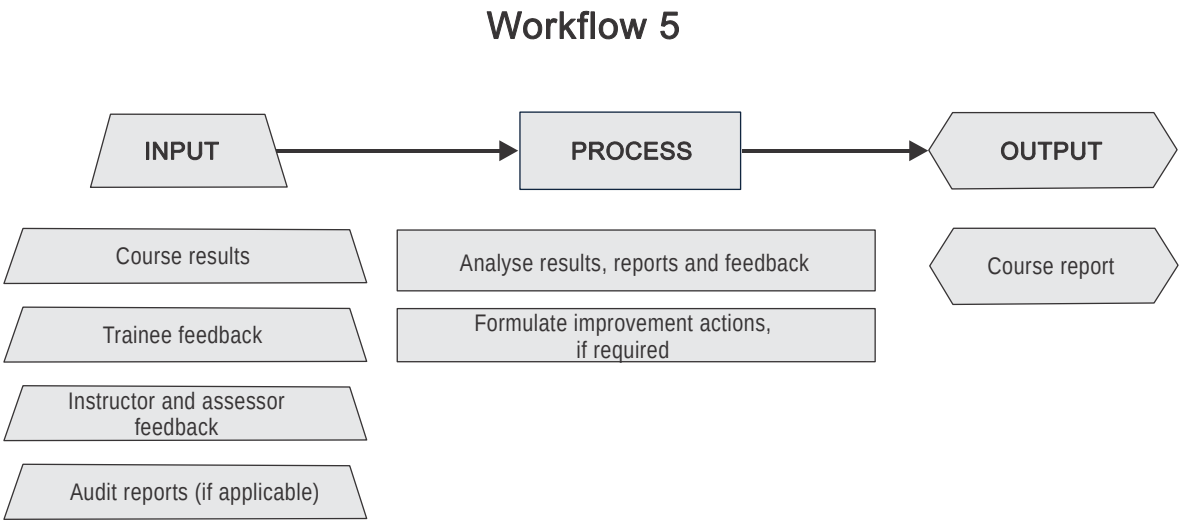

Figure I-2-C-11. Workflow 5 — Evaluate the course including the training and assessment plans

Chapter 3

COURSE DEVELOPERS AND QUALIFICATIONS OF INSTRUCTORS

Note 1.— An ICAO competency framework for pilot instructors and evaluators is contained in Part II, Section 1.

Note 2.— An ICAO competency framework for air traffic control on-the-job training instructors is contained in Part IV.

3.1 COURSE DEVELOPERS

Course developers shall have demonstrated that they are able to develop training in accordance with the principles of a competency-based approach to training, as outlined in Part I, Chapter 2, 2.2.

3.2 INSTRUCTOR QUALIFICATIONS

3.2.1 Instructors shall hold or have held a licence and be authorized to carry out instruction on the basis of their expertise and/or qualifications and/or ratings.

Note 1.— Authorization to carry out instruction will take into account Annex 1 instructor rating, authorization or qualification requirements, when applicable.

Note 2.— The above requirement does not preclude a non-licensed technical specialist from being authorized by the appropriate authority to instruct on subject matters that deal with systems operation or procedural requirements in any training environment or media.

3.2.2 Prior to an organization authorizing the provision of instruction, instructors should undergo a selection process designed to ensure the individual's motivation and disposition are suitable for the instructor's role.

3.2.3 Prior to an organization authorizing the provision of instruction, instructors should successfully complete a formal instructor competency assessment during the conduct of practical training. During the assessment, the instructor should consistently demonstrate the required competencies according to the relevant adapted competency model.

3.2.4 All instructors should receive refresher training, and be reassessed according to 3.2.3 using a documented training and assessment process acceptable to the appropriate authority, implemented by a certificated or approved organization and at intervals established by the authority. Such refresher training and reassessment intervals shall not be greater than three years.

3.2.5 As of 3 November 2022, *RPAS instructors.* RPAS instructors shall meet the requirements specified in Annex 1, 2.11.7 and 2.14, as appropriate. In addition, the RPAS instructor shall have experience, acceptable to the Licensing Authority, in RPAS operations.

3.2.6 Qualified and authorized instructors may be assigned to carry out specific assessment, checking and/or testing duties to determine that all required performance criteria have been satisfactorily achieved. These performance criteria may have been established as a final objective or required to be met on a continuous basis. In either case, the instructor is responsible for making a determination of the level of competence achieved and any recommendation for immediate remediation, if necessary. Qualified instructors/assessors/evaluators may be assigned to determine the final level of competence of a candidate.

Procedures for
Air Navigation Services

TRAINING

Part II

TRAINING AND ASSESSMENT
FOR AIRCRAFT OPERATIONAL PERSONNEL

Part II

TRAINING AND ASSESSMENT FOR AIRCRAFT OPERATIONAL PERSONNEL

This part provides guidance on the training and assessment for aircraft operational personnel, including flight crew, cabin crew and flight operations officers/flight dispatchers. Section 1 introduces the training and assessment for flight crew. Chapter 1 outlines the ICAO competency framework for aeroplane pilots. Chapter 2 outlines the principles and procedures for competency-based training and assessment for the multi-crew pilot licence (MPL). Chapter 3 covers evidence-based training (EBT). Chapter 4 deals with upset prevention and recovery training (UPRT). Chapter 5 contains procedures for competency-based training and assessment for the type rating. Chapter 6 describes the threat and error management model and provides the procedures applicable to all pilots. Chapter 7 outlines the ICAO competency framework for pilot instructors and evaluators. Chapter 8 outlines the principles and procedures for competency-based training and assessment for the remote pilot licence (RPL).

Note. — Additional chapters will be introduced to Part II as procedures become available.

Section 1

FLIGHT CREW TRAINING AND ASSESSMENT

Chapter 1

ICAO COMPETENCY FRAMEWORK FOR AEROPLANE PILOTS

1.1 INTRODUCTION

1.1.1 This chapter provides the procedures for establishing a competency-based training and assessment programme for aeroplane pilots, with which approved training organizations (ATOs), air operators and Authorities shall comply when implementing such a programme.

1.1.2 Paragraph 3 of Appendix 2 to Annex 1 offers to Licensing Authorities the option to apply a competency-based approach to training for private and commercial pilot licences and instrument rating as an alternative means of compliance to experience requirements in accordance with the particular provisions in Annex 1. Competency-based training and assessment for the type rating is not directly addressed in Annex 1 but is one means to satisfy the requirements for the issue of a type rating. A competency-based approach is an Annex 1 requirement for multi-crew pilot licence training programmes.

1.1.3 The ICAO competency framework for aeroplane pilots defined in Appendix 1 to this chapter shall be used by the ATO or the operator as the basis for the development of an adapted competency model, approved by the Licensing Authority, for pilot licences and ratings in accordance with Part I, Chapter 2. The ICAO Competency Framework for Aeroplane Pilots is applicable to all aeroplane pilot licences and/or ratings. The instructor rating or authorization will require additional competencies. A designated pilot examiner will also require additional competencies. These competencies are included in Chapter 6 of this section.

1.1.4 In addition, the ICAO competency framework for aeroplane pilots can be applied to recurrent assessment and training to comply with the requirements of Annex 6 — *Operation of Aircraft*, Part I, *International Commercial Air Transport — Aeroplanes*, 9.3, *Flight crew member training programmes* and 9.4.4, *Pilot proficiency checks*.

1.1.5 It may also be applied for approved training organizations and operators engaged in the recurrent training and assessment of flight crew operating large or turbojet aeroplanes in accordance with Annex 6, Part II — *International General Aviation — Aeroplanes*.

1.1.6 Competency-based training and assessment programmes for aeroplane pilots shall include all components identified in paragraph 2.6 of Part I, Chapter 2.

1.1.7 An ISD methodology shall be applied in the design of competency-based training and assessment programmes as per Part I, Chapter 2.

1.1.8 The ATO shall develop the assessment process, approved by the Licensing Authority, in accordance with Part I, Chapter 2.

1.1.9 Appendix 2 to this Chapter provides a list of tasks by phase of flight for the aeroplane pilot. Tasks serve solely as inventory of the course curriculum in competency-based training and assessment. The training objective is training of the competencies to proficiency.

1.1.10 The applicant shall meet the requirements of the approved competency-based training and assessment programme before the appropriate aeroplane pilot licence or rating can be issued.

1.1.11 **Application of Knowledge**

1.1.11.1 Underpinning the pilot competencies is the ‘application of knowledge’ which collectively refers to the ability of the pilot to:

- recall and proactively update relevant knowledge; and
- apply acquired knowledge to the operational environment, including TEM.

1.1.11.2 Throughout all phases of pilot training, an operator or ATO must progressively develop, assess and debrief the trainees on their application of knowledge, recording at least strengths, weaknesses and any remedial action.

1.1.11.3 The training and evaluation for 1.1.11.2 should be conducted to meet the training objective, using a range of methods which have been developed using an instructional systems design method (e.g. ADDIE). The training and evaluation should be described in the approved relevant manual(s) and subject to operator or ATO course review and update action.

1.1.11.4 Where the effect of a trainee’s knowledge impacts on an observable behaviour within a pilot competency, this should also be reflected in the review of that competency and be debriefed in the context of that competency.

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Appendix 1 to Chapter 1

ICAO COMPETENCY FRAMEWORK TO DEVELOP COMPETENCY-BASED TRAINING AND ASSESSMENT FOR AEROPLANE PILOT LICENCES, RATINGS, AND RECURRENT TRAINING

Note 1.— The competencies and observable behaviours in the table are not listed according to any pre-defined priority. Observable behaviours may include but are not limited to the observable behaviours listed in the table below.

Note 2.— Observable behaviours are performed to a criterion, e.g. accurately or correctly, generally not stated.

Competency	*Description*	*Observable behaviours (OB)*
Application of procedures and compliance with regulations	Identifies and applies appropriate procedures in accordance with published operating instructions and applicable regulations	OB 1.1 Identifies where to find procedures and regulations OB 1.2 Applies relevant operating instructions, procedures and techniques in a timely manner OB 1.3 Follows SOPs unless a higher degree of safety dictates an appropriate deviation OB 1.4 Operates aeroplane systems and associated equipment correctly OB 1.5 Monitors aircraft systems status OB 1.6 Complies with applicable regulations OB 1.7 Applies relevant procedural knowledge
Communication	Communicates through appropriate means in the operational environment, in both normal and non-normal situations	OB 2.1 Determines that the recipient is ready and able to receive information OB 2.2 Selects appropriately what, when, how and with whom to communicate OB 2.3 Conveys messages clearly, accurately and concisely OB 2.4 Confirms that the recipient demonstrates understanding of important information OB 2.5 Listens actively and demonstrates understanding when receiving information OB 2.6 Asks relevant and effective questions OB 2.7 Uses appropriate escalation in communication to resolve identified deviations OB 2.8 Uses and interprets non-verbal communication in a manner appropriate to the organizational and social culture OB 2.9 Adheres to standard radiotelephone phraseology and procedures OB 2.10 Accurately reads, interprets, constructs and responds to datalink messages in English

Competency	*Description*	*Observable behaviours (OB)*
Aeroplane Flight Path Management, automation	Controls the flight path through automation	OB 3.1 Uses appropriate flight management, guidance systems and automation, as installed and applicable to the conditions (see Part I, Chapter 1, for the definition of conditions) OB 3.2 Monitors and detects deviations from the intended flight path and takes appropriate action OB 3.3 Manages the flight path safely to achieve optimum operational performance OB 3.4 Maintains the intended flight path during flight using automation while managing other tasks and distractions OB 3.5 Selects appropriate level and mode of automation in a timely manner considering phase of flight and workload OB 3.6 Effectively monitors automation, including engagement and automatic mode transitions
Aeroplane Flight Path Management, manual control	Controls the flight path through manual control	OB 4.1 Controls the aircraft manually with accuracy and smoothness as appropriate to the situation OB 4.2 Monitors and detects deviations from the intended flight path and takes appropriate action OB 4.3 Manually controls the aeroplane using the relationship between aeroplane attitude, speed and thrust, and navigation signals or visual information OB 4.4 Manages the flight path safely to achieve optimum operational performance OB 4.5 Maintains the intended flight path during manual flight while managing other tasks and distractions OB 4.6 Uses appropriate flight management and guidance systems, as installed and applicable to the conditions (See Part I, Chapter 1, definitions) OB 4.7 Effectively monitors flight guidance systems including engagement and automatic mode transitions

Competency	*Description*	*Observable behaviours (OB)*
Leadership and Teamwork	Influences others to contribute to a shared purpose Collaborates to accomplish the goals of the team	OB 5.1 Encourages team participation and open communication OB 5.2 Demonstrates initiative and provides direction when required OB 5.3 Engages others in planning OB 5.4 Considers inputs from others OB 5.5 Gives and receives feedback constructively OB 5.6 Addresses and resolves conflicts and disagreements in a constructive manner OB 5.7 Exercises decisive leadership when required OB 5.8 Accepts responsibility for decisions and actions OB 5.9 Carries out instructions when directed OB 5.10 Applies effective intervention strategies to resolve identified deviations OB 5.11 Manages cultural and language challenges, as applicable
Problem-solving and decision-making	Identifies precursors, mitigates problems; and makes decisions	OB 6.1 Identifies, assesses and manages threats and errors in a timely manner OB 6.2 Seeks accurate and adequate information from appropriate sources OB 6.3 Identifies and verifies what and why things have gone wrong, if appropriate OB 6.4 Perseveres in working through problems while prioritizing safety OB 6.5 Identifies and considers appropriate options OB 6.6 Applies appropriate and timely decision-making techniques OB 6.7 Monitors, reviews and adapts decisions as required OB 6.8 Adapts when faced with situations where no guidance or procedure exists OB 6.9 Demonstrates resilience when encountering an unexpected event

Competency	*Description*	*Observable behaviours (OB)*
Situational awareness and management of information	Perceives, comprehends and manages information and anticipates its effect on the operation	OB 7.1 Monitors and assesses the state of the aeroplane and its systems OB 7.2 Monitors and assesses the aeroplane's energy state, and its anticipated flight path OB 7.3 Monitors and assesses the general environment as it may affect the operation OB 7.4 Validates the accuracy of information and checks for gross errors OB 7.5 Maintains awareness of the people involved in or affected by the operation and their capacity to perform as expected OB 7.6 Develops effective contingency plans based upon potential risks associated with threats and errors OB 7.7 Responds to indications of reduced situational awareness
Workload management	Maintains available workload capacity by prioritizing and distributing tasks using appropriate resources	OB 8.1 Exercises self-control in all situations OB 8.2 Plans, prioritizes and schedules appropriate tasks effectively OB 8.3 Manages time efficiently when carrying out tasks OB 8.4 Offers and gives assistance OB 8.5 Delegates tasks OB 8.6 Seeks and accepts assistance, when appropriate OB 8.7 Monitors, reviews and cross-checks actions conscientiously OB 8.8 Verifies that tasks are completed to the expected outcome OB 8.9 Manages and recovers from interruptions, distractions, variations and failures effectively while performing tasks

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Appendix 2 to Chapter 1

AEROPLANE PILOT TASKS BY PHASES OF FLIGHT

Note 1.— Pilot tasks used in training may include but are not limited to the pilot tasks listed in the table below.

Note 2.— The assignment of PF and PM duty in the table are presented as an example.

	X. Phase of flight **X.X Tasks** **X.X.X Sub-tasks**	*Duty*
1.	***[RESERVED]***	
2.	**PERFORM AEROPLANE GROUND AND PRE-FLIGHT OPERATIONS**	
2.1	**Perform dispatch duties**	
2.1.1	Verifies technical condition of the aeroplane, including adequate use of MEL	PF/PM
2.1.2	Checks technical bulletins and notices	PF/PM
2.1.3	Determines operational environment and pertinent weather	PF/PM
2.1.4	Determines impact of weather on aeroplane performance	PF/PM
2.1.5	Applies flight planning and load procedures	PF/PM
2.1.6	Determines fuel requirement	PF/PM
2.1.7	Files an ATS flight plan (if required)	PF/PM
2.2	**Provide flight crew and cabin crew briefings**	
2.2.1	Briefs flight crew in all relevant matters	PF
2.2.2	Briefs cabin crew in all relevant matters	PF
2.3	**Perform pre-flight checks and cockpit preparation**	
2.3.1	Ensures the airworthiness of the aeroplane	PF
2.3.2	Performs the cockpit preparation and briefings	PF/PM
2.3.3	Performs FMS initialization, data insertion and confirmation	PF/PM
2.3.4	Optimizes and checks take-off performance and take-off data calculation	PF/PM
2.3.5	Conducts relevant briefings	PF
2.4	**Perform engine start**	
2.4.1	Asks for, receives, acknowledges and checks ATC clearance	PM
2.4.2	Performs engine start procedure	PF/PM
2.4.3	Uses standard communication procedures with ground crew and ATC	PF/PM

	X. Phase of flight **X.X Tasks** **X.X.X Sub-tasks**	*Duty*
2.5	**Perform taxi**	
2.5.1	Receives, checks and adheres to taxi clearance	PM
2.5.2	Taxis the aeroplane including use of exterior lighting	PF
2.5.3	Complies to taxi clearance	PF/PM
2.5.4	Maintains lookout for conflicting traffic and obstacles	PF/PM
2.5.5	Operates thrust, brakes and steering	PF
2.5.6	Conducts relevant briefings	PF
2.5.7	Uses standard communication procedures with crew and ATC	PM
2.5.8	Completes standard operating procedures and checklists	PF/PM
2.5.9	Updates and confirms FMS data	PF/PM
2.5.10	Manages changes in performance and departure route	PF/PM
2.5.11	Completes de-icing/anti-icing procedures	PF/PM
2.6	**Manage abnormal and emergency situations**	
2.6.1	Identifies the abnormal and emergency condition	PF/PM
2.6.2	Interprets the abnormal and emergency condition	PF/PM
2.6.3	Performs the procedure for the abnormal and emergency condition	PF/PM
2.7	**Communicate with cabin crew, passengers and company**	
2.7.1	Communicates relevant information to cabin crew	PF
2.7.2	Communicates relevant information to company	PF/PM
2.7.3	Makes passenger announcements when appropriate	PF/PM
3.	**PERFORM TAKE-OFF**	
3.1	**Perform pre-take-off and pre-departure preparation**	
3.1.1	Checks and acknowledges line-up clearance	PF/PM
3.1.2	Checks correct runway selection	PF/PM
3.1.3	Confirms validity of performance data	PF/PM
3.1.4	Checks approach sector and runway are clear	PF/PM
3.1.5	Confirms all checklists and take-off preparations completed	PF/PM
3.1.6	Lines up the aeroplane on centre line without losing distance	PF
3.1.7	Checks weather on departure sector	PF/PM
3.1.8	Checks runway status and wind	PF/PM
3.2	**Perform take-off roll**	
3.2.1	Applies take-off thrust	PF
3.2.2	Checks engine parameters	PF/PM
3.2.3	Checks airspeed indicators	PF/PM

	X. Phase of flight **X.X Tasks** **X.X.X Sub-tasks**	*Duty*
	3.2.4 Stays on runway centre line	PF
3.3	**Perform transition to instrument flight rules**	
	3.3.1 Applies V1 procedures	PF/PM
	3.3.2 Rotates at Vr to initial pitch attitude	PF
	3.3.3 Establishes initial wings level attitude	PF
	3.3.4 Retracts landing gear	PM
	3.3.5 Maintains climb-out speed	PF
3.4	**Perform initial climb to flap retraction altitude**	
	3.4.1 Sets climb power	PF
	3.4.2 Adjusts attitude for acceleration	PF
	3.4.3 Selects flaps according to flap speed schedule	PF/PM
	3.4.4 Observes speed restrictions	PF
	3.4.5 Completes relevant checklists	PF/PM
3.5	**Perform rejected take-off**	
	3.5.1 Recognizes the requirement to abort the take-off	PF
	3.5.2 Applies the rejected take-off procedure	PF
	3.5.3 Assesses the need to evacuate the aeroplane	PF/PM
3.6	**Perform navigation**	
	3.6.1 Complies with departure clearance	PF
	3.6.2 Complies with published departure procedures, e.g. speeds	PF
	3.6.3 Monitors navigation accuracy	PF/PM
	3.6.4 Communicates and coordinates with ATC	PM
3.7	**Manage abnormal and emergency situations**	
	3.7.1 Identifies the abnormal and emergency condition	PF/PM
	3.7.2 Interprets the abnormal and emergency condition	PF/PM
	3.7.3 Performs the procedure for the abnormal and emergency condition	PF/PM

	X. Phase of flight **X.X Tasks** **X.X.X Sub-tasks**	*Duty*
4.	**PERFORM CLIMB**	
4.1	**Perform standard instrument departure/en-route navigation**	
4.1.1	Complies with departure clearance and procedures, including RNAV and RNP procedures	PF
4.1.2	Demonstrates terrain awareness	PF/PM
4.1.3	Monitors navigation accuracy	PF/PM
4.1.4	Adjusts flight to weather and traffic conditions	PF
4.1.5	Communicates and coordinates with ATC	PM
4.1.6	Observes minimum altitudes	PF/PM
4.1.7	Selects appropriate level of automation	PF
4.1.8	Complies with altimeter setting procedures	PF/PM
4.2	**Complete climb procedures and checklists**	
4.2.1	Performs the after-take-off items	PF/PM
4.2.2	Confirms and checks according to checklists	PF/PM
4.3	**Modify climb speeds, rate of climb and cruise altitude**	
4.3.1	Recognizes the need to change speed/rate of climb/cruise altitude	PF
4.3.2	Selects and maintains the appropriate climb speed/rate of climb	PF
4.3.3	Selects optimum cruise flight level	PF/PM
4.4	**Perform systems operations and procedures**	
4.4.1	Monitors operation of all systems	PF/PM
4.4.2	Operates systems as required	PF/PM
4.5	**Manage abnormal and emergency situations**	
4.5.1	Identifies the abnormal and emergency condition	PF/PM
4.5.2	Interprets the abnormal and emergency condition	PF/PM
4.5.3	Performs the procedure for the and emergency abnormal condition	PF/PM
4.6	**Communicate with cabin crew, passengers and company**	
4.6.1	Communicates relevant information to cabin crew	PF
4.6.2	Communicates relevant information to company	PF/PM
4.6.3	Makes passenger announcements when appropriate	PF

	X. Phase of flight **X.X Tasks** **X.X.X Sub-tasks**	*Duty*
5.	**PERFORM CRUISE**	
5.1	**Monitor navigation accuracy**	
5.1.1	Demonstrates adequate area knowledge	PF/PM
5.1.2	Demonstrates adequate route knowledge, including RNAV and RNP routes and procedures	PF/PM
5.1.3	Navigates according to flight plan and clearance	PF
5.1.4	Adjusts flight to weather and traffic conditions	PF
5.1.5	Communicates and coordinates with ATC	PM
5.1.6	Observes minimum altitudes	PF/PM
5.1.7	Uses all means of automation	PF
5.2	**Monitor flight progress**	
5.2.1	Selects optimum speed	PF
5.2.2	Selects optimum cruise flight level	PF
5.2.3	Monitors and controls fuel status	PF/PM
5.2.4	Recognizes the need for a possible diversion	PF/PM
5.2.5	Creates a diversion contingency plan if required	PF/PM
5.3	**Perform descent and approach planning**	
5.3.1	Checks weather of destination and alternate airport	PF/PM
5.3.2	Checks runway in use and approach procedure	PF/PM
5.3.3	Sets the FMS accordingly	PM
5.3.4	Checks landing weight and landing distance required	PM
5.3.5	Checks MEA, MOCA and MSA	PF/PM
5.3.6	Identifies top of descent point	PF
5.3.7	Conducts relevant briefings	PF
5.4	**Perform systems operations and procedures**	
5.4.1	Monitors operation of all systems	PF/PM
5.4.2	Operates systems as required	PM
5.5	**Manage abnormal and emergency situations**	
5.5.1	Identifies the abnormal and emergency condition	PF/PM
5.5.2	Interprets the abnormal and emergency condition	PF/PM
5.5.3	Performs the procedure for the abnormal and emergency condition	PF/PM
5.6	**Communicate with cabin crew, passengers and company**	
5.6.1	Communicates relevant information to cabin crew	PF

	X. Phase of flight **X.X Tasks** **X.X.X Sub-tasks**	*Duty*
	5.6.2 Communicates relevant information to company	PF/PM
	5.6.3 Makes passenger announcements when appropriate	PF
6.	**PERFORM DESCENT**	
6.1	**Initiate and manage descent**	
	6.1.1 Starts descent according to ATC clearance or optimum descent point	PF
	6.1.2 Selects optimum speed and descent rate	PF
	6.1.3 Adjusts speed to existing environmental conditions	PF
	6.1.4 Recognizes the need to adjust the descent path	PF
	6.1.5 Adjusts the flight path as required	PF
	6.1.6 Utilizes all means of FMS descent information	PF
6.2	**Monitor and perform en-route and descent navigation**	
	6.2.1 Complies with arrival clearance and procedures, including RNAV and RNP procedures	PF
	6.2.2 Demonstrates terrain awareness	PF/PM
	6.2.3 Monitors navigation accuracy	PF/PM
	6.2.4 Adjusts flight to weather and traffic conditions	PF
	6.2.5 Communicates and coordinates with ATC	PM
	6.2.6 Observes minimum altitudes	PF/PM
	6.2.7 Selects appropriate level/mode of automation	PF
	6.2.8 Complies with altimeter setting procedures	PF/PM
6.3	**Replanning and update of approach briefing**	
	6.3.1 Rechecks destination weather and runway in use	PM
	6.3.2 Briefs/rebriefs about instrument approach and landing as required	PF
	6.3.3 Reprogrammes the FMS as required	PM
	6.3.4 Rechecks fuel status	PF/PM
6.4	**Perform holding**	
	6.4.1 Identifies holding requirement	PF/PM
	6.4.2 Programmes FMS for holding pattern	PM
	6.4.3 Enters and monitors holding pattern	PF
	6.4.4 Assesses fuel requirements and determines max. holding time	PF/PM
	6.4.5 Reviews the need for a diversion	PF/PM
	6.4.6 Initiates diversion	PF
6.5	**Perform systems operations and procedures**	
	6.5.1 Monitors operation of all systems	PF/PM
	6.5.2 Operates systems as required	PF/PM

X. Phase of flight **X.X Tasks** **X.X.X Sub-tasks**	*Duty*
6.6 Manage abnormal and emergency situations	
6.6.1 Identifies the abnormal and emergency condition	PF/PM
6.6.2 Interprets the abnormal and emergency condition	PF/PM
6.6.3 Performs the procedure for the abnormal and emergency condition	PF/PM
6.7 Communicate with cabin crew, passengers and company	
6.7.1 Communicates relevant information to cabin crew	PF
6.7.2 Communicates relevant information to company	PF/PM
6.7.3 Makes passenger announcements when appropriate	PF
7. PERFORM APPROACH	
7.1 Perform approach in general	
7.1.1 Executes approach according to procedures and situation	PF
7.1.2 Selects appropriate level/mode of automation	PF
7.1.3 Selects optimum approach path	PF
7.1.4 Operates controls smoothly and with coordination	PF
7.1.5 Performs speed reduction and flap extension	PF/PM
7.1.6 Performs relevant checklists	PF/PM
7.1.7 Initiates final descent	PF
7.1.8 Achieves stabilized approach criteria	PF
7.1.9 Ensures adherence to minima	PF/PM
7.1.10 Initiates go-around if required	PF
7.1.11 Masters transition to visual segment	PF
7.2 Perform precision approach	
7.2.1 Performs ILS approach	PF
7.2.2 Performs low visibility ILS CAT II/III approach	PF
7.2.3 Performs PAR approach	PF
7.2.4 Performs GPS/GNSS approach	PF
7.2.5 Performs MLS approach	PF
7.3 Perform non-precision approach	
7.3.1 Performs VOR approach	PF
7.3.2 Performs NDB approach	PF
7.3.3 Performs SRE approach	PF
7.3.4 Performs GPS/GNSS approach	PF
7.3.5 Performs LOC approach	PF

	X. Phase of flight **X.X Tasks** **X.X.X Sub-tasks**	*Duty*
	7.3.6 Performs ILS back beam approach	PF
	7.3.7 Performs APV and BARO-VNAV approach	PF
	7.3.8 Performs RNP APCH and RNP AR approach	PF
7.4	**Perform approach with visual reference to ground**	
	7.4.1 Performs standard visual approach	PF
	7.4.2 Performs circling approach	PF
7.5	**Monitor the flight progress**	
	7.5.1 Ensures navigation accuracy	PF/PM
	7.5.2 Communicates with ATC and crew members	PM
	7.5.3 Monitors fuel status	PF/PM
7.6	**Perform systems operations and procedures**	
	7.6.1 Monitors operation of all systems	PF
	7.6.2 Operates systems as required	PF
7.7	**Manage abnormal and emergency situations**	
	7.7.1 Identifies the abnormal and emergency condition	PF/PM
	7.7.2 Interprets the abnormal and emergency condition	PF/PM
	7.7.3 Performs the procedure for the abnormal and emergency condition	PF/PM
7.8	**Perform go-around/missed approach**	
	7.8.1 Initiates go-around procedure	PF
	7.8.2 Navigates according to missed approach procedure	PF
	7.8.3 Completes the relevant checklists	PF/PM
	7.8.4 Initiates approach or diversion after the go- around	PF
	7.8.5 Communicates with ATC and crew members	PM
7.9	**Communicate with cabin crew, passengers and company**	
	7.9.1 Communicates relevant information to cabin crew	PF
	7.9.2 Communicates relevant information to company	PF/PM
	7.9.3 Makes passenger announcements when appropriate	PF

	X. Phase of flight **X.X Tasks** **X.X.X Sub-tasks**	*Duty*
8.	**PERFORM LANDING**	
8.1	**Land the aeroplane**	
8.1.1	Maintains a stabilized approach path during visual segment	PF
8.1.2	Recognizes and acts on changing conditions for wind shift/wind shear segment	PF
8.1.3	Initiates flare	PF
8.1.4	Controls thrust	PF
81.5	Achieves touchdown in touchdown zone on centre line	PF
8.1.6	Lowers nose wheel	PF
8.1.7	Maintains centre line	PF
8.1.8	Performs after-touchdown procedures	PF
8.1.9	Makes use of appropriate braking and reverse thrust	PF
8.1.10	Vacates runway with taxi speed	PF
8.2	**Perform systems operations and procedures**	
8.2.1	Monitors operation of all systems	PF
8.2.2	Operates systems as required	PF
8.3	**Manage abnormal and emergency situations**	
8.3.1	Identifies the abnormal and emergency condition	PF/PM
8.3.2	Interprets the abnormal and emergency condition	PF/PM
8.3.3	Performs the procedure for the abnormal and emergency condition	PF/PM
9.	**PERFORM AFTER-LANDING AND POST-FLIGHT OPERATIONS**	
9.1	**Perform taxi-in and parking**	
9.1.1	Receives, checks and adheres to taxi clearance	PM
9.1.2	Taxis the aeroplane including use of exterior lighting	PF
9.1.3	Controls taxi speed	PF/PM
9.1.4	Maintains centre line	PF
9.1.5	Maintains lookout for conflicting traffic and obstacles	PF
9.1.6	Identifies parking position	PF/PM
9.1.7	Complies with marshaller/stand guidance	PF/PM
9.1.8	Applies parking and engine shut-down procedures	PF
9.1.9	Completes with relevant checklists	PF/PM
9.2	**Perform aeroplane post-flight operations**	
9.2.1	Communicates with ground personnel and crew	PF
9.2.2	Completes all required flight documentation	PF/PM

	X. Phase of flight **X.X Tasks** **X.X.X Sub-tasks**	*Duty*
	9.2.3 Ensures securing of the aeroplane	PF
	9.2.4 Conducts the debriefings	PF
9.3	**Perform systems operations and procedures**	
	9.3.1 Monitors operation of all systems	PF/PM
	9.3.2 Operates systems as required	PF/PM
9.4	**Manage abnormal and emergency situations**	
	9.4.1 Identifies the abnormal and emergency condition	PF/PM
	9.4.2 Interprets the abnormal and emergency condition	PF/PM
	9.4.3 Performs the procedure for the abnormal and emergency condition	PF/PM
9.5	**Communicate with cabin crew, passengers and company**	
	9.5.1 Communicates relevant information to cabin crew	PF
	9.5.2 Communicates relevant information to company	PF/PM
	9.5.3 Makes passenger announcements when appropriate	PF

Chapter 2

COMPETENCY-BASED TRAINING AND ASSESSMENT FOR THE MULTI-CREW PILOT LICENCE (MPL)

This chapter outlines the principles and procedures that are applicable to the development and implementation of a multi-crew pilot licence (MPL) course and that shall be followed in addition to those outlined in Part I, Chapter 2.

2.1 INTRODUCTION

2.1.1 This chapter provides the elements for a competency-based MPL, with which approved training organizations (ATOs) and Licensing Authorities shall comply.

2.1.2 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 Part I, Chapter 2. The appendices to this Chapter provide guidelines for the implementation of the MPL and its training scheme. The attachments to this Chapter contain guidance material on: structure of the MPL training programme; an example of a completed training specification for an initial Multi-crew Pilot Licence course; and the tasks of MPL examiners and inspectors.

2.2 ASSESSMENT

2.2.1 Competency-based training and assessment for the MPL shall use an approved MPL adapted competency model, developed from the ICAO competency framework for aeroplane pilots contained in Part II, Chapter 1 through the application of the procedures in Part I, Chapter 2. The competencies of the adapted competency model provide the TEM countermeasures (see Chapter 6 of this Section).

2.2.2 The MPL holder shall meet the requirements of an operator's structured initial operating experience (IOE) programme, evaluation of which shall be conducted on completion of IOE by means of an operator's line check or equivalent means accepted by the Licensing Authority.

2.2.3 Licensing Authorities shall ensure that TEM and its countermeasures are assessed as an integral part of the approved MPL adapted competency model.

Note.— Refer to Chapter 6 of this section and the Human Factors Training Manual *(Doc 9683) for guidance material on TEM.*

2.2.4 ATOs and operators involved in MPL programmes shall assure the existence of a data collection and analysis mechanism, acceptable to the Licensing Authority, as a basis for seamless student performance tracking and continuous course improvement. This requires the harmonization of the adapted competency models used by the ATO and the operator.

2.3 TRAINING

2.3.1 Each phase of the MPL training scheme (see Appendix 2 to this chapter) shall be composed of instruction in underpinning knowledge and presented in practical training segments. Training in the underpinning knowledge requirements for the MPL shall therefore be fully integrated with the training of the skill requirements (see Appendix 1 to this chapter).

2.3.2 The training course for an MPL licence shall include an ongoing evaluation of the training programme and of the students following the programme that is acceptable to the Licensing Authority. The evaluation shall ensure that:

a) the competencies and related assessment are relevant to the task of a co-pilot of an aircraft certificated for more than one pilot, under visual flight rules (VFR) and instrument flight rules (IFR), day and night flights; and

b) the training plan is designed to enable the trainees to meet the interim (if defined) and final competency standards; and

c) corrective action shall be taken if in-training or post-training evaluation indicates a need to do so.

2.3.3 The advanced phase of an MPL training course shall include a sufficient number of take-offs and landings in actual flight to ensure that competency standards are met and shall not be less than twelve. These take-offs and landings shall be performed under the supervision of an authorized instructor in an aeroplane for which the type rating shall be issued.

2.3.4 The Licensing Authority may accept a reduction, from twelve to six, of the number of take-offs and landings required in 2.3.3, provided that:

a) the approved training organization has demonstrated to the satisfaction of the Licensing Authority that this does not negatively affect the achievement of the competency standards by the student; and

b) a process is in place to ensure that corrective action can be made if in-training or post-training evaluation indicates a need to do so.

2.4 MPL EXAMINER AND INSPECTOR QUALIFICATIONS

2.4.1 MPL examiner qualifications

2.4.1.1 MPL examiners shall meet at least the following requirements:

a) have demonstrated that they possess the competencies required to perform the tasks described in Attachment D to this chapter;

b) hold the qualifications to provide instruction at the Advanced phase of MPL training; and

c) meet the experience requirements of an instructor for the MPL as specified in Part I, Chapter 3, 3.2.

2.4.1.2 The Licensing Authority shall authorize an MPL examiner for periods not exceeding three years.

2.4.2 MPL inspector qualifications

2.4.2.1 Inspectors of MPL training programmes shall have demonstrated that they possess the competencies required to perform the tasks described in Attachment D to this chapter.

Note.— Guidance for the qualifications of inspectors, including MPL inspectors, is contained in the Manual on the Competencies of Civil Aviation Safety Inspectors *(Doc 10070).*

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Appendix 1 to Chapter 2

GUIDELINES FOR THE IMPLEMENTATION OF THE MULTI-CREW PILOT LICENCE

1. Introduction

1.1 Multi-crew pilot licence (MPL) training delivers ab initio aeroplane pilots directly for co-pilot duties. MPL courses shall be competency-based. MPL training makes greater use of modern simulation and training devices. The ICAO Standards for the MPL specify the minimum number of actual and simulated flight hours (240) but do not specify the breakdown between actual and simulated flight hours to achieve the performance criteria of the programme's adapted competency model. This allows part of the training curriculum that was traditionally conducted on an aeroplane to now be done on flight simulation training devices. States and approved training organizations (ATOs) should use these guidelines to facilitate safe and efficient implementation of the MPL Standards.

1.2 The competency standards expected from the MPL holder are defined in the approved adapted competency model used by the ATO. With these competencies, the MPL holder is expected to complete the air operator's initial operational experience phase (IOE) with high probability of success and within the time frame normally allowed for this phase.

2. Guidelines for the authority

2.1 The implementation of the MPL requires the development of an approved training programme that blends the various types of training (knowledge and practical) with the media (classroom, various level of simulation and aeroplane).

2.2 In view of the developmental nature of the first MPL courses in each ATO, the approval to conduct MPL courses should be provisional and should be confirmed only after obtaining a satisfactory result from the first courses and after incorporation of lessons learned into the curriculum.

2.3 All the applicable Standards related to ATOs (Annex 1, Appendix 2) shall apply and all associated guidance material should apply, in particular those dealing with approval of the curriculum and quality assurance system (Doc 9841 refers).

2.4 One of the indispensable attributes of competency-based training and assessment, as defined in this document, is the use of an ongoing evaluation process to ensure the effectiveness of the training and its relevance to line operations.

2.5 Close oversight by the Licensing Authority shall be exercised during the period of provisional approval. Regular feedback from the ATO to the Licensing Authority on the progress and problems faced during delivery of the course is important. How this feedback is to be provided to the Licensing Authority shall therefore be clearly stated as part of the approval.

2.6 The ATO shall furnish the Licensing Authority with de-identified information concerning each phase of evaluation for each student during and following the course, including any corrective action found to be necessary. The Licensing Authority shall make this information available to ICAO upon request for the purpose of evaluating the MPL programme on a periodic basis.

2.7 The success of the implementation of the MPL depends to a large measure on the effective coordination and cooperation between the Licensing Authority, the ATO, the air operators hiring the graduates and pilot representative bodies. Licensing Authorities should encourage and facilitate such cooperation and coordination.

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Appendix 2 to Chapter 2

MULTI-CREW PILOT LICENCE TRAINING SCHEME

<table>
<tr><td colspan="6">MPL training scheme
Training including PF and PM*</td></tr>
<tr><td rowspan="8">Adapted Competency Model</td><td>Phase of training</td><td>Training items</td><td colspan="2">Flight and simulated flight training media — Minimum level requirement</td><td>Ground training media</td></tr>
<tr><td rowspan="2">Advanced

Type rating training within an airline-oriented environment</td><td rowspan="2">— TEM and CRM
— Landing training
— All weather scenarios
— LOFT
— Abnormal procedures
— Normal procedures
— Upset prevention and recovery***</td><td>Aeroplane:
Turbine
Multi-engine
Multi-crew certified</td><td>12 take-offs and landings as PF**</td><td rowspan="7">• E-learning

• Part-task trainer

• Classroom</td></tr>
<tr><td>FSTD: Type VII</td><td>PF/PM</td></tr>
<tr><td>Intermediate

Application of multi-crew operations in a high-performance, multi-engine turbine aeroplane</td><td>— TEM and CRM
— LOFT
— Abnormal procedures
— Normal procedures
— Multi-crew
— Instrument flight</td><td>FSTD: Type VI</td><td>PF/PM</td></tr>
<tr><td rowspan="2">Basic

Introduction of multi-crew operations and instrument flight</td><td rowspan="2">— TEM and CRM
— PF/PM complement
— IFR cross-country
— Upset prevention and recovery***
— Night flight****
— Instrument flight</td><td>Aeroplane: single or multi-engine</td><td rowspan="2">PF/PM</td></tr>
<tr><td>FSTD: Types IV or V</td></tr>
<tr><td rowspan="2">Core flying skills

Specific basic single pilot training</td><td rowspan="2">— TEM and CRM
— VFR cross-country
— Upset prevention and recovery***
— Solo flight
— Night flight****
— Basic instrument flight
— Principles of flight
— Cockpit procedures</td><td>Aeroplane: single engine (or multi-engine as appropriate)</td><td rowspan="2">PF</td></tr>
<tr><td>FSTD: Types I or III – Type II may be used for certain basic instrument flight training tasks</td></tr>
</table>

Note.— The FSTD Types are defined in the Manual of Criteria for the Qualification of Flight Simulation Training Devices *(Doc 9625), Volume I* – Aeroplanes.

* PF — pilot flying; PM — pilot monitoring.
** Limited credit may be granted in accordance with Part II, Chapter 2, 2.3.3 and 2.3.4.
*** UPRT is provided in modules starting with an on-aeroplane module in the Core flying skills phase or in the Basic phase depending on the individual course design and equipment, and completed with at least one FSTD training module during the type rating training.
**** Night flying experience should be gained on-airplane, which could be in the Core flying skills phase or in the Basic phase.

Attachment A to Chapter 2

STRUCTURE OF THE MPL TRAINING PROGRAMME

1. The MPL training scheme is contained in Appendix 2 to Chapter 2 of this section. The training items listed under the ***Core Flying Skills and Basic*** phases of training must be completed prior to entering the Intermediate phase of training. These first two phases of training are of the utmost importance as the student starts to develop core technical, interpersonal, procedural and aircraft-handling skills that underpin the competencies of an MPL. The learning of crew resource management (CRM) skills and threat and error management (TEM) is also strengthened by introducing them at the very beginning of the programme. The student shall meet the interim competency standard representative of the Core Flying Skills, Basic or Intermediate phases, as applicable. The student shall meet the final competency standards at the completion of the advanced phase of training.

2. During the **Core flying skills** phase or the **Basic** phase, training on an aeroplane includes upset prevention and recovery and instrument flight. However, starting with the Basic phase of training, use of flight simulation training devices (FSTDs) will form an integral part of the training. FSTDs range from part-task training devices, through generic systems to full-motion, full-visual, high-fidelity, type-specific flight simulators that also permit the introduction of interactive air traffic control environments. Both Pilot Flying and Pilot Monitoring tasks and performance should be emphasised equally in the training conducted during the Basic, Intermediate and Advanced phases of training.

3. During the **Intermediate** phase, flight training should be conducted under IFR but need not be specific to any aeroplane type.

4. During the **Advanced** phase, the student will be required to consistently achieve the final competency standards needed for the safe operation of an applicable aeroplane type as specified in the training and assessment plans. Upon qualifying, the student will hold an MPL which includes the privileges of the type and instrument ratings, the privileges of which are to be exercised as co-pilot on a turbine-powered, commercial air transport aeroplane.

Note.— Appendix 3 to Annex 1 contains a description of the FSTDs used in the four phases of the MPL training programmes.

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Attachment B to Chapter 2

EXAMPLE OF MPL TRAINING SPECIFICATIONS

The table below contains an example of a completed training specification for an initial multi-crew pilot licence course.

Purpose	
What is the purpose of the training?	To train ab initio aeroplane pilots for co-pilot duties.
State the phase(s) of training.	Core Flying Skills and Basic Phases (ab initio pilot training on single- and/or multi-pilot, and single- and/or multi-engine aeroplane) Intermediate Phase (reinforcement of multi-crew coordination and IFR operations). Advanced Phase (type rating and instrument qualification on multi-pilot, multi-engine turbine-powered aeroplane used in commercial air transport operations).
What qualification, if any, will the trainee achieve on successful completion of the training?	Multi-crew pilot licence with aircraft type rating and instrument privileges as appropriate to proceed for commercial air transport line training (initial operating experience).
Tasks	
Describe the tasks associated with the purpose of the training.	The trainee shall carry out the following tasks: 1) flight planning and preparation; 2) aeroplane checks and cockpit procedures, radio-telephony procedures, CRM and TEM; 3) basic aircraft handling in the phases of flight in both VFR and IFR conditions, with asymmetric concepts; 4) aeroplane upset prevention and recovery; 5) cross-country flying procedures and technique, including diversion procedures; 6) basic and applied instrument flying technique, including standard instrument departure (SID), standard instrument arrival (STAR), airways tracking, holding procedures, arrival and approach charts and procedures (precision and non-precision), missed approach procedures; 7) solo flight and night flying operations;

	8) multi-crew operations including pilot flying (PF)/pilot monitoring (PM) duties, abnormal and emergency procedures, CRM and TEM; 9) multi-engine turbine aeroplane operations, maximum demonstrated crosswind take-off and landing, and asymmetric handling; 10) upset prevention and recovery training and abnormal procedure handling considerations for turbine aeroplane; 11) line oriented flight training (LOFT), including IFR RNAV (PBN) international flights; and 12) take-offs and landings on aeroplane type.
Operational requirements	
Which procedures will be applied?	Air operator's operations manual, aeroplane flight manual as appropriate.
Describe the operational (or simulated) environment required to successfully achieve the purpose of the training.	Actual and simulated flight as PF and PM duties in appropriately qualified aeroplane and FSTD. On aircraft training in take-offs and landings on aeroplane type to proficiency (with at least the minimum required number of take-offs and landings to comply with PANS-TRG and national regulations). LOFT in accordance with the operator's procedures for PF and PM duties.
Describe the nature of the traffic necessary to achieve the training outcome.	Actual and simulated air traffic as applicable: a) mix of IFR and VFR traffic; b) arrivals, departures, overflights and circuit traffic; and c) heavy and medium jets, business jets, light aircraft, helicopters, ground vehicles.
Which non-routine situations are necessary for successful completion of the training?	a) aeroplane system malfunctions; b) rejected take-off; c) engine fire and failure in various phases of flight; d) missed approaches, including baulked landings; e) asymmetric approaches and landing; f) landing emergencies; g) pilot incapacitation on multi-crew aeroplane and medical emergencies; h) traffic alert and collision avoidance system resolution advisory (TCAS-RA);

	i) wind shear recovery and enhanced ground proximity warning system (EGPWS); j) emergency descent; k) UPRT; and l) runway incursions and excursions.
Describe the working position configuration.	Co-pilot's position in a multi-crew aeroplane type.
Technical requirements	
List any specific operational (or simulated operation) systems and/or equipment that are necessary to achieve the training outcome.	a) appropriate aeroplane type for solo flying experience; b) aeroplane or appropriately qualified FSTD for multi-crew, multi-engine turbine-powered aeroplane type including training in IFR operations; and c) aeroplane and appropriately qualified FSTD for UPRT.
Regulatory requirements	
Which rules and regulations are applicable?	a) National regulations on the provision of MPL; and b) ICAO Doc 9868 and Annexes 1 and 6, Part I, for training and licensing Standards and requirements.
Are there any regulatory requirements that will affect the following aspects of the training: • duration; • content; • assessment procedures; • course approval; • any other?	a) theoretical knowledge requirements at the airline transport pilot licence level; b) practical training in both PF and PM duties to achieve and demonstrate the competencies of the adapted competency model to the final competency standard; c) multi-crew aircraft type rating for licence endorsement; d) instrument qualification on appropriate aircraft type; e) specified minimum number of take-offs and landings on aircraft type; f) flight simulation devices approved by the CAA; and g) training programme incorporating type rating, and assessment standards approved by the CAA.
Organizational requirements	
Describe any organizational requirements that may impact the training?	Approved training organization with appropriate staff and training devices for both theoretical knowledge and practical training.

Other requirements	
Other constraints.	a) appropriately authorized instructors; b) training in UPRT to be conducted by instructors appropriately qualified and approved by the CAA; c) approved type rating programme in the Advanced Phase; and d) examiners must be appropriately qualified, and current for flight checks.
Simulation requirements	
List the simulation requirements that are necessary to achieve the training outcome, if any.	a) part-task trainer; and b) FSTD of appropriate type commensurate with MPL Phase of training (refer to Doc 9625, Volume 1 and Annex 1, Appendix 3).

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Attachment C to Chapter 2

TASKS OF MPL EXAMINERS AND INSPECTORS

TASKS OF THE MPL EXAMINER

Carry out competency-based assessment

1. Gather evidence

1.1 Establish a working relationship with the candidate

1.2 Interpret competency standards

1.3 Apply assessment techniques and tools

2. Evaluate evidence

2.1 Ensure validity of evidence gathered

2.2 Ensure reliability of evidence gathered

2.3 Establish assessment decision

2.4 Provide constructive feedback to the candidate

3. Report assessment decision

3.1 Record assessment results

3.2 Provide candidate with future training plan, if applicable

3.3 Review assessment process to improve validity and reliability

3.4 Process relevant documentation

TASKS OF THE MPL INSPECTOR

Inspect competency-based training and assessment programmes

1. Assess ATO's application to conduct a competency-based training and assessment programme

1.1 Validate background data on approved training organization

1.2 Review application

1.3 Evaluate quality assurance system implementation

1.4 Document findings

2. Evaluate competency-based training and assessment programme

2.1 Assess training needs analysis

2.2 Assess curriculum design

2.3 Assess courseware (ground, FSTD and flight)

2.4 Assess evaluation procedures

2.5 Confirm required qualifications and competencies of instructors and designated/delegated MPL examiners

2.6 Document evaluation findings

3. Inspect competency-based training and assessment programme

3.1 Inspect ground school facilities

3.2 Inspect FSTD facilities

3.3 Inspect flight training facilities

3.4 Inspect record-keeping system

3.5 Evaluate conduct of training

3.6 Document inspection findings

4. Conduct surveillance

4.1 Carry out a risk assessment

4.2 Establish initial surveillance plan

4.3 Conduct operational review of training programme

4.4 Instigate follow-up rectification/enforcement action

4.5 Document surveillance findings

4.6 Establish ongoing surveillance plan

5. Conduct trend analysis of approval/surveillance activity*

* Depending on the size of the CAA, individual MPL inspectors may or may not be responsible for this task.

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Chapter 3

EVIDENCE-BASED TRAINING (EBT)

Until 2 November 2022, this chapter is intended to provide guidance to civil aviation authorities, operators and approved training organizations in the recurrent training of pilots.

As of 3 November 2022, this chapter is intended to provide guidance to civil aviation authorities, operators and approved training organizations in the recurrent training of pilots and remote pilots.

3.1 APPLICABILITY

3.1.1 This chapter, supported by the *Manual of Evidence-based Training* (Doc 9995), is intended to describe procedures that civil aviation authorities, operators and approved training organizations shall comply with when implementing competency-based recurrent training and assessment of aeroplane pilots also referred to as evidence-based training (EBT). Recurrent training is referred to in Annex 6 — *Operation of Aircraft,* Part I, *International Commercial Air Transport — Aeroplanes*, 9.3 — *Flight crew member training programmes* and 9.4.4 — *Pilot proficiency checks*.

3.1.2 It may also provide guidance for approved training organizations engaged in the recurrent training and assessment of flight crew engaged in the operations of large or turbojet aeroplanes in accordance with Annex 6, Part II — *International General Aviation — Aeroplanes* (section 3 refers).

3.1.3 EBT is optional and is an alternative means of training and assessing key areas of flight crew performance in a recurrent training system.

3.1.4 EBT is based on an approved adapted competency model derived from the ICAO competency framework for aeroplane pilots in Part II, Section 1, Chapter 1, using the methodology in Part I, Chapter 2.

3.1.5 The aim of EBT is to develop, maintain and assess the competencies required to operate safely, effectively and efficiently in a commercial air transport environment, while addressing the most relevant threats according to evidence collected in accidents, incidents, flight operations and training.

3.1.6 Demonstration of the competencies can be assessed using the observable behaviours, which should meet the required level of performance, described in the performance criteria established by the operator for its specific operation. Observable behaviours may include but are not limited to the observable behaviours listed in the ICAO competency framework for aeroplane pilots (Part II, Section 1, Chapter 1 refers).

3.1.7 The *Manual of Evidence-based Training* (Doc 9995) provides guidance for the development of EBT programmes in addition to information for instructors conducting the training. It is assumed that the EBT training and assessment will be conducted in FSTDs qualified to an appropriate level in accordance with civil aviation authority rules (*Manual of Criteria for the Qualification of Flight Simulation Training Devices* (Doc 9625) refers).

3.1.8 When choosing to implement EBT in their regulatory framework, as an alternative to the regulated traditional recurrent training and checking of airline pilots, States shall ensure that operators and training organizations apply the principles of Doc 9995 when developing and implementing such recurrent training programmes.

3.2 BACKGROUND

3.2.1 The development of EBT arose from an industry-wide consensus that, in order to reduce the aircraft hull loss and fatal accident rates, a strategic review of recurrent training for airline pilots was necessary. The availability of useful data covering both flight operations and training activity has improved substantially over the last 20 years. Data sources like flight data analysis, flight observation (e.g. line operations safety audit (LOSA)) and air safety reports give a detailed insight into the threats, errors and risks in flight operations and their relation to unwanted consequences. Training results demonstrate important differences in training needs between different manoeuvres and aircraft generations. Availability of such data has both established the need for the EBT effort and supported the definition of the resulting evidence-based training concept and curriculum.

3.2.2 The complexity of today's aviation system makes it impossible to foresee all scenarios. The system's complexity and high reliability mean that the next accident may be something completely unexpected. EBT addresses this by prioritizing the assessment and development of a finite number of competencies. Mastering competencies, rather than a prescribed set of events, should allow a pilot to manage unforeseen situations in flight thus developing flight crew resilience. The scenarios used in EBT are means to develop and assess these competencies.

3.3 EBT INSTRUCTION

3.3.1 Recognizing the critical role that instructors play in training, Doc 9995 provides specific additional guidance on the requirements for instructors delivering EBT. EBT, like any competency-based training and assessment, emphasizes a focus on the analysis of root causes of errors in order to take corrective actions.

3.3.2 It is recognized that in today's very high-fidelity simulator environment, there are very powerful training tools and yet some regulations are much more biased towards testing and checking, as opposed to training. EBT seeks to redress the balance between training and checking, recognizing that an assessment of competence is necessary, but once completed, pilots learn most effectively when not under pure test conditions. Appropriate input by competent instructors will enable pilots to be trained to a given set of performance criteria for performing tasks and managing events effectively.

Chapter 4

UPSET PREVENTION AND RECOVERY TRAINING (UPRT)

4.1 APPLICABILITY

4.1.1 This chapter, supported by the *Manual on Aeroplane Upset Prevention and Recovery Training* (Doc 10011), is intended to provide procedures to civil aviation authorities (CAAs), operators and approved training organizations (ATOs) to meet the upset prevention and recovery training (UPRT) requirements for a multi-crew pilot licence (MPL) and UPRT recommendations for a commercial pilot licence (aeroplane) (CPL(A)) contained in Annex 1 — *Personnel Licensing*. Similarly, the information provided supports the UPRT requirements for type-rating in Annex 1 and for the recurrent training of pilots required by Annex 6 — *Operation of Aircraft*, Part I — *International Commercial Air Transport — Aeroplanes*, 9.3 — *Flight crew member training programmes*. The procedures in this chapter are applicable only to aeroplane UPRT.

4.1.2 Although not obligatory, training organizations engaged in the recurrent training and assessment of flight crew engaged in the operations of large or turbojet aeroplanes in accordance with Annex 6, Part II — *International General Aviation — Aeroplanes,* Section 3 should also use this information to enhance the scope of their training services being offered.

4.2 BACKGROUND

4.2.1 The UPRT development project arose from an industry-wide consensus that the hull loss rates and fatalities attributable to loss of control in flight (LOC-I) events warranted a concerted effort in identifying and effectively implementing mitigating strategies. The study of the LOC-I phenomena and, in particular, the determination of any systemic contributing factors quickly became an ICAO priority.

4.2.2 Following an in-depth study involving representatives from numerous CAAs, aviation accident investigative bodies, industry and professional associations, airlines, major ATOs and original equipment manufacturers (OEMs), it was determined that the flight crews involved in LOC-I accidents had often reacted inappropriately prior to and/or during the event. An effective countermeasure to LOC-I pointed towards the need for improvements to existing training.

4.3 UPRT APPROACH

4.3.1 The UPRT programme and approach are a means of assessing and training critical areas of flight crew performance in conditions of flight during which pilots are likely to be exposed to an increased risk of an in-flight upset. UPRT should be designed and delivered within existing training and regulatory paradigms, which will be focused upon the trainee being “trained to proficiency” based upon achieving pre-determined knowledge and skill performance levels. UPRT for MPL and evidence-based training (EBT) programmes has to be developed in the same manner as competency-based training and assessment, so that they can be seamlessly integrated into those existing programmes. A well-constructed UPRT programme will better enable individual pilots and flight crews to effectively cope with unexpected and unforeseeable situations, which involve a skill set that, regrettably, has been found lacking in virtually every recorded LOC-I accident.

4.3.2 To realize the full value of UPRT programmes and permit ATOs to focus their attention on ensuring that the trainee achieves the targeted proficiency requirements, CAAs should view UPRT as purely a training programme and not invoke direct testing requirements on the trainee as part of their oversight process. Other regulatory due-diligence processes can be used to ensure that operational safety levels are not compromised and to establish whether the approved training programme is meeting its stated objectives.

4.3.3 The aim of UPRT is to identify and develop the training resources (academic, on-aeroplane, and flight simulation training device (FSTD)-based) and the associated elements of training required to provide pilots with the necessary knowledge and skills required to increase their ability to recognize and avoid situations that may lead to aeroplane upsets and improve their ability to recover control of an aeroplane that has exceeded the normal flight regime. The guidance contained in Doc 10011 is intended to enable and support the implementation of more effective training to improve safety levels. Recognizing the criticality of competent instructors in any training programme, the manual also provides specific guidance on the required qualifications of instructors delivering UPRT in addition to those identified in Part I, Chapter 3.

4.3.4 This chapter does not formally consider training media, but all FSTD training described should be conducted in an FSTD qualified in accordance with 4.5.5.

4.4 REGULATORY REQUIREMENTS

In several instances UPRT is not optional. It is a requirement for the MPL as well as for those pilots receiving type rating training or commercial air transport operator-specific initial and recurrent training. It is also recommended for pilots undergoing training towards the issuance of a CPL(A). When introducing UPRT into their regulatory framework, States shall ensure that operators and training organizations apply the principles of Doc 10011, when developing and implementing such a programme.

Note. — Refer to the following provisions in Annex 1, 2.1.5 — Requirements for the issue of class and type ratings*; 2.4 —* Commercial pilot licence*; and 2.5 —* Multi-crew pilot licence appropriate to the aeroplane category*; and Annex 6, Part I, 9.3 —* Flight crew member training programmes.

4.5 TRAINING

4.5.1 UPRT programmes should focus on training to ensure that trainees achieve the required knowledge and skills and/or competencies to effectively manage those conditions of flight that are likely to increase the risk of an upset or those conditions during which an actual upset has occurred so that a safe condition of flight can be restored without undue delay and risk.

4.5.2 UPRT programmes should be developed and introduced in an integrated manner using differing approaches depending on the phase of a pilot's career. Those begin with the appreciation that learning is best achieved when information is presented in context to current conditions. Hence, the recommended UPRT provided at the CPL(A) licensing level should be commensurate with those requirements deemed appropriate for an entry-level licence for a pilot starting employment with a commercial operator. This is because the expansion of that CPL(A) trainee's knowledge, skills and attitudes would be subsequently developed during the transition to airline level type-rating and operator-specific initial and recurrent training phases. The UPRT programme for an MPL trainee, on the other hand, shall take into account that an MPL programme includes learning the core set of flying abilities as well as achieving a type rating on an airline's commercial air transport aeroplane. Doc 10011 addresses the three distinct areas for UPRT in detail under the following headings:

a) single-pilot training on-aeroplane;

b) multi-crew training in an FSTD; and

c) type-specific training in an FSTD.

Note.— Doc 10011 provides detailed guidance on training topics, training elements and their descriptions to enable ATOs to develop comprehensive programmes for all three areas of UPRT. This information is further supplemented by OEM-supported recommendations in prevention and recovery techniques, as well as suggested training scenarios for the FSTD.

4.5.3 The logical delivery of the training syllabus is the second part of the programme integration issue. In this regard, the programme should commence with either the creation or confirmation of a solid foundation of baseline knowledge levels. These should then be reinforced by practical exercises that demonstrate the application of those learned principles. Finally, this level of understanding should then be further enhanced by introducing scenarios during flight (actual or simulated, as applicable) that provide the trainees with a comprehensive set of descriptors in order to expand their ability to recognize specific threats to safe conditions of flight and take deliberate and effective avoidance actions. The first emphasis of UPRT shall, therefore, be on awareness, recognition, and avoidance, as part of the prevention equation of UPRT. The second part of UPRT shall involve developing the analytical and manual handling abilities of the trainee to recognize the type of upset event and then effectively apply the correct recovery actions.

4.5.4 Care must be taken at the early stages of UPRT implementation not to assume the existence of a comprehensive level of UPRT-related knowledge, particularly at the commercial air transport type rating and recurrent training levels, as LOC-I accident data strongly indicates that even highly experienced flight crews exhibited signs of shortcomings in understanding and reacting to their predicament, which indicated potential knowledge deficiencies.

4.5.5 ATOs are required by Annex 1, Appendix 2 to establish a quality assurance (QA) system. The objective of QA is to assure the achievement of results that conform to the standards set out in the ATOs' manuals and in those requirements and documents issued by the Licensing Authority. QA attempts to improve and stabilize the training process and to identify and avoid, or at least minimize, issues that could lead to problems. It continuously verifies that standards are adhered to throughout the training process by introducing various checkpoints and controls. It further introduces a system of audits to assure that documented policies, processes and procedures are consistently followed. It is the "assurance" part of quality management and its effective operation is crucial to the success of a competency-based training and assessment programme. Quality management focuses on the means to achieve product or service quality objectives through the use of four key components: quality planning; quality control; quality assurance; and quality improvement.

4.5.6 A large portion of a fully integrated UPRT programme involves the training of flight crews in a simulated environment. Most FSTDs can be used satisfactorily for a significant portion of upset training, including training close to the critical angle of attack but not involving full aerodynamic stalls. However, ATOs and commercial air transport operators shall take into account the fact that existing FSTD flight models have deficiencies in adequately representing aircraft characteristics outside the valid training envelope, i.e. in conditions which exceed the aeroplane flight envelope data used for the FSTD qualification. Furthermore, many current FSTDs lack enhanced instructor feedback tools to allow for a complete and accurate assessment of the trainee's performance. These limitations, if not fully appreciated by training programme designers and instructional staff, can have serious and long-term repercussions by which trained flight crews could be left with significant misunderstandings of upset events. While the industry moves towards introducing improvements to FSTD models and instructor operating station design, ATOs shall conduct all FSTD training in an FSTD qualified to an appropriate level in accordance with civil aviation authority rules (Doc 9625 — *Manual of Criteria for the Qualification of Flight Simulation Training Devices* refers) and approved for each intended training task. Detailed guidance on the technical requirements and on the instructor operating station functions and tools for UPRT can be found in Doc 9625, Volume I.

Note.— Regarding 3.5.4 and 3.5.5, ATOs are encouraged to establish more robust quality-related processes to optimize their efforts in achieving excellence in the provision of training. The subject of QA and the implementation of quality systems (QS) are detailed in Appendix B to the Manual on the Approval of Training Organizations *(Doc 9841).*

4.5.7 On-aeroplane training shall include special risk mitigation measures. This is particularly true when the training programme involves the development of analytical and handling abilities among pilots with low levels of experience and often under conditions of high stress. Robust instructor training and qualification requirements, aircraft certification and capabilities appropriate for the training tasks, strict operational control involving appropriate minimum dispatch and weather conditions, adhering to minimum safe altitudes, use of collision avoidance equipment and establishing special separation criteria, and contingency considerations are just some proactive examples to marginalize threats to safety levels. The ATOs' ability to establish robust risk mitigation strategies under the umbrella of a mature safety management system (SMS) is critical to the safe and effective implementation of an on-aeroplane UPRT programme. The primary objective of on-aeroplane UPRT shall be to learn best practices in upset avoidance and recovery in a safe and controlled environment.

Note 1.— Doc 10011 makes several recommendations for the ATOs' risk mitigation efforts.

Note 2.— On-aeroplane UPRT is not to be considered synonymous with aerobatic training. While aerobatic training does provide improved manual handling skills, the primary objective to training aerobatics is proficiency in precision manoeuvring. Aerobatic flight training does not necessarily provide the best medium to develop the full spectrum of analytical reasoning skills required to rapidly and accurately determine the best course of recovery action during periods of high stress.

4.5.8 Regardless of an individual's background, all instructors designated to provide training in a UPRT programme should successfully complete an approved UPRT instructor qualification training course in accordance with the applicable provisions in Part I, Chapter 3, 3.2. Both initial qualification and recurrent training curriculum for instructors should address training elements appropriate to the level of an instructor's participation in delivering a UPRT programme, as a minimum, to ensure that the designated instructor acquires and maintains the required UPRT knowledge levels and skill sets. The UPRT on-aeroplane environment may be beyond that which is experienced during normal training operations. The unpredictable nature of trainee inputs, reactions, and behaviour requires fluency in response to a wide variety of potential situations requiring a time-constrained and accurate response. This specialized expertise cannot be acquired through routine flight operations alone, but demands that instructor training provides the appropriate degree of exposure necessary to develop complete knowledge and understanding of the entire UPRT operating environment. As part of their QA effort, ATOs shall ensure that all UPRT instructors are qualified, competent, and current in delivering the course material as well as possessing the ability to make accurate performance assessments and recommendations for remediation, whenever necessary.

Note.— Many LOC-I accident investigations have revealed that the affected flight crew had received misleading information from well-meaning training staff or their organizations. Indeed, some existing trained practices were found to be not only ineffective but were also considered a contributory factor, which led to inappropriate responses by some flight crews. For example, in certain cases, the methodologies being applied in training and checking a recovery from an approach to stall condition of flight were based on the pilot being able to achieve recovery with a minimal loss of altitude. This resulted in training practices emphasizing the importance of a rapid application of power with the least amount of reduction in angle of attack to minimize the loss of altitude rather than appreciating the importance of reducing the angle of attack to effectively increase the ability of the wing to restore its capability to generate lift. Action has now been taken by both regulators and training providers to amend such procedures with new training and testing standards emphasizing that effective recovery from an approach to stall requires, foremost, an immediate and deliberate reduction in the angle of attack. This reduction, while operating at high altitude and depending on the aeroplane energy state, might result in a substantial loss in altitude necessary to ensure that an effective recovery from an impending or actual aerodynamic stall condition is achieved.

4.5.9 Training that is delivered under a quality system as described in Appendix B to Doc 9841 should prevent instances of inappropriate or incomplete training.

4.6 REGULATORY OVERSIGHT

4.6.1 UPRT programmes should be competency-based in their design and delivery in accordance with those principles outlined in Part I, Chapter 2. UPRT shall be treated as purely a training programme, which is outcome-focused and permits trainees to gain the skill sets and confidence to effectively manage conditions that may pose a threat to safety. As opposed to regulatory testing criteria, an individual shall not be considered to have completed the training if the required competency standards are achieved.

4.6.2 The Authority should ensure levels of safety and quality of the training by applying due diligence processes upon the training providers and their QA policies, processes, procedures and observed practices. The application of this form of oversight is particularly conducive to achieving the best results in competency-based training and assessment environments. Although not required, CAAs should also consider requiring that training programmes approved under the training criteria outlined in Annex 6, Part I, Chapter 9, 9.3, be similarly conducted within a QA governance structure to assure the maintenance of high delivery standards in UPRT.

Note.— Doc 9841 and Chapter 6 of Doc 10011, provide detailed guidance on the oversight of ATOs and such specially-designed curricula.

Chapter 5

COMPETENCY-BASED TRAINING AND ASSESSMENT OF PILOTS FOR THE TYPE RATING

5.1 GENERAL PROVISIONS FOR CBTA OF PILOTS FOR THE TYPE RATING

5.1.1 Introduction

This chapter outlines the requirements to be met in order to implement CBTA of pilots for the type rating. Implementation of such training is, however, optional.

5.1.2 Applicability of CBTA for type rating

5.1.2.1 This chapter applies only to CBTA for the type rating in the aeroplane category.

5.1.2.2 CBTA for type rating may be implemented by an approved training organization (ATO) or an operator certified in accordance with Annex 6. This chapter provides the procedures, with which ATOs and operators must comply with when implementing a CBTA type rating programme. These procedures are complementary to those provided in Part I, Chapter 2.

5.2 PROCEDURES FOR CBTA OF PILOTS FOR THE TYPE RATING

5.2.1 Adapted competency model

The ICAO competency framework for aeroplane pilots provided in Part II, Section 1, Chapter 1 must be used to develop the adapted competency model for type rating.

5.2.2 Training and assessment

5.2.2.1 To be considered as qualified to conduct CBTA for type rating, the instructor/evaluator must meet the requirements of the pilot instructor and evaluator competency framework defined in Part II, Section 1, Chapter 7.

5.2.2.2 Guidance to Licensing Authorities, ATOs and operators on the measures to be taken to facilitate design, development and implementation of CBTA type ratings are defined in the Appendix to this chapter.

5.2.3 Evaluation of training programmes

5.2.3.1 The CBTA type rating training programme shall include an ongoing evaluation of the training programme acceptable to the Licensing Authority.

5.2.3.2 The evaluation shall ensure that:

a) the training and assessment plans are relevant to the aeroplane type;

b) the trainees meet the competency standards as defined in the training and assessment plan; and

c) remedial actions are taken if in-training or post-training evaluation indicates a need to do so.

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Appendix to Chapter 5

GUIDELINES FOR THE DESIGN, DEVELOPMENT AND IMPLEMENTATION OF COMPETENCY-BASED TYPE RATING

1. Introduction

Approved training organizations and operators may elect to develop a CBTA type rating.

Note.— Detailed guidance on the principles of CBTA for pilots can be found in the Manual on Aeroplane Pilot Competency-based Training and Assessment *(Doc xxxxx). (To be developed).*

2. Course Design and Development

2.1 Course design must include the mandatory training elements or specific training requirements published by the original equipment manufacturer (OEM) or the State approving the course.

2.2 Course design should consider training design guidelines (if any) provided by the OEM and the State approving the course.

2.3 Course content must focus on the development of pilot competencies rather than focus on pure task orientated training.

2.4 Course design should require the use of representative training and simulation tools as early as possible in the training process in order to contextualize all pilot competencies.

2.5 CBTA type rating programmes should follow a progressive approach to achieve the final competency standard by initially acquiring the basic knowledge and skills for operation of the aircraft; then developing the competencies; and finally consolidating all competencies in conditions as close as possible to the real environment, in real-time (scenario based training/line orientated simulations).

2.6 The course design should group aircraft system malfunctions by reference to malfunction characteristics and the underlying elements of crew performance required to manage them. (Class of Equivalence principle or Equivalency of Malfunctions).

Note.— Guidance on equivalency of malfunctions is contained in the Manual of Evidence-based Training *(Doc 9995), Part I, 3.8.*

2.7 The CBTA programme should integrate threat and error management and surprise elements throughout the complete course syllabus with an increase of these factors towards the end of the syllabus.

2.8 Course design should enable the instructor to apply a wide range of competency-based instructional techniques. For details see the *Manual on Aeroplane Pilot Competency-based Training and Assessment* (Doc xxxxx). (To be developed).

3. Guidelines for the authority

3.1 Guidance material regarding the approval of the training and assessment plans of a CBTA programme, as well as the quality assurance and safety management system used by an ATO or an operator in implementing these programmes can be found in the *Manual on the Approval of Training Organizations* (Doc 9841).

3.2 One of the attributes of CBTA, as defined in this document, is the use of an ongoing process for the evaluation of the training programme. The licensing authority shall therefore ensure that the ATO or the operator continuously monitors the effectiveness of the training.

3.3 The need for regular feedback from the ATO or operator to the Licensing Authority on the progress and problems faced during and after the delivery of the first programme(s) is important. How this feedback is to be provided to the Licensing Authority should therefore be clearly stated as part of the approval.

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Chapter 6

THREAT AND ERROR MANAGEMENT (TEM)

6.1 General

6.1.1 Threat and error management (TEM) is an overarching safety concept regarding aviation operations and human performance. TEM is not a revolutionary concept; it evolved gradually, as a consequence of the constant drive to improve the margins of safety in aviation operations through the practical integration of human factors knowledge.

6.1.2 TEM developed as a product of the collective industry experience. Such experience fostered the recognition that past studies and, most importantly, operational consideration of human performance in aviation had largely overlooked the most important factor influencing human performance in dynamic work environments: the interaction between people and the operational context (i.e. organizational, regulatory and environmental) within which they perform their operational duties.

6.1.3 The recognition of the influence of the operational context in human performance led to the conclusion that study and consideration of human performance in aviation operations must not be an end in itself. In regard to the improvement of margins of safety in aviation operations, the study and consideration of human performance without context address only part of a larger issue. TEM therefore aims to provide a principled approach to the broad examination of the dynamic and challenging complexities of the operational context in human performance, for it is the influence of these complexities that generates consequences directly affecting safety.

6.2 Meeting training and licensing requirements for TEM

6.2.1 As the management of operational threats and errors is considered to be a key aspect of safety critical aviation disciplines, TEM knowledge, threat and error recognition and its management are part of licensing and rating requirements in Annex 1. TEM pilot training requirements for commercial air transport operations are identified in Annex 6, Parts I and III. TEM is applicable to all flight crews conducting flight operations and is to be adapted according to the operational context.

6.2.2 In traditional training, TEM can be trained as a separate module or as parts of several modules to recognize and manage threats and errors to the appropriate level of performance.

6.2.3 In competency-based training, TEM is naturally and fully embedded in the training curriculum. The competencies of the approved adapted competency model provide individual and team countermeasures to threats and errors to avoid undesired aircraft states.

6.3 The threat and error management (TEM) model

6.3.1 The threat and error management (TEM) model is a conceptual framework that assists in understanding, from an operational perspective, the interrelationship between safety and human performance in dynamic and challenging operational contexts.

6.3.2 The TEM model focuses simultaneously on the operational context and the people performing operational duties in such context. The model is descriptive and diagnostic of both human and system performance: descriptive because it captures human and system performance in the operational context, resulting in realistic descriptions; diagnostic because it allows qualifying and quantifying complexities of the operational context in relation to the description of the contextual human performance, and vice versa.

6.3.3 The TEM model can be used in several ways:

a) safety analysis tool — can focus on a single event, as is the case with accident/incident analysis, or can be used to understand systemic patterns within a large set of events, as is the case with operational audits;

b) licensing tool — helps clarify human performance needs, strengths and vulnerabilities, allowing the definition of competencies from a broader safety management perspective;

c) training tool — helps an organization improve the effectiveness of its training interventions and, consequently, of its organizational safeguards; and

d) operational tool — helps an organization to increase its safety margins by providing the operational personnel tools as well as strategies and tactics to manage potential threats and errors.

6.3.4 From a training perspective, the broadest application to date of the TEM model is in flight crew human performance training, especially in crew resource management (CRM) training, a widely implemented human factors-based training intervention. This may lead to questions about the relationship between TEM and CRM, and it is therefore essential to clarify potential confusions from the outset.

6.3.5 TEM is an overarching safety concept with multiple applications in aviation, while CRM is exclusively a training intervention.

6.3.6 From a traditional training perspective, the basic concepts underlying TEM (threats, errors and undesired aircraft states) have been systematically only integrated into existing CRM programmes because TEM countermeasures build in large measure — although not exclusively — upon CRM skills. The combination of TEM concepts with CRM skills thus introduces the opportunity to present the utilization of CRM skills by flight crews anchored in the operational environment and from a purely operational perspective. TEM training does not replace CRM training but rather complements and enhances it.

6.3.7 From a competency-based training and assessment perspective, the competencies of the approved adapted competency model provide individual and team countermeasures to threats and errors and undesired aircraft states. CRM skills are embedded in the approved adapted competency model. Therefore, the CRM training supports the development of the competencies as countermeasures in the TEM concept.

6.3.8 Originally developed for flight deck operations, the TEM model can nonetheless be used at different levels and in different sectors within an organization, and across different organizations and activities within the aviation industry. It is therefore important, when applying TEM, to keep the user's perspective in the forefront. Depending on "who" is using TEM (front-line personnel, intermediate management, senior management; flight operations, maintenance, air traffic control), slight adjustments to related definitions may be required. This document focuses on the flight crew as "user", and the discussion herein presents the perspective of flight crews use of TEM.

6.4 The challenges in the TEM model

There are three basic challenges in the TEM model, from the perspective of flight crews: threats, errors and undesired aircraft states. The model proposes that threats and errors are part of everyday aviation operations that must be managed

by flight crews, since both threats and errors carry the potential to generate undesired aircraft states. Flight crews must also manage undesired aircraft states, since they carry the potential for unsafe outcomes. Undesired aircraft state management is an essential component of the TEM model, as important as threat and error management, because it largely represents the last opportunity to avoid an unsafe outcome and thus maintain safety margins in flight operations.

6.5 Threats

6.5.1 Threats are defined as events or errors that occur beyond the influence of the flight crew, increase operational complexity, and must be managed to maintain the margins of safety. During typical flight operations, flight crews have to manage various contextual complexities, for example, adverse meteorological conditions, airports surrounded by high mountains, congested airspace, aircraft malfunctions, and errors committed by other people outside of the cockpit, such as air traffic controllers, flight attendants or maintenance workers. The TEM model considers these complexities as threats because they all have the potential to negatively affect flight operations by reducing margins of safety.

6.5.2 Some threats can be anticipated, since they are expected or known to the flight crew. For example, flight crews can anticipate the consequences of a thunderstorm by briefing their response in advance or can prepare for a congested airport, as they execute the approach, by making sure they keep a watchful eye out for other aircraft.

6.5.3 Some threats can occur unexpectedly and without warning, such as an in-flight aircraft malfunction. In this case, flight crews must demonstrate competencies developed through training and operational experience to manage such unexpected threats.

6.5.4 Some threats may not be directly obvious to, or observable by, flight crews as they are immersed in operational context. Such threats can potentially be uncovered by safety analysis. These are considered latent threats. Examples include equipment design issues, optical illusions, or shortened turn-around schedules.

6.5.5 Regardless of whether threats are expected, unexpected, or latent, one measure of the effectiveness of a flight crew's ability to manage threats is whether threats can be anticipated so as to enable the flight crew to respond to them through deployment of appropriate countermeasures.

6.5.6 Threat management is a building block to error management and undesired aircraft state management. Although the threat-error linkage is not necessarily straightforward (i.e. it may not always be possible to establish a linear relationship or one-to-one mapping between threats, errors and undesired states), safety analysis data demonstrate that mismanaged threats are normally linked to flight crew errors, which in turn are often linked to undesired aircraft states. Threat management provides the most proactive option to maintain margins of safety in flight operation, by avoiding safety-compromising situations at their roots. As threat managers, flight crews are the last line of defence to keep threats from impacting flight operations.

6.5.7 Table II-1-6-1 presents examples of threats, grouped under two basic categories derived from the TEM model. Some environmental threats can be planned for and some will arise spontaneously, but they all have to be managed by flight crews in real time. Organizational threats, on the other hand, can be controlled (i.e. removed or, at least, minimized) at source by aviation organizations and are usually latent in nature. Flight crews still remain the last line of defence, but there are earlier opportunities for these threats to be mitigated by aviation organizations themselves.

Table II-1-6-1. Examples of threats

Environmental threats	*Organizational threats*
— **Weather:** thunderstorms, turbulence, icing, wind shear, cross/tailwind, very low/high temperatures. — **ATC:** traffic congestion, TCAS RA/TA, ATC command, ATC error, ATC language difficulty, ATC non-standard phraseology, ATC runway change, ATIS communication, units of measurement (QFE/meters). — **Airport:** contaminated/short runway; contaminated taxiway, lack of/confusing/faded signage/markings, birds, aids U/S, complex surface navigation procedures, airport constructions. — **Terrain:** High ground, slope, lack of references, "black hole". — **Other:** similar call signs.	— **Operational pressure:** delays, late arrivals, equipment changes. — **Aircraft:** aircraft malfunction, automation event/anomaly, MEL/CDL. — **Cabin:** flight attendant error, cabin event distraction, interruption, cabin door security. — **Maintenance:** maintenance event/error. — **Ground:** ground-handling event, de-icing, ground crew error. — **Dispatch:** dispatch paperwork event/error. — **Documentation:** manual error, chart error. — **Other:** crew scheduling event

6.6 Errors

6.6.1 Errors are defined actions or inactions by the flight crew that lead to unintentional deviations from organizational or operational expectations. Unmanaged and/or mismanaged errors can lead to undesired aircraft states. Errors in the operational context thus tend to reduce the margins of safety.

6.6.2 Errors can be spontaneous (i.e. without direct linkage to specific, obvious threats), linked to threats, or part of an error chain. Examples of errors would include the inability to maintain stabilized approach parameters, executing a wrong automation mode, failing to give a required call-out, or misinterpreting an ATC clearance.

6.6.3 Regardless of the type of error, an error's effect on safety depends on whether the flight crew detects and responds to the error before it leads to an undesired aircraft state and to a potential unsafe outcome. This is why one of the objectives of TEM is to understand error management (i.e. detection and response), rather than solely focusing on error causality (i.e. causation and commission). From a safety perspective, operational errors that are detected in a timely manner and promptly responded to (i.e. properly managed) do not lead to undesired aircraft states and lead to the desired margins of safety being restored by proper error management in flight operations, thus becoming operationally inconsequential. In addition to its safety value, proper error management is an example of successful human performance, having both learning and training value.

6.6.4 Capturing how errors are managed is then as important as, if not more important than, capturing the prevalence of errors itself. It is of interest to capture if and when errors are detected and by whom, the response(s) upon detecting errors, and the outcome of errors. Some errors are quickly detected and resolved, thus becoming operationally inconsequential, while others go undetected or are mismanaged. A mismanaged error is defined as an error that is linked to or induces an additional error or undesired aircraft state.

6.6.5 Table II-1-6-2 presents examples of errors, grouped under three basic categories derived from the TEM model. In the TEM concept, errors have to be "observable"; therefore, the TEM model uses the "primary interaction" as the point of reference for defining the error categories.

Table II-1-6-2. Examples of errors

Aircraft-handling errors	— Manual handling/flight controls: vertical/lateral and/or speed deviations, incorrect flaps/speed brakes, thrust reverser or power settings. — Automation: incorrect altitude, speed, heading, autothrottle settings, incorrect mode executed, or incorrect entries. — Systems/radio/instruments: incorrect packs, incorrect anti-icing, incorrect altimeter, incorrect fuel switches settings, incorrect speed bug, incorrect radio frequency dialled. — Ground navigation: attempting to turn down wrong taxiway/runway, taxi too fast, failure to hold short, missed taxiway/runway.
Procedural errors	— SOPs: failure to cross-verify automation inputs. — Checklists: wrong challenge and response; items missed, checklist performed late or at the wrong time. — Call-outs: omitted/incorrect call-outs. — Briefings: omitted briefings; items missed. — Documentation: wrong weight and balance, fuel information, ATIS, or clearance information recorded, misinterpreted items on paperwork; incorrect logbook entries, incorrect application of MEL procedures.
Communication errors	— Crew to external: missed calls, misinterpretations of instructions, incorrect read back, wrong clearance, taxiway, gate or runway communicated. — Pilot to pilot: within crew miscommunication or misinterpretation.

6.6.6 The TEM model classifies errors based upon the primary interaction of the pilot or flight crew at the moment the error is committed. Thus, in order to be classified as an aircraft-handling error, the pilot or flight crew must be interacting with the aircraft (e.g. through its controls, automation or systems). In order to be classified as a procedural error, the pilot or flight crew must be interacting with a procedure (e.g. checklists and SOPs). In order to be classified as a communication error, the pilot or flight crew must be interacting with people (e.g. ATC, ground crew, and other crew members).

6.6.7 Aircraft-handling errors, procedural errors and communication errors may be unintentional or may involve intentional non-compliance. Similarly, proficiency considerations (i.e. deficiencies in various competencies and training system deficiencies) may underlie all three categories of error. In order to keep the approach simple and avoid confusion, the TEM model does not consider intentional non-compliance and proficiency as separate categories of error but rather as subsets of the three major categories of error.

6.7 Undesired aircraft states

6.7.1 Undesired aircraft states are characterized by divergences from parameters normally experienced during operations (e.g. aircraft position or speed deviations, misapplication of flight controls, or incorrect systems configuration) associated with a reduction in margins of safety. Often considered at the cusp of becoming an incident or accident, undesired aircraft states must be managed by flight crews.

6.7.2 Examples of undesired aircraft states would include lining up for the incorrect runway during approach to landing, exceeding ATC speed restrictions during an approach, or landing long on a short runway requiring maximum braking. Events such as equipment malfunctions or ATC controller errors can also reduce margins of safety in flight operations, but these would be considered threats.

6.7.3 Undesired states can be managed effectively, restoring margins of safety, or can induce an additional error, leading to an incident or accident.

6.7.4 Table II-1-6-3 presents examples of undesired aircraft states, grouped under three basic categories derived from the TEM model.

Table II-1-6-3. Examples of undesired aircraft states

Aircraft handling	— Aircraft control (attitude). — Vertical, lateral or speed deviations. — Unnecessary weather penetration. — Unauthorized airspace penetration. — Operation outside aircraft limitations. — Unstable approach. — Continued landing after unstable approach. — Long, floated, firm or off-centre line landing.
Ground navigation	— Proceeding towards wrong taxiway/runway. — Wrong taxiway, ramp, gate or hold spot.
Incorrect aircraft configurations	— Incorrect systems configuration. — Incorrect flight controls configuration. — Incorrect automation configuration. — Incorrect engine configuration. — Incorrect weight and balance configuration.

6.7.5 An important learning and training point for flight crews is the timely switching from error management to undesired aircraft state management. An example would be as follows: a flight crew selects a wrong approach in the flight management computer. The flight crew subsequently identifies the error during a cross-check prior to the final approach fix (FAF). However, instead of using a basic mode (e.g. heading) or manually flying the desired track, both flight crew members become involved in attempting to re-programme the correct approach prior to reaching the FAF. As a result, the aircraft "stitches" through the localizer, descends late, and goes into an unstable approach. This would be an example of the flight crew getting "locked in" to error management, rather than switching to undesired aircraft state management. The use of the TEM model assists in educating flight crews that, when the aircraft is in an undesired state, their basic task is undesired aircraft state management instead of error management. It also illustrates how easy it is to get locked in to the error management phase.

6.7.6 Also from a learning and training perspective, it is important to establish a clear differentiation between *undesired aircraft states* and *outcomes*. *Undesired aircraft states* are transitional states between a normal operational state (i.e. a stabilized approach) and an outcome. *Outcomes*, on the other hand, are end states, most notably reportable occurrences (i.e. incidents and accidents). An example would be as follows: a stabilized approach (normal operational state) turns into an unstabilized approach (undesired aircraft state) that results in a runway excursion (outcome).

6.7.7 The training and remedial implications of this differentiation are significant. While at the undesired aircraft state stage, the flight crew has the possibility, through appropriate TEM, of recovering the situation and returning to a normal operational state, thus restoring margins of safety. Once the undesired aircraft state becomes an outcome, recovery of the situation, return to a normal operational state, and restoration of margins of safety are not possible.

6.8 Countermeasures

6.8.1 As part of the normal discharge of their operational duties, flight crews must employ countermeasures to keep threats, errors and undesired aircraft states from reducing margins of safety in flight operations. Examples of countermeasures would include communication, workload management, application of procedure, etc. Flight crews dedicate a significant amount of resources to the application of counter-measures to ensure margins of safety during flight operations. Empirical observations during training and checking suggest that as much as 70 per cent of flight crew activities may be countermeasure-related activities.

6.8.2 Countermeasures are generally flight crew actions. However, some counter-measures to threats, errors and undesired aircraft states that flight crews employ build upon “hard” resources provided by the aviation system. These resources are already imbedded in the system before flight crews report for duty and are therefore considered as systemic-based countermeasures. These include for example:

— airborne collision avoidance system (ACAS);

— ground proximity warning system (GPWS),

— standard operating procedures (SOPs);

— checklists;

— briefings; and

— training.

6.8.3 Other countermeasures are more directly related to the human contribution to the safety of flight operations. These are personal strategies and tactics, and individual and team countermeasures, which typically include canvassed knowledge, skills and attitudes underpinning the pilot competencies. There are basically three categories of individual and team countermeasures:

— planning countermeasures: essential for managing anticipated and unexpected threats;

— execution countermeasures: essential for error detection and error response; and

— review countermeasures: essential for managing the changing conditions of a flight.

6.8.4 Enhanced TEM is the product of the combined use of systemic-based and individual and team countermeasures. Table II-1-6-4 presents detailed examples of individual and team countermeasures. Further guidance on countermeasures can be found in the manual *Line Operations Safety Audit (LOSA)* (Doc 9803).

Table II-1-6-4. Examples of individual and team countermeasures

Planning countermeasures		
Application of procedures and compliance with regulations	The required briefing was interactive and operationally thorough	— Concise, not rushed, and met SOP requirements — Bottom lines were established
Communication	Operational plans and decisions were communicated and acknowledged	— Shared understanding about plans – "Everybody on the same page"
Workload management	Roles and responsibilities were defined for normal and non-normal situations	— Workload assignments were communicated and acknowledged
Problem-solving and decision-making	Crew members developed effective strategies to manage threats to safety	— Threats and their consequences were anticipated — Used all available resources to manage threats
Execution countermeasures		
Situational awareness and management of information	Crew members actively monitored and cross-checked systems and other crew members	— Aircraft position, settings, and crew actions were verified
Workload management	Operational tasks were prioritized and properly managed to handle primary flight duties	— Avoided task fixation — Did not allow work overload
Flight path management automation	Automation was properly managed to balance situational and/or workload requirements	— Automation setup was briefed to other members — Effective recovery techniques from automation anomalies
Review countermeasures		
Problem-solving and decision-making	Existing plans were reviewed and modified when necessary	— Crew decisions and actions were openly analysed to make sure the existing plan was the best plan
Leadership and teamwork; Communication	Crew members asked questions to investigate and/or clarify current plans of action	— Crew members not afraid to express a lack of knowledge – "Nothing taken for granted" attitude
Leadership and teamwork	Crew members stated critical information and/or solutions with appropriate persistence	— Crew members spoke up without hesitation

Chapter 7

THE ICAO PILOT INSTRUCTOR AND EVALUATOR COMPETENCY FRAMEWORK

7.1 Introduction

7.1.1 Pilot instructors shall meet the requirements specified in Annex 1, 2.1.8 and 2.8, as appropriate. In addition, for the multi-crew pilot licence (MPL) training programme, the instructor shall have experience, acceptable to the Licensing Authority, in multi-crew operations, as follows:

a) for at least the intermediate and advanced phases of the multi-crew pilot licence (MPL) programme, have suitable experience in multi-pilot operations; or

b) with the exception of instructors providing instruction in the intermediate and advanced phases of the MPL licence, receive training as an alternative means of compliance with the experience prerequisite for instruction in multi-pilot operations. This training should include but may not be limited to the following elements:

1) multi-crew cooperation training in a suitable multi-pilot flight simulation training device;

2) observations of multi-pilot line operations with a suitable operator;

3) observations of subsequent multi-pilot training where applicable; and

4) completion of multi-pilot cockpit resource management training.

7.1.2 The benefit of using competencies for the pilot instructor and evaluator, and some explanation on the terms used, are described below.

7.1.3 Mastering a defined set of *pilot* competencies should enable a *pilot* to perform ~~their~~ routine duties and manage unforeseen situations which cannot be trained in advance.

7.1.4 Similarly, mastering a set of *instructor and evaluator* competencies (IECs) should enable an instructor/evaluator (IE) to perform instruction and evaluation duties and manage the full spectrum ranging from ground instruction to evaluations in dynamic flight situations. It is beneficial to define a set of universal competencies, which can be consistently applied throughout the whole career of an IE.

7.1.5 The competencies for instructors and evaluators developed hereby are based on the latest ICAO provisions, EASA and FAA regulations, guidance material and best practices from the industry.

7.1.6 In the competency framework, the evaluator is a person authorized to conduct the formal and final summative assessment of a trainee's performance.

7.1.7 The table below proposes an overview of the ICAO Pilot Instructor and Evaluator Competency (IEC) Framework. Therefore, operators and ATOs electing to implement competency-based training and assessment for their instructors and evaluators may develop an adapted competency model to suit the particular context of their organization.

7.1.8 In the tables below, the cells in green are not part of the ICAO competency framework but are to be developed by the operator or the ATO for the adapted competency model, respecting the guidance contained in the green cells.

7.2 ICAO pilot instructor and evaluator competency framework

The tables in 7.3 provide the details for each competency.

<table>
<tr><th colspan="4">Competencies for pilot instructors and evaluators</th></tr>
<tr><td rowspan="3">Name of the competency</td><td rowspan="3">Description</td><td colspan="3">Performance Criteria</td></tr>
<tr><td rowspan="2">Observable behaviour (OB)</td><td colspan="2">Competency Assessment</td></tr>
<tr><td>Final competency standard</td><td>Conditions</td></tr>
<tr><td>Pilot competencies[1]</td><td>See ICAO Aeroplane Pilot Competency Framework[2]</td><td rowspan="5">See the observable behaviours in the tables below</td><td rowspan="5">Operators and ATOs define in their relevant approved manuals the level of performance to be achieved by the instructor and evaluator.</td><td rowspan="5">Ground training
and/or
Flight training</td></tr>
<tr><td>Management of the learning environment</td><td rowspan="4">See descriptions in the tables below for the individual competencies</td></tr>
<tr><td>Instruction</td></tr>
<tr><td>Interaction</td></tr>
<tr><td>Assessment and evaluation</td></tr>
</table>

1. For ground instructors some pilot competencies may not apply – see 3.1.
2. Only an ICAO Aeroplane Pilot Competency Framework is published. For other categories of aircraft, suitable amendments to the framework may be necessary to account for differences in piloting.

7.3 Tables detailing the individual competencies for instructors and evaluators (IEC1 – IEC5)

Note.— The competencies and observable behaviours in the tables are not listed according to any pre-defined priority. Observable behaviours may include, but are not limited to, the observable behaviours listed in the tables below.

7.3.1 IEC1 – Pilot competencies

Instructor and evaluator competency – pilot competencies				
Name of the competency	Description	Performance Criteria		
		Observable behaviour (OB)	Competency Assessment	
			Final competency standard	Conditions
IEC1: **Pilot competencies**[1]	See ICAO Aeroplane Pilot Competency Framework[2]	See ICAO Aeroplane Pilot Competency Framework[2]	Operators and ATOs define in their relevant approved manuals the level of performance to be achieved by the instructor and evaluator.	**Ground training** and/or **Flight training**

[1] For ground instructors some pilot competencies may not apply: the operators and ATOs have to identify which pilot competencies and associated observable behaviours are applicable depending on their ground instructors/evaluators activities. As an example the pilot competency communication must be demonstrated by ground instructors/evaluators (except for some observable behaviours) while the pilot competency flight path management manual control may not be mandatory.

[2] Only an ICAO Aeroplane Pilot Competency Framework is published. For other categories of aircraft, suitable amendments to the framework may be necessary to account for differences in piloting.

7.3.2 IEC2 – Management of the environment

Instructor and evaluator competency – management of the learning environment				
Name of the competency	Description	Performance Criteria		
		Observable behaviour (OB)	Competency Assessment	
			Final competency standard	Conditions
IEC2: **Management of the learning environment**	Ensures that the instruction, assessment and evaluation are conducted in a suitable and safe environment	OB 2.1 Applies TEM in the context of instruction/ evaluation OB 2.2 Briefs on safety procedures for situations that are likely to develop during instruction/evaluation OB 2.3 Intervenes appropriately at the correct time and level (e.g. progresses from verbal assistance to taking over control) OB 2.4 Resumes training/evaluation as practicable after any intervention OB 2.5 Plans and prepares training media, equipment and resources OB 2.6 Briefs training devices or aircraft limitations that may influence training, when applicable OB 2.7 Creates and manages conditions that are suitable for the training objectives (e.g. FSTD, airspace, ATC, weather, time, etc.) OB 2.8 Adapts to changes in the environment while minimizing training disruptions OB 2.9 Manages time, training media and equipment to ensure that training objectives are met	Operators and ATOs define in their relevant approved manuals the level of performance to be achieved by the instructor and evaluator.	**Ground training** and/or **Flight training**

7.3.3 IEC3 – Instruction

Instructor and evaluator competency – instruction				
Name of the competency	Description	Performance Criteria		
		Observable behaviour (OB)	Competency Assessment	
			Final competency standard	Conditions
IEC3: **Instruction**	Conducts training to develop the trainee´s competencies	OB 3.1 References approved sources (operations and technical sources, training manuals and regulations) OB 3.2 States clearly the objectives and clarifies roles for the training OB 3.3 Follows the approved training programme OB 3.4 Applies instructional methods as appropriate, (e.g. explanation, demonstration, learning by discovery, facilitation, in-seat instruction) OB 3.5 Sustains operational relevance and realism OB 3.6 Adapts the amount of instructor inputs to ensure that the training objectives are met OB 3.7 Adapts to situations that might disrupt a planned sequence of events OB 3.8 Continuously assesses trainee's competencies OB 3.9 Encourages the trainee to self-assess OB 3.10 Allows trainee to self-correct in a timely manner OB 3.11 Applies trainee-centred feedback techniques (e.g. facilitation, …) OB 3.12 Provides positive reinforcement	Operators and ATOs define in their relevant approved manuals the level of performance to be achieved by the instructor and evaluator.	**Ground training** and/or **Flight training**

7.3.4 IEC4 – Interaction

Instructor and evaluator competency – interaction				
Name of the competency	Description	Performance Criteria		
		Observable behaviour (OB)	Competency Assessment	
			Final competency standard	Conditions
IEC4: **Interaction**	Supports the trainee's learning and development Demonstrates exemplary behaviour (role model)	OB 4.1 Shows respect for the trainee, e.g. for culture, language and experience OB 4.2 Shows patience and empathy, e.g. by actively listening, reading non-verbal messages and encouraging dialogue OB 4.3 Manages trainee´s barriers to learning OB 4.4 Encourages engagement and mutual support OB 4.5 Coaches the trainees OB 4.6 Supports the goal and training policies of the Operator/ATO and Authority OB 4.7 Shows integrity (e.g. honesty and professional principles) OB 4.8 Demonstrates acceptable personal conduct, acceptable social practices, content expertise, a model for professional and interpersonal behaviour OB 4.9 Actively seeks and accepts feedback to improve own performance	Operators and ATOs define in their relevant approved manuals the level of performance to be achieved by the instructor and evaluator.	**Ground training** and/or **Flight training**

7.3.5 IEC5 – Assessment and evaluation

Instructor and evaluator competency – assessment and evaluation				
Name of the competency	Description	Performance Criteria		
		Observable behaviour (OB)	Competency Assessment	
			Final competency standard	Conditions
IEC5: **Assessment and evaluation**	Assesses the competencies of the trainee Contributes to continuous training system improvement.	OB 5.1 Complies with Operator / ATOs and authority requirements OB 5.2 Ensures that the trainee understands the assessment process OB 5.3 Applies the competency standards and conditions OB 5.4 Assesses trainee's competencies OB 5.5 Performs grading OB 5.6 Provides recommendations based on the outcome of the assessment OB 5.7 Makes decisions based on the outcome of the summative assessment OB 5.8 Provides clear feedback to the trainees OB 5.9 Reports strengths and weaknesses of the training system (training environment, curriculum, assessment/evaluation) including feedback from trainees OB 5.10 Suggests improvements for the training system OB 5.11 Produces reports using provided appropriate forms and media	Operators and ATOs define in their relevant approved manuals the level of performance to be achieved by the instructor and evaluator.	**Ground training** and/or **Flight training**

Chapter 8[1]

COMPETENCY-BASED TRAINING AND ASSESSMENT FOR REMOTE PILOT LICENCE (RPL)

(Applicable as of 3 November 2022)

8.1 INTRODUCTION

8.1.1 This chapter outlines the principles and procedures that are applicable to the development and implementation of a remote pilot competency-based training and assessment programme and that shall be followed using the methodology outlined in Chapter 2. The appendix to this chapter contains the ICAO RPL Competency framework.

8.1.2 The approved training organizations (ATO) conducting approved RPL training and the Licensing Authorities shall comply with the procedures in this chapter.

8.1.3 The ICAO RPL competency framework in the appendix to this chapter shall be used as the basis for the development of an adapted competency model and approval of competency-based training and assessment programmes specific to the remotely piloted aircraft system (RPAS) operational context.

8.2 ASSESSMENT

8.2.1 The assessment process developed by the ATO, which includes the assessment (evidence) guide, conditions and competency standards required for assessing applicants, shall be approved by the Licensing Authority.

8.2.2 The RPL applicant shall successfully complete the approved competency-based training and assessment programme.

8.3 TRAINING

8.3.1 All competency-based training and assessment for RPLs shall be developed using analyse, design, develop, implement and evaluate (ADDIE) principles.

8.3.2 The competency-based training and assessment programme for RPL shall consist of an integrated programme of theoretical and practical instruction.

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[1] Within Amendment 6 to the PANS-TRG, which is applicable in 2022, Competency-based training and assessment for remote pilot licence (RPL) had a reserved Chapter 6. Amendment 7 to the PANS-TRG, applicable in 2020, will maintain Competency-based training and assessment for remote pilot licence (RPL) space reserved under Chapter 8. Therefore, at its applicability in 2022, Amendment 6 to the PANS-TRG should highlight this change.

8.4 RPAS INSTRUCTOR AND RPL EXAMINER QUALIFICATIONS

8.4.1 RPAS instructors and RPL examiners shall meet the following requirements:

a) demonstrate competencies described in the appendix to this chapter; and

b) hold the qualifications to provide instruction for RPL training.

8.4.2 All RPL examiners shall receive refresher training and be authorized or re-authorized using a documented process acceptable to the Licensing Authority implemented by an ATO at intervals established by the Licensing Authority.

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Appendix 1 to Chapter 8

ICAO COMPETENCY FRAMEWORK FOR RPL

Note 1.— Paragraph 2.5 of Part I, section 2 states that this framework should be adapted to the RPAS operational context. It does not address the specific definition of duties, sharing of tasks, ratings and proficiency levels existing in the RPAS operator organization. The competencies in the table are not listed according to a pre-defined priority.

Note 2.— The principles of threat and error management should be integrated in the development of competency-based training and assessment programmes.

Competency	*Competency description*	*Observable behaviour*
Situational awareness	Perceives and comprehends the operational situation of the moment and all of the relevant information available and anticipates what could happen that may affect the operation	– Identifies and assesses accurately the state of the RPAS – Identifies and assesses accurately the RPA's vertical and lateral position, and its anticipated flight path – Identifies and assesses accurately the general environment as it may affect the flight, including the air traffic neighbouring the RPA operation and the meteorological conditions that could impact the operation – Conducts the operation in accordance with the airspace configuration where the RPAS operation is taking place – Keeps track of time and energy – Maintains awareness of the people involved in or affected by the operation and their capacity to perform as expected – Anticipates accurately what could happen, plans and stays ahead of the situation – Develops effective contingency plans based upon potential threats – Recognizes and effectively responds to indications of reduced situational awareness

Competency	*Competency description*	*Observable behaviour*
Application of procedures	Identifies and applies procedures in accordance with published operating instructions and applicable regulations, using the appropriate knowledge	– Identifies the source of operating instructions – Follows standard operating procedures (SOPs) unless a higher degree of safety dictates an appropriate deviation – Identifies and follows all operating instructions in a timely manner – Correctly operates the RPAS and associated equipment – Complies with applicable regulations – Applies relevant procedural knowledge
Communication	Demonstrates effective verbal, written and non-verbal communications, in normal and abnormal situations	– Ensures the recipient is ready and able to receive the information – Selects appropriately what, when, how and with whom to communicate – Conveys messages clearly, accurately and concisely – Confirms that the recipient correctly understands important information – Listens actively and demonstrates understanding when receiving information – Asks relevant and effective questions – Adheres to standard radiotelephony phraseology and procedures – Accurately reads and interprets required documentation for the operation of RPAS – Accurately reads, interprets, constructs and responds to datalink messages – Completes accurate reports as required by operating procedures – Correctly interprets non-verbal communication – Where applicable, uses eye contact, body movement and gestures that are consistent with and support verbal messages

Competency	*Competency description*	*Observable behaviour*
RPA flight path management, automation	Controls the RPA flight path through automation, including appropriate use of flight management system(s) and guidance	– Controls the RPA through automation with accuracy and smoothness as appropriate to the situation – Contains the RPA within the normal flight envelope – Maintains the desired flight path during flight using automation – Takes appropriate action in case of deviations from the desired RPA trajectory – Selects appropriate level and mode of automation in a timely manner considering phase of flight and workload – Effectively monitors automation, including engagement and automatic mode transitions – Controls the RPA safely in degraded automation using only the relationship between RPA attitude, speed and thrust if applicable
Leadership, teamwork and self-management	Demonstrates effective leadership, team working and self-management	– Understands and agrees with the crew's roles and objectives – Creates an atmosphere of open communication and encourages team participation – Uses initiative and gives directions when required – Admits mistakes and takes responsibility for own performance, detecting and resolving own errors – Anticipates and responds appropriately to other crew members' needs – Carries out instructions when directed – Communicates relevant concerns and intentions – Gives and receives feedback constructively – Confidently intervenes when important for safety – Demonstrates empathy and shows respect and tolerance for other people – Engages others in planning and allocates activities fairly and appropriately according to abilities – Addresses and resolves conflicts and disagreements in a constructive manner – Demonstrates self-control in all situations – Self-evaluates the effectiveness of actions

Competency	*Competency description*	*Observable behaviour*
Problem solving and decision making	Accurately identifies risks and resolves problems. Uses the appropriate decision-making processes	– Seeks accurate and adequate information from appropriate sources – Identifies and verifies what and why things have gone wrong – Employs proper problem solving strategies – Perseveres in working through problems without reducing safety – Uses appropriate and timely decision-making processes – Identifies and considers options effectively – Monitors, reviews and adapts decisions as required – Identifies and manages risks and threats to the safety of the RPAS and people effectively – Changes behaviour and responds as needed to deal with the demands of the changing situation
Workload management	Manages available resources efficiently to prioritize and perform tasks in a timely manner under all circumstances	– Plans, prioritizes and schedules tasks effectively – Manages time efficiently when carrying out tasks – Offers and accepts assistance, delegates when necessary and asks for help early – Reviews, monitors and crosschecks actions conscientiously – Verifies that tasks are completed to the expected outcome – Manages and recovers from interruptions, distractions, variations and failures effectively

Competency	*Competency description*	*Observable behaviour*
Coordination and handover	Manages coordination and handover between personnel in operational positions and with other affected personnel	– Coordinates with personnel and other stakeholders, in a timely manner – Selects coordination/handover method based on circumstances, including urgency of coordination, status of facilities and prescribed procedures – Coordinates the handover using the prescribed coordination procedures – Coordinates changes of status of operational facilities such as equipment, systems and functions – Coordinates changes of status of airspace and aerodrome resources, as applicable – Uses clear and concise terminology for verbal coordination – Uses standard message formats and protocols for non-verbal coordination – Uses clear and concise non-standard coordination methods when required – Conducts effective briefings during position handover
Management of abnormal situations	Detects and responds to emergency and abnormal situations related to RPAS operations and manages the degraded modes of operation of the RPAS	– Identifies the possibility for the development of an emergency or abnormal situation from the information available – Determines the nature of the abnormal situation emergency – Prioritizes actions based on the urgency of the situation – Decides the most appropriate actions to initiate – Follows the prescribed procedures for managing the RPAS in emergency situations – Detects potential degradation to RPAS and/or equipment with particular attention to the potential loss of the C2 Link – Assesses the impact of the degraded mode of operation – Takes actions, when required, to ensure the safety of the people overflown – Creates solutions when no guidance or procedure for a given abnormal situation

Chapter 9

OTHER FLIGHT CREW MEMBERS

[Reserved]

Chapter 10

FLIGHT VALIDATION PILOTS

[Reserved]

Section 2

CABIN CREW

[Reserved]

Section 3

FLIGHT OPERATIONS
OFFICERS/FLIGHT DISPATCHERS

Chapter 1

GENERAL PROVISIONS FOR COMPETENCY-BASED TRAINING AND ASSESSMENT FOR FLIGHT OPERATIONS OFFICERS/FLIGHT DISPATCHERS (FOOs)

1.1 INTRODUCTION

1.1.1 This chapter provides the procedures for establishing a competency-based training and assessment programme for FOOs, with which approved training organizations (ATOs), airlines and Authorities shall comply when implementing such programmes. These procedures are complementary to those provided in Part I, Chapter 2 of the PANS-TRG.

1.1.2 The basic qualification for all functions or tasks in the system of operational control is the FOO Qualification. All functions (independent from the job title) and with the responsibility and authority for initiation, planning, continuation and diversion of each flight shall be qualified according to these requirements.

1.1.3 Following the generic FOO qualification, additional competencies (knowledge, skills and attitude) might be required according to the intended specific function within the operator. Operator specific functions or tasks may include, for example:

— Flight Dispatch (Flight Planning)

— Operations Control

— Flight Control (Inflight Control or Mission Support)

— Operations Engineering

1.1.4 The ICAO Competency framework for FOOs provided in Appendix 2 to this chapter shall be used as the basis for the development of an adapted competency model. The adapted competency model and associated competency-based training and assessment programme shall be approved by the appropriate authority.

1.2 TRAINING

A competency-based training and assessment programme for FOOs shall include on-the-job training to ensure that competency standards appropriate to the exercise of duty are consistently achieved.

1.3 ASSESSMENT

1.3.1 FOOs shall meet the final competency standards acceptable to the appropriate Authority and in compliance with Annex 1— *Personnel Licensing* requirements.

1.3.2 Assessment shall include a component of on-the-job competency assessment.

1.4 EVALUATION OF TRAINING PROGRAMMES

1.4.1 The competency-based training and assessment programme for FOOs shall include an ongoing evaluation of the training programme acceptable to the authority. The evaluation shall ensure that:

a) the training and assessment plans are relevant to the work of FOOs in the specific context and environment to which they may be assigned after training;

b) the programme enables the trainees to achieve the interim and final competency standards; and

c) remediation actions are taken if in-training and post-training evaluation indicates a need to do so.

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Appendix 1 to Chapter 1

GUIDELINES FOR THE IMPLEMENTATION OF COMPETENCY-BASED TRAINING AND ASSESSMENT FOR FOOs

1. Introduction

1.1 This appendix provides guidance to authorities, approved training organizations (ATOs) and airlines on the measures to be taken to facilitate the efficient implementation of competency-based training and assessment for FOOs. Detailed guidance on how to structure competency-based training and assessment for FOOs in different phases of training can be found in the *Manual on Flight Operations Officers/Flight Dispatchers Competency-based Training and Assessment* (Doc 10106).

2. Guidelines for the Authority

2.1 In view of the developmental nature of a first competency-based FOO programme in an ATO or airline, the approval should be provisional and should be confirmed only after obtaining a satisfactory result from the implementation of the first courses and after incorporating the lessons learnt into the training programme.

2.2 Guidance material regarding the approval of the training and assessment plans of competency-based training and assessment programmes, as well as the quality assurance system used by an approved training organization in implementing these programmes, can be found in the *Manual on the Approval of Training Organizations* (Doc 9841).

2.3 Oversight by the authority shall be exercised during the initial implementation.

2.4 It is intended that the training programme be subject to regular evaluation to ensure the effectiveness of the training and its relevance to real-time operations.

2.5 The success of the implementation of the FOO competency-based training and assessment depends to a large measure on effective coordination and cooperation between the authority, the ATO and the Operators employing the FOOs, and FOO representative bodies. Authorities should encourage and facilitate such cooperation and coordination.

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Appendix 2 to Chapter 1

ICAO COMPETENCY FRAMEWORK FOR FLIGHT OPERATIONS OFFICER/FLIGHT DISPATCHER (FOO)

1. The ICAO competency framework for FOOs provides the basis that ATOs and Operators shall use to develop an adapted competency model suitable for their operating environment.

2. ATOs and Operators shall use the training specifications and the adapted competency model to develop their training and assessment programmes.

3. The ICAO Competency framework for FOOs is generic and applicable to all the job functions (flight dispatcher, operations controller, etc.). Consequently, the framework does not address the specific definition of duties, sharing of tasks, and proficiency levels existing in the organization.

4. The framework is independent of the operating conditions, including the type of equipment in use or of the major areas of application.

Note 1. —The competencies and observable behaviours in the table below are not listed according to any pre-defined priority. Observable behaviours may include, but are not limited to, the observable behaviours listed in the table below.

Note 2.— The principles of risk management should be integrated in the development of competency-based training and assessment programmes.

Competency	*Description*	*Observable behaviours (OB)*
Application of procedures and regulations	Identifies and applies procedures in accordance with published operating instructions and applicable regulations.	OB 1.1 Interprets SOPs appropriately
		OB 1.2 Applies SOPs flexibly where necessary
		OB 1.3 Follows all procedures in a timely manner.
		OB 1.4 Complies with applicable regulations and procedures
Technical expertise	Applies and improves individual technical knowledge and skills.	OB 2.1 Retrieves the applicable data and operating procedures
		OB 2.2 Explains to other stakeholders the intent of the applicable procedure for a given context when necessary
		OB 2.3 Uses appropriate operational information (Meteorological, airports, crew, aircraft, network, general) to make optimum decisions
		OB 2.4 Uses standard and non-standard information distribution systems and sources
		OB 2.5 Keeps up to date with changes to operational standards
Process Improvement	Contributes to the continuous improvement of the system.	OB 3.1 Consistently provides appropriate guidance to stakeholders and colleagues on how to implement procedures
		OB 3.2 Analyses evidence to identify opportunities for process improvement
		OB 3.3 Proposes process improvements for approval/adoption by management
		OB 3.4 Provide suitable justification for proposed improvements
		OB 3.5 Recognizes trends in practice of one’s own technical area
Communication	Communicates effectively in all situations.	OB 4.1 Ensures the recipient is ready and able to receive the information
		OB 4.2 Selects appropriately what, when, how and with whom to communicate
		OB 4.3 Conveys messages clearly, accurately and concisely
		OB 4.4 Uses and interprets non-verbal communication appropriately
		OB 4.5 Confirms that the recipient correctly understands important information
		OB 4.6 Listens actively when receiving information
		OB 4.7 Asks relevant and effective questions
		OB 4.8 Adheres to standard radiotelephone

Competency	*Description*	*Observable behaviours (OB)*
		phraseology and procedures
		OB 4.9 Accurately interprets communication in the language used in the Operation Manuals and in the operational environment
Situational Awareness	Perceives and comprehends all of the relevant information available and anticipates what could happen that may affect the operation.	OB 5.1 Identifies hazards and assesses risks
		OB 5.2 Adjusts the operation in response to changes in the available the available resources (infrastructure, IT-systems, personnel)
		OB 5.3 Assesses the status of the operation (technical status of aircraft, weather conditions, NOTAMS, industrial action etc.)
		OB 5.4 Monitors current operations to identify operational risk
		OB 5.5 Develops contingency plans sufficiently in advance of an identifiable threat or risk
Workload management	Manages available resources efficiently to prioritize and perform tasks in a timely manner under all circumstances.	OB 6.1 Plans, prioritizes and schedules tasks effectively
		OB 6.2 Manages time efficiently when carrying out tasks
		OB 6.3 Maintains self-control in all situations
		OB 6.4 Collaborates to balance workload
		OB 6.5 Delegates tasks when necessary
		OB 6.6 Recognizes overload and asks for help early
		OB 6.7 Monitors and cross-checks actions
		OB 6.8 Verifies that tasks are completed with the expected outcome
		OB 6.9 Manages interruptions, distractions and failures
		OB 6.10 Evaluates individual capacity to perform work and takes appropriate action
Problem-solving and decision-making	Accurately identifies risks and resolves problems. Uses appropriate decision-making techniques.	OB 7.1 Identifies relevant information required for the analysis of operational situations
		OB 7.2 Develops and applies an appropriate model for the situation (relations, coefficients etc.)
		OB 7.3 Makes appropriate decisions when confronted with conflicting, unexpected or incomplete information
		OB 7.4 Adapts decision-making process to available time

Competency	*Description*	*Observable behaviours (OB)*
		OB 7.5 Evaluates options in view of safety, costs and operational stability
		OB 7.6 Define the deadlines that limit the available options
		OB 7.7 Uses appropriate decision-making processes and tools
		OB 7.8 Evaluates own decision-making to improve performance
Leadership and teamwork	Collaborates up, down and across the organization to foster and promote a clear vision and common goals. Energizes others to achieve the operational goals.	OB 8.1 Manages professional relationships with appropriate role boundaries
		OB 8.2 Gains the trust and confidence of others
		OB 8.3 Inspires others to collaborate and strive towards excellence
		OB 8.4 Resolves conflicts and disagreements in a constructive manner
		OB 8.5 Takes responsibility for mistakes
		OB 8.6 Provides relevant information and solutions to others
		OB 8.7 Provides and seeks effective and constructive feedback

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Procedures for
Air Navigation Services

TRAINING

Part III

TRAINING AND ASSESSMENT FOR AIRCRAFT MAINTENANCE PERSONNEL

Part III — TRAINING AND ASSESSMENT FOR AIRCRAFT MAINTENANCE PERSONNEL

This part outlines the principles and procedures for the development and implementation of competency-based training and assessment programme for aircraft maintenance personnel.

Chapter 1

COMPETENCY-BASED TRAINING AND ASSESSMENT FOR AIRCRAFT MAINTENANCE PERSONNEL

1.1 INTRODUCTION

The purpose of the PANS-TRG is to support the training and qualification of personnel conducting activities affecting safety and for whom there are detailed SARPs in Annexes or procedures in PANS with requirements for such training and qualification. This part outlines the principles and procedures for the development and implementation of a competency-based training and assessment programme for aircraft maintenance personnel in order to focus training and assessment on how an AMTEM is expected to competently perform on the job. The goal of competency-based training and assessment is to provide a competent workforce for personnel working in aircraft maintenance including those with certification privileges. The *Manual on Training of Aircraft Maintenance Personnel* (Doc 10098) contains guidance material on the design and development of an aircraft maintenance personnel training programme as well as examples of training objectives based on Appendix 2 to Chapter 1 *Guidelines for the Implementation of Competency-based Training and Assessment for Aircraft Maintenance Personnel*. Implementation of competency-based training and assessment programmes for AMTEM personnel is optional.

1.2 COMPETENCY-BASED APPROACH TO TRAINING AND ASSESSMENT

1.2.1 The development of competency-based training and assessment shall be based on a systematic approach whereby competencies and their performance criteria are defined, training is based on the competencies identified, and assessments are developed to determine whether these competencies have been achieved.

1.2.2 Competency-based training and assessment may be implemented by an AMO or an ATO, or a combination of both. If implemented, in addition to Part I, Chapter 2, competency-based training and assessment shall address as a minimum the following:

a) the conduct of a training needs analysis;

b) the derivation of training objectives from the training needs analysis and their formulation in an observable and measurable fashion;

c) the development of a curriculum with a view to achieving an optimal path to the attainment of competencies;

d) the development of material-dependent training (as opposed to instructor-dependent training);

e) the development of criterion-referenced, valid, reliable and performance-oriented assessments;

f) the performance criteria to be considered by the assessor when assessing each competency and the use of an assessment (evidence) guide applicable to all competency-based assessments.

Note. — A definition of ***Assessment (evidence) guide*** *can be found in Part I, Chapter 1 of the PANS-TRG.*

g) the selection and description of the training for competency-based assessors;

Note. — Guidance on the selection and training of competency–based assessors is contained in the Manual on Training of Aircraft Maintenance Personnel *(Doc 10098).*

h) the identification of indicators to be used to evaluate the effectiveness of training on the AMTEM's performance; and

i) the use of an ongoing evaluation process to ensure the effectiveness of training and its relevance to real-time operations.

1.3 DESIGN OF COMPETENCY–BASED TRAINING AND ASSESSMENT

Part I, Chapter 2 of the PANS-TRG contains guidance on the design of competency-based training and assessment. Licensing Authorities responsible for approving training programmes of AMOs and ATOs should ensure that the training programmes meet the provisions of Part I, Chapter 2.

1.4 THE COMPETENCY FRAMEWORK

1.4.1 The competency framework supports the establishment of a systematic approach as mentioned in Part I, Chapter 2 of the PANS-TRG by providing a model that should be adapted to suit the variety of situations that exist worldwide in the aircraft maintenance personnel environment.

1.4.2 The ICAO competency framework for aircraft maintenance personnel as contained in Appendix 1 to Chapter 1 consists of a select group of competencies with their associated description and observable behaviours. Organizations electing to implement competency-based training and assessment for aircraft maintenance personnel shall use this ICAO competency framework to develop an *adapted competency model* that forms the basis for development of competency-based training and assessment for aircraft maintenance personnel. The assessment (evidence) guide is to be developed by AMOs and/or ATOs as part of the local adaptation process.

Note.— The elements of an adapted competency model are outlined in Part I, Chapter 2 of the PANS-TRG and include performance criteria for each competency.

1.4.3 The competencies with their associated description and observable behaviours shall be used to develop performance criteria

Note.— The definition of performance criteria is provided in Part I, Chapter 1, of the PANS-TRG.

1.5 EVALUATION OF TRAINING MATERIAL

1.5.1 Competency-based training and assessment programmes for aircraft maintenance personnel shall be based on the competencies contained in the ICAO competency framework in Appendix 1 to this chapter, as applicable to the aircraft maintenance domain, and shall be created using the analysis, design, develop, implement and evaluate (ADDIE) instructional systems design (ISD) methodology or equivalent.

Note. — A detailed step-by-step guide on the design of competency-based training and assessment using the ADDIE model is found in Attachment C to Part I, Chapter 2.

1.5.2 Each phase of a CBT programme including theoretical and practical training shall integrate the CBT approach as necessary to ensure required level of competency is achieved The training programme shall comply with the principles of CBTA listed in Part I Chapter 2, section 2.2. Instructors and Assessors shall be qualified and competent in the technical domain for which the certificate of competency shall be issued. When conducted by an AMO, the training shall be performed under the supervision of a suitably qualified and licensed aircraft maintenance technician/engineer/mechanic. When conducted by an ATO, the training shall be performed under the supervision of an instructor qualified and competent in the technical domain for which the certificate of competency shall be issued.

Note.— Guidelines for the implementation of aircraft maintenance personnel competency-based training and assessment can be found in Appendix 2 to this chapter.

1.5.3 Training courses for aircraft maintenance personnel shall include continuous formative assessments of the performance of individual students attending the programme. The process of ongoing evaluation shall be acceptable to the Authority. This evaluation shall ensure that:

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

b) the training plan is designed to enable the trainees to meet the interim (if defined) and final competency standards.

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

1.6 ASSESSMENT

1.6.1 Licensing Authorities, AMOs and ATOs electing to implement competency-based training and assessment may develop an adapted competency model with its associated performance criteria. The model can be adapted from the corresponding ICAO competency framework in developing and approving their own training and assessment programmes for the licensing and/or authorization of aircraft maintenance personnel.

1.6.2 Design of competency-based training and assessment of *Part I, Chapter 2*, provides a step-by-step guide for licensing authorities. AMOs and ATOs intending to establish competency-based training and assessment that is specific to their environment and requirements shall ensure compliance with *Part I, Chapter 2*, Attachment C.

1.6.3 Aircraft maintenance personnel shall meet the final competency standards approved by the appropriate authority and in compliance with Annex 1 — *Personnel Licensing* requirements.

1.7 TRAINING AND ASSESSMENT MATERIAL

Part I, Chapter 2 of the PANS-TRG contains guidance on the development of training and assessment materials. Licensing Authorities responsible for approving training programmes of AMOs and ATOs should ensure that the training and assessment materials meet the provisions of this chapter.

1.8 EVALUATION OF TRAINEES

1.8.1 The competency-based training and assessment for aircraft maintenance personnel shall include formative and/or summative assessment to evaluate the effectiveness of the training and of the performance of individual students attending the training. The evaluation process shall be acceptable to the Authority. This evaluation shall ensure that:

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

b) the trainees meet the interim (if defined) and final competency standards; and

c) it achieves the training objectives as derived from the training needs analysis.

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

Note.— Attachment C to Part I, Chapter 2 illustrates the process that should be considered for evaluating a competency-based training and assessment course.

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Appendix 1 to Chapter 1

ICAO COMPETENCY FRAMEWORK FOR AMTEMs

1. Introduction

1. This appendix provides a competency framework for aircraft maintenance personnel, which is designed to be used by ATOs and AMOs in developing adapted competency models to suit their organizational context; adapted competency models are then used by ATOs and AMOs to develop competency-based training and assessment plans.

2. The ICAO competency framework for aircraft maintenance personnel is generic in nature and applicable to broad rating categories. The framework is independent of the type of equipment in use or maintenance activity performed.

3. The competency frameworks were developed with the following assumptions:

- they are targeted to aircraft maintenance technicians/engineers/mechanics and/or aircraft component maintenance, aircraft maintenance mechanics/technicians/engineers working within the scope of aircraft, engines and instruction for continued airworthiness found in a variety of manuals and other maintenance instructions which describe how these tasks are executed and to which standards;
- they are applicable in aircraft line, base and workshop maintenance; and
- they apply to all aircraft and components thereof.

Note.— The competencies and observable behaviours in the table below are not listed according to any pre-defined priority. Observable behaviours may include, but are not limited to, the observable behaviours listed in the table below.

ICAO COMPETENCY FRAMEWORK FOR AMTEMs

Competency	*Description*	*Observable behaviours (OB)*
ICAO Competency 1 **APPLICATION OF PROCEDURES**	Description 1 Identifies and applies procedures in accordance with appropriate documents and applicable regulations, using the appropriate knowledge	OB 1.1 Identifies correct processes and procedures associated with a specific task OB 1.2 Demonstrates proper use of documents. OB 1.3 Applies system knowledge appropriately OB 1.4 Demonstrates compliance with applicable regulations **OB 1.5** Documents work performed or accomplished correctly
ICAO Competency 2 **WORK MANAGEMENT**	Description 2 Manages available resources efficiently to prioritize and perform tasks in a safe and efficient manner	OB 2.1 Plans prioritizes and schedules tasks effectively OB 2.2 Identifies where and when assistance is needed OB 2.3 Requests assistance when and where required OB 2.4 Manages time effectively OB 2.5 Selects appropriate tools, equipment and resources to support the efficient achievement of tasks OB 2.6 Uses available tools safely, efficiently and effectively OB 2.7 Offers and accepts assistance, when necessary and asks for help OB 2.8 Inspects work area after completion of task OB 2.9 Verifies that tasks are completed to the relevant procedures OB 2.10 Manages environmental stress, interruptions, distractions, variations and failures effectively
ICAO Competency 3 **SITUATIONAL AWARENESS**	Description 3 Recognize and understands the maintenance environment and relevant information; anticipates future events	OB 3.1 Maintains awareness of the maintenance environment OB 3.2 Maintains awareness of hazard situations OB 3.3 Recognises the future operational situations OB 3.4 Verifies that information is accurate and assumptions are correct OB 3.5 Is cognisant of ongoing concurrent activities OB 3.6 Assesses situations and reports deviations
ICAO Competency 4 **TECHNICAL EXPERTISE**	Description 4 Applies and improves technical knowledge and skills to perform maintenance safely and efficiently	OB 4.1 Applies technical knowledge and skills as appropriate for the task OB 4.2 Answers technical questions accurately OB 4.3 Keeps up to date on specialized technical knowledge and skills **OB 4.4** Applies appropriate procedures in accordance with the applicable standards

Competency	*Description*	*Observable behaviours (OB)*
ICAO Competency 5 **SYSTEM THINKING**	Description 5 Understands and determines how the various components of systems management interact and affect the overall system safety performance	OB 5.1 Evaluates the inter-relationship between policies, processes and procedures OB 5.2 Evaluates the inter-relationship between various systems including quality planning, quality control, and quality assurance of the stakeholder OB 5.3 Recognises importance of continuous improvement, reactive and proactive processes OB 5.4 Recognizes the essential components of a functional safety management system and their interoperability OB 5.5 Recognise whether the stakeholder's management processes are appropriate for the size and scope of the operation OB 5.6 Correctly interprets performance data analysis OB 5.7 Assesses if the stakeholder safety objectives achieve the desired safety requirements OB 5.8 Provides feedback on potential deficiencies of the regulatory framework OB 5.9 Understands that root cause(s) of deficiencies results from single-point or systemic failure(s)
ICAO Competency 6 **COORDINATION AND HANDOVER**	Description 6 Manages coordination and handover between personnel	OB 6.1 Coordinates with personnel and other stakeholders OB 6.2 Selects coordination/ handover method based on circumstances, including the urgency of coordination, the status of facilities and the prescribed procedures OB 6.3 Report safety-critical information OB 6.4 Coordinates handover using the prescribed coordination procedures OB 6.5 Coordinates changes to status of equipment, systems and functions OB 6.6 Uses clear and concise terminology for verbal coordination and confirms that the message was properly received OB 6.7 Uses standard message formats and protocols for non-verbal coordination OB 6.8 Conducts effective briefings during position handover including transfer of maintenance tasks

Competency	*Description*	*Observable behaviours (OB)*
ICAO Competency 7 **RISK MANAGEMENT**	Description 7 Demonstrates an effective safety approach to the work environment considering its risk profile and the availability of resources	OB 7.1 Carries out comprehensive risk assessments using appropriate methodologies OB 7.2 Makes decisions based on risk assessment outcome OB 7.3 Identify accurately problem areas or hazards that may negatively impact safety OB 7.4 Recognizes company policies, work practices, or organizational cultures that indicate increased levels of risk OB 7.5 Analyses root causes applicable to their task
ICAO Competency 8 **TEAMWORK**	Description 8 Operates safely and efficiently as a team member	OB 8.1 Fosters an atmosphere of open communication OB 8.2 Encourages team participation and cooperation OB 8.3 Uses feedback to improve overall team performance OB 8.4 Provides feedback constructively OB 8.5 Shows respect and tolerance for other people OB 8.6 Carries out duties in support of a team OB 8.7 Uses negotiating and problem-solving techniques to manage unavoidable conflict when encountered OB 8.8 Raises relevant concerns in an appropriate manner OB 8.9 Accepts feedback constructively OB 8.10 Shares experiences with the aim of continuous improvement OB 8.11 Manages interpersonal conflicts to maintain an effective team environment OB 8.12 Anticipates and responds appropriately to the needs of others OB 8.13 Demonstrates integrity and honesty OB 8.14 Demonstrate soundness and good judgement

Competency	*Description*	*Observable behaviours (OB)*
ICAO Competency 9 **PROBLEM-SOLVING AND DECISION-MAKING**	Description 9 Accurately identifies and resolves problems using the appropriate decision-making processes	OB 9.1 Determines possible solutions to an identified problem OB 9.2 Prioritizes effectively OB 9.3 Manages risks effectively OB 9.4 Considers rules and operating procedures when determining possible solutions to a problem OB 9.5 Implements a chosen solution to a problem OB 9.6 Organizes tasks in accordance with determined priorities OB 9.7 Applies appropriate mitigation strategies for the identified hazards OB 9.8 Works through problems without reducing safety OB 9.9 Considers expediency and efficiency in decision-making
ICAO Competency 10 **SELF MANAGEMENT AND CONTINUOUS LEARNING**	Description 10 Demonstrates personal attributes that improve performance and maintain an active involvement in self-learning and self-development	OB 10.1 Manages stress in an appropriate manner OB 10.2 Self-evaluates to improve performance OB 10.3 Adapts to the demands of a situation as needed OB 10.4 Engages in continuous development activities OB 10.5 Takes responsibility for own performance; detects and resolves own errors OB 10.6 Improves performance through self-evaluation OB 10.7 Seeks and uses feedback to improve performance OB 10.8 Maintains self-control and performs effectively in adverse situations OB 10.9 Maintains awareness of developments in aviation and technological evolution OB 10.10 Participates in learning activities

Competency	*Description*	*Observable behaviours (OB)*
ICAO Competency 11 **COMMUNICATION**	Description 11 Communicates effectively in all situations and ensures clear and common understanding	OB 11.1 Selects appropriate method of communication OB 11.2 Uses effective verbal communication OB 11.3 Uses effective written and other non-verbal communication OB 11.4 Maintains situational awareness when selecting method of communication Speaks clearly, accurately and concisely OB 11.5 Uses appropriate vocabulary and expressions for communications with stakeholders OB 11.6 Demonstrates active listening by asking relevant questions and providing feedback OB 11.7 Verifies comprehension of counterparts and corrects as necessary OB 11.8 Uses eye contact, body movements and gestures that are consistent with verbal messages where applicable, OB 11.9 Interprets non-verbal communication accurately

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Appendix 2 to Chapter 1

GUIDELINES FOR THE IMPLEMENTATION OF COMPETENCY-BASED TRAINING AND ASSESSMENT FOR AIRCRAFT MAINTENANCE PERSONNEL

1. Introduction

1.1 This Appendix provides guidance to authorities, ATOs and AMOs on the measures to be taken to facilitate the efficient implementation of competency-based training and assessment for AMTEM. Detailed guidance on how to structure competency-based training and assessment for AMTEMs is contained in the *Manual on Training of Aircraft Maintenance Personnel* (Doc 10098).

1.2 The effectiveness of a Quality Management System of an AMO depends on the competency of its 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. In some cases where specifically identified, a second inspection (independent inspection) is 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. Harmonization of training standards may facilitate the movement of competent personnel among Contracting States.

1.4 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, a competency-based training and assessment programme can easily accommodate the introduction of training activities for new technological applications.

1.7 Finally, competency-based training and assessment 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 authorities and maintenance organizations

2.1 Aircraft maintenance technician/engineer/mechanic (AMTEM) training and licensing path

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

2.1.2 Guidance material regarding the approval of the training and assessment plans of competency-based training and assessment programmes, as well as the quality assurance system used by an approved training organization in implementing these programmes, can be found in the *Manual on the Approval of Training Organizations* (Doc 9841).

2.1.3 One of the attributes of competency-based training and assessment, as defined in this document, is the use of an ongoing process for the evaluation of the training programme to ensure the effectiveness of the training and its relevance to real-time operations. This aspect of regular evaluation is especially important during the initial implementation of an AMTEM competency-based programme.

2.1.4 Oversight by the authority shall be exercised during the initial implementation. The need for regular feedback from the ATO or AMO to the authority on the progress and problems faced during delivery of the programme is important. How this feedback is to be provided to the authority shall therefore be clearly stated as part of the approval.

2.1.5 The success of the implementation of aircraft maintenance personnel competency-based training and assessment depends to a large measure on effective coordination and cooperation between the authority, the ATO and the AMOs employing the trained personnel. Authorities should encourage such cooperation and coordination.

2.2 Competency-based training and assessment — basic training

Note.— Basic training may be referred to as initial training or fundamental training.

2.2.1 At the end of basic training, students shall demonstrate the set of competencies associated with the standard practices applied in aircraft maintenance activities. In order to demonstrate these competencies, underlying knowledge and skills shall be acquired. These standard practices are applicable to all types of aircraft, aeronautical equipment and all existing environments.

2.2.2 As the personnel involved in aircraft maintenance should undergo basic 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. Civil aviation authorities shall therefore approve basic competency-based training and assessment programmes.

2.2.3 Conditional to trainees successfully passing the required basic training examinations and assessments that demonstrate competency, Licensing Authorities may issue aircraft maintenance licences without endorsement for any particular rating, giving clear statements about which competencies the licence holder can demonstrate.

2.3 Competency-based training and assessment — aircraft maintenance personnel ratings

2.3.1 At the end of competency-based training and assessment for a particular maintenance rating, students shall demonstrate the set of competencies required to perform maintenance tasks for that rating. These maintenance tasks are described in the instructions for continued airworthiness found in a variety of manuals 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 AMTEM needs to apply the relevant standard practices learned in basic training to the particular ratings.

2.3.3 Competency-based training and assessment for a particular maintenance rating shall address the features that are unique to the aircraft type or component to be worked on and were not included in basic training. Competency-based training and assessment for rating shall 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;

— troubleshooting, performance of adjustments and tests; and

— use of appropriate 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, ATOs and/or AMOs shall be responsible for the contents of training programmes for a particular 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 a particular rating and approve them. These programmes shall be described in the aviation training organization training and procedures manual and the maintenance organization’s procedures manual (MOPM). The evaluation of the effectiveness of the training programmes is the responsibility of both organizations and shall be included in the auditing and monitoring activities performed by the civil aviation authority on that organization.

2.3.6 Examiners/Assessors designated by the ATOs or AMOs and accepted by the Licensing Authority are responsible for the final competency-based examinations and assessments of the students in courses for a particular 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, shall be described in the aviation training organization training and procedures manual. The procedures to conduct assessment and 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 and assessment 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 flowcharts contained in Chapter 3 of the *Manual on Training of Aircraft Maintenance Personnel* (Doc 10098) illustrate how this can be accommodated. All start with the student attending basic training.

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Chapter 2

COMPETENCY-BASED TRAINING AND ASSESSMENT AS APPLICABLE TO MAINTENANCE LICENCES AND PRIVILEGES

2.1 INTRODUCTION

This chapter provides material on the implementation of a competency-based approach to training and assessment for personnel working in aircraft maintenance, including those with certification privileges. This material is complementary to those provided in *Part I, Chapter 2*. Furthermore, the material will be useful to Licensing Authorities responsible for approving training programmes at approved maintenance organizations (AMOs) and approved training organizations (ATOs) for maintenance personnel.

2.2 EXISTING AIRCRAFT MAINTENANCE LICENCES AND TRAINING PROGRAMMES

2.2.1 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.

2.2.2 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) licences covering a certain technology range (e.g. airframe, engines, avionics, and aircraft systems); and

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

and within these groups there are additional subsets like:

a) AMTEM licences with or without particular rating endorsements; and

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

2.2.3 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 — *Personnel Licensing.*

2.3 THE LINK BETWEEN COMPETENCY-BASED TRAINING AND ASSESSMENT AND PRIVILEGES

2.3.1 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.

2.3.2 The Licensing Authority or organization (as described in 2.4) shall ensure that a candidate for a particular licence and/or authorization demonstrates the required set of competencies in relation to the privileges granted.

2.4 ISSUE OF LICENCES AND AUTHORIZATIONS

2.4.1 Introduction

2.4.1.1 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 ATOs or AMOs, or they may allow AMOs to substitute or complement licences with in-house issued authorizations, which would then 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 MOPM, which is subject to civil aviation authority approval.

2.4.1.2 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

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

2.4.2.1 The scope, requirements and privileges of the AMTEM 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.

2.4.2.2 The Licensing Authority may delegate certain functions leading to the issuance of a particular rated licence endorsements to designated personnel of AMOs under its jurisdiction and shall exercise oversight over the designees' 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 AMO's quality management documentation, which is approved by the civil aviation authority.

2.4.2.3 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.

2.4.3 Involvement of ATOs in competency-based training and assessment

2.4.3.1 Competency-based approved training for aircraft maintenance personnel shall be conducted within an ATO for the issuance of a licence. An ATO providing training that will allow an alternate means of compliance with the experience requirements established by Annex 1 should ensure that 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.

2.4.3.2 One role of the ATOs 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 ATOs should carry out competency-based exams and/or 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.

2.4.4 Involvement of AMOs in competency-based training and assessment

2.4.4.1 Candidates for licences without particular rating endorsement may work in AMOs 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 become eligible for the assessments of that training leading to the issuance of a licence by the appropriate authority.

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

2.4.4.3 For a particular rating and/or 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 the MOPM. The Licensing 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.

Procedures for
Air Navigation Services

TRAINING

Part IV

TRAINING AND ASSESSMENT FOR
AIR TRAFFIC MANAGEMENT (ATM) PERSONNEL

Part IV

TRAINING AND ASSESSMENT FOR AIR TRAFFIC MANAGEMENT (ATM) PERSONNEL

This part contains four chapters with procedures for the development and implementation of a competency-based training and assessment programme for air traffic controllers (ATCOs), ATC on-the-job training instructors (OJTIs) and air traffic safety electronics personnel (ATSEP):

Chapter 1 outlines the general principles and procedures to be followed in the design and implementation of competency-based training and assessment of ATM personnel.

Chapters 2, 3 and 4 outline the procedures that are applicable to the development and implementation of competency-based training and assessment for ATCOs, ATC OJTIs and ATSEP, respectively, and that shall be followed, in addition to those outlined in Part I, Chapter 2, by those training organizations or air navigation services providers (ANSPs) opting for a competency-based approach. Chapters 2, 3 and 4 also contain the ICAO Competency Frameworks for the ATCOs, ATC OJTIs and ATSEP, respectively.

Chapter 1

GENERAL PROVISIONS FOR COMPETENCY-BASED TRAINING AND ASSESSMENT FOR AIR TRAFFIC MANAGEMENT (ATM) PERSONNEL

1.1 INTRODUCTION

This chapter outlines the requirements to be met in order to implement competency-based training and assessment for air traffic management (ATM) personnel. If implemented, competency-based training and assessment shall comply with the procedures of Part I, Chapter 2. Implementation of such training is, however, optional.

1.2 COMPETENCY-BASED APPROACH TO TRAINING AND ASSESSMENT

Competency-based training and assessment may be implemented by a training organization or an air navigation services provider (ANSP), or a combination of both. If implemented, competency-based training and assessment shall comply with procedures of Part I, Chapter 2.

Chapter 2

COMPETENCY-BASED TRAINING AND ASSESSMENT FOR AIR TRAFFIC CONTROLLERS (ATCOs)

2.1 INTRODUCTION

2.1.1 This chapter provides the procedures for establishing a competency-based training and assessment programme for ATCOs, with which approved training organizations (ATOs), air navigation services providers and Authorities shall comply when implementing a competency-based training and assessment programme. These procedures are complementary to those provided in Part I, Chapter 2 of the PANS-TRG.

2.1.2 The ICAO competency framework for air traffic controllers provided in Appendix 2 to this chapter shall be used as the basis for the development of an adapted competency model. The adapted competency model and associated competency-based training and assessment programme shall be approved by the appropriate authority.

2.2 ASSESSMENT

2.2.1 ATCOs shall meet the final competency standards approved by the appropriate Authority and in compliance with Annex 1 — *Personnel Licensing* requirements.

2.3 EVALUATION OF TRAINING PROGRAMMES

2.3.1 The competency-based training and assessment programme for ATCOs shall include an ongoing evaluation of the training programme acceptable to the authority. The evaluation shall ensure that:

a) the training and assessment plans are relevant to the work of air traffic controllers in the specific context and environment to which they may be assigned after training;

b) the training plan is designed to enable the trainee to meet the interim (if defined) and final competency standards; and

c) remedial actions are taken if in-training or post-training evaluation indicates a need to do so.

2.3.2 A competency-based training and assessment programme for ATCOs shall include on-the-job training to ensure that the competencies appropriate to the exercise of duty are consistently achieved. On-the-job training shall be performed under the supervision of a qualified ATC on-the-job training instructor who has been authorized to provide instruction in the area for which the rating shall be issued and be conducted under the SMS of the ANSP.

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Appendix 1 to Chapter 2

GUIDELINES FOR THE IMPLEMENTATION OF COMPETENCY-BASED TRAINING AND ASSESSMENT FOR AIR TRAFFIC CONTROLLERS (ATCOs)

1. Introduction

1.1 This appendix provides guidance to authorities, approved training organizations (ATOs) and air navigation services providers on the measures to be taken to facilitate the efficient implementation of competency-based training and assessment for air traffic controllers (ATCOs).

1.2 Approved training organizations and air navigation service providers may elect to develop a competency-based training and assessment for some of the phases of training (e.g. initial training, unit training, etc.). Detailed guidance on how to structure competency-based training and assessment for ATCOs in different phases of training can be found in the *Manual on Air Traffic Controller Competency-based Training and Assessment* (Doc 10056).

2. Guidelines for the authority

2.1 In view of the developmental nature of a first competency-based ATCO programme in an ATO or air navigation services provider (ANSP), the approval should be provisional and should be confirmed only after obtaining a satisfactory result from the implementation of the first courses and after incorporating the lessons learnt into the training programme.

2.2 Guidance material regarding the approval of the training and assessment plans of competency-based training and assessment programmes, as well as the quality assurance system used by an approved training organization in implementing these programmes can be found in the *Manual on the Approval of Training Organizations* (Doc 9841).

2.3 One of the attributes of competency-based training and assessment, as defined in this document, is the use of an ongoing process for the evaluation of the training programme to ensure the effectiveness of the training and its relevance to real-time operations. This aspect of regular evaluation is especially important during the initial implementation of an ATCO competency-based programme.

2.4 The need for regular feedback from the ATO or ANSP to the authority on the progress and problems faced during and after delivery of the programme is important. How this feedback is to be provided to the authority shall therefore be clearly stated as part of the approval.

2.5 The success of the implementation of the ATCO competency-based training and assessment depends to a large measure on effective coordination and cooperation between the authority, the ATO and the ANSPs employing the ATCOs, and controller representative bodies. Authorities should encourage and facilitate such cooperation and coordination.

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Appendix 2 to Chapter 2

ICAO COMPETENCY FRAMEWORK FOR AIR TRAFFIC CONTROLLERS

1. The ICAO competency framework for air traffic controllers provides the basis that shall be used to develop an adapted competency model suitable for the ANSPs.

2. ATOs or ANSPs shall use the adapted competency model to develop their training programmes.

3. The ICAO competency framework for air traffic controllers is generic and applicable to broad rating categories such as area, approach and aerodrome. The framework is independent of the type of equipment in use or of the major areas of application (en-route, approach, tower, etc.) or of the sharing of tasks on the controller working position.

4. The principles of threat and error management should be integrated in the development of competency-based training and assessment programmes.

Note.— Guidance on threat and error management in air traffic control operations and on the collection of related data is contained in Circular 314, Threat and Error Management (TEM) in Air Traffic Control*, and Doc 9910,* Normal Operations Safety Survey (NOSS).

ICAO COMPETENCY FRAMEWORK FOR AIR TRAFFIC CONTROLLERS

Note.— This framework needs to be adapted to the local context of the organization. The competencies and observable behaviours in the table below are not listed according to any pre-defined priority. Observable behaviours may include, but are not limited to, the observable behaviours listed in the table below.

Competency	*Definition*	*Observable behaviours (OB)*
Situational awareness	Comprehend the current operational situation and anticipate future events	OB 1.1 Monitors air traffic in own area of responsibility and nearby airspace OB 1.2 Monitors the meteorological conditions that impact on own area of responsibility and nearby airspace OB 1.3 Monitors the status of the ATC systems and equipment OB 1.4 Monitors the operational circumstances in nearby sectors to anticipate impact on own situation OB 1.5 Scans all available sources of information OB 1.6 Acquires information from available surveillance and flight data systems, meteorological data, electronic data displays and any other means available OB 1.7 Integrates information acquired from monitoring and scanning into the overall picture OB 1.8 Analyses the actual situation based on information acquired from monitoring and scanning

Competency	*Definition*	*Observable behaviours (OB)*
		OB 1.9 Interprets the situation based on the analysis OB 1.10 Anticipates the future operational situation OB 1.11 Identifies potential threats (e.g. high traffic volumes, mountainous terrain, complex airspace infrastructure, complex ATC procedures, adverse weather, unserviceable navigational equipment, flight crew unfamiliar with airport or procedures) OB 1.12 Verifies that information is accurate and interpretation are correct OB 1.13 Uses available tools to monitor, scan, comprehend and anticipate operational situations

Competency	*Definition*	*Observable behaviours (OB)*
Traffic and capacity management	Ensure a safe, orderly and efficient traffic flow and provide essential information on environment and potentially hazardous situations	OB 2.1 Manages traffic using prescribed procedures OB 2.2 Issues clearances and instructions that take into account aircraft performance, terrain obstacles, airspace constraints and weather OB 2.3 Uses a variety of techniques to effectively manage the traffic (e.g. speed control, vectoring, traffic sequencing, assigning climb/descent rate) OB 2.4 Increases safety margins when deemed necessary OB 2.5 Takes action when appropriate to ensure that demand does not exceed sector capacity OB 2.6 Maintains focus despite varying traffic levels OB 2.7 Reacts appropriately to situations that have the potential to become unsafe OB 2.8 Issues clearances and instructions to the flight crew that result in an efficient traffic flow OB 2.9 Issues appropriate clearances and instructions OB 2.10 Issues clearances and instructions in a timely manner OB 2.11 Uses available tools to reduce delays and optimize flight profiles OB 2.12 Issues information on the runway conditions, status of airspace, aerodrome resources and status of facilities in a timely manner OB 2.13 Issues hazard and safety alerts to the flight crews when necessary OB 2.14 Issues traffic proximity information to flight crews in a relevant, accurate and timely manner OB 2.15 Issues weather information to flight crews when necessary

Competency	*Definition*	*Observable behaviours (OB)*
Separation and conflict resolution	Manage potential traffic conflicts and maintain separation	OB 3.1 Detects potential traffic conflicts OB 3.2 Selects the appropriate separation method OB 3.3 Applies appropriate separation and spacing OB 3.4 Issues clearances and instructions that ensure separation is maintained OB 3.5 Issues clearance and instructions that resolve conflicts OB 3.6 Resolves conflicts through coordination with adjacent sectors or units OB 3.7 Monitors the execution of separation actions OB 3.8 Adjusts control actions, when necessary, to maintain separation OB 3.9 Takes corrective action to restore appropriate separation as soon as possible when below minima
Communication	Communicate effectively in all operational situations	OB 4.1 Selects communication mode that takes into account the requirements of the situation, including speed, accuracy and level of detail of the communication OB 4.2 Speaks clearly, accurately and concisely OB 4.3 Uses standard radiotelephony phraseology, when prescribed OB 4.4 Adjusts speech techniques to suit the situation OB 4.5 Demonstrates active listening by asking relevant questions and providing feedback OB 4.6 Verifies accuracy of read backs and corrects as necessary OB 4.7 Uses plain language when standardized phraseology does not exist or the situation warrants it OB 4.8 Where applicable, uses eye contact, body movements and gestures that are consistent with verbal messages and the environment OB 4.9 Writes or inputs messages according to protocol or in a clear and concise manner where protocol does not exist OB 4.10 Communicates relevant concerns and intentions OB 4.11 Verifies accuracy of system inputs and corrects as necessary

Competency	*Definition*	*Observable behaviours (OB)*
Coordination	Manage coordination between personnel in operational positions and with other affected stakeholders	OB 5.1 Determines the need for coordination OB 5.2 Coordinates with personnel in other operational positions and other stakeholders, in a timely manner OB 5.3 Selects coordination method based on circumstances, including urgency of coordination, status of facilities and prescribed procedures OB 5.4 Coordinates the movement, control, transfer of control and changes of previously coordinated data for flights using the prescribed coordination procedures OB 5.5 Coordinates changes of status of operational facilities such as equipment, systems and functions OB 5.6 Coordinates changes of status of airspace and aerodrome resources OB 5.7 Uses clear and concise terminology for verbal coordination OB 5.8 Uses standard ATS message formats and protocol for non-verbal coordination OB 5.9 Uses clear and concise non-standard coordination methods when required OB 5.10 Conducts effective briefings during position handover
Management of non-routine situations	Detect and respond to emergency and unusual situations related to aircraft operations and manage degraded modes of ATS operation	OB 6.1 Recognizes, from the information available, the possibility of an emergency or unusual situation developing OB 6.2 Verifies the nature of the emergency OB 6.3 Prioritizes actions based on the urgency of the situation OB 6.4 Selects the most appropriate type(s) of assistance that can be given OB 6.5 Follows prescribed procedures for communication and coordination of urgent situations OB 6.6 Provides assistance and takes action, when necessary, to ensure safety of aircraft in area of responsibility OB 6.7 Detects that ATS systems and/or equipment have degraded OB 6.8 Assesses the impact of a degraded mode of operation OB 6.9 Follows prescribed procedures for managing, coordinating and communicating a degraded mode of operation OB 6.10 Creates solutions when no procedure exists for responding to non-routine situations
Problem solving and decision making	Find and implement solutions for identified threats and associated undesired states	OB 7.1 Takes into account the existing rules and operating procedures when determining possible solutions to a problem OB 7.2 Uses appropriate tools to interrogate relevant systems as prescribed to assist in determining possible solutions to a problem OB 7.3 Implements an appropriate solution to a problem OB 7.4 Establishes which situations have the highest priority OB 7.5 Organizes tasks in accordance with an appropriate order of priorities

Competency	*Definition*	*Observable behaviours (OB)*
		OB 7.6 Applies an appropriate mitigation strategy for the threats identified OB 7.7 Perseveres in working through problems without impacting safety
Self-management	Demonstrate personal attributes that improve performance and maintain an active involvement in self-learning and self-development	OB 8.1 Takes responsibility for own performance, detecting and resolving own errors OB 8.2 Improves performance through self-evaluation of the effectiveness of actions OB 8.3 Maintains self-control in adverse situations OB 8.4 Responds as needed to deal with the demands of the changing situation

Competency	*Definition*	*Observable behaviours (OB)*
Workload management	Use available resources to prioritize and perform tasks in an efficient and timely manner	OB 9.1 Manages tasks effectively in response to current and future workload OB 9.2 Manages interruptions and distractions effectively OB 9.3 Determines if and when support is necessary based on workload OB 9.4 Asks for help, when necessary OB 9.5 Delegates tasks when necessary to reduce workload OB 9.6 Accepts assistance, when necessary OB 9.7 Adjusts the pace of work according to workload OB 9.8 Selects appropriate tools, equipment and resources to support the efficient achievement of tasks OB 9.9 Uses the automated capabilities of ATS equipment to improve efficiency
Teamwork	Operate as a team member	OB 10.1 Provides both positive and negative feedback constructively OB 10.2 Accepts both positive and negative feedback objectively OB 10.3 Shows respect and tolerance for other people OB 10.4 Carries out actions and duties in a manner that fosters a team environment OB 10.5 Manages interpersonal conflicts to maintain an effective team environment OB 10.6 Uses negotiating and problem-solving techniques to help resolve unavoidable conflict when encountered OB 10.7 Raises relevant concerns in an appropriate manner OB 10.8 Anticipates and responds appropriately to the needs of others

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Chapter 3

COMPETENCY-BASED TRAINING AND ASSESSMENT FOR ATC ON-THE-JOB TRAINING INSTRUCTORS (OJTIs)

3.1 INTRODUCTION

3.1.1 This chapter provides the procedures for establishing a competency-based training and assessment programme for ATC on-the-job training instructors (OJTIs), with which approved training organizations (ATOs), air navigation services providers and Authorities shall comply when implementing a competency-based training and assessment programme. These procedures are complementary to those provided in Part I, Chapter 2 of the PANS-TRG.

3.1.2 The ICAO competency framework for ATC OJTIs provided in Appendix 2 to this chapter shall be used as the basis for the development of an adapted competency model. The adapted competency model and associated competency-based training and assessment programme shall be approved by the appropriate authority.

3.2 ASSESSMENT

3.2.1 To be considered as qualified to conduct on-the-job training in the live operational environment, ATC OJTIs shall meet the requirements of the approved OJTI adapted competency model.

3.3 EVALUATION OF TRAINING PROGRAMMES

3.3.1 The competency-based training and assessment programme for ATC OJTIs shall include an ongoing evaluation of the training programme acceptable to the authority. The evaluation shall ensure that:

a) the training and assessment plans are relevant to the work of ATC OJTIs in the specific context and environment within which they will provide training;

b) the training plan is designed to enable trainee ATC OJTIs to meet the final competency standards agreed with the authority; and

c) remedial actions are taken if in-training or post-training evaluation indicates a need to do so.

3.3.2 A competency-based training and assessment programme for ATC OJTIs shall include sufficient practical training to ensure that required competency appropriate to the exercise of duty is consistently achieved. This practical training should be performed under the supervision of an instructor qualified and competent to train ATC OJTIs. In instances where practical training of ATC OJTI trainees is provided through on-the-job training in live environment, the instructor shall be qualified and competent as an ATC OJTI, and the training shall be conducted under the SMS of the ANSP.

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Appendix 1 to Chapter 3

GUIDELINES FOR THE IMPLEMENTATION OF COMPETENCY-BASED TRAINING AND ASSESSMENT FOR ATC ON-THE-JOB TRAINING INSTRUCTORS (OJTIs)

1. Introduction

1.1 This appendix provides guidance to authorities, approved training organizations (ATOs) and air navigation services providers on the measures to be taken to facilitate the efficient implementation of competency-based training and assessment for ATC on-the-job-training-instructors (OJTIs).

1.2 Approved training organizations and air navigation service providers may elect to develop a competency-based training and assessment for ATC OJTIs or some of the phases of this training (e.g. initial training, unit training, etc.). Detailed guidance on how to structure competency-based training and assessment for ATC OJTIs can be found in the *Manual on Air Traffic Controller Competency-based Training and Assessment* (Doc 10056).

2. Guidelines for the authority

2.1 In view of the developmental nature of a first competency-based ATC OJTI programme in an ATO or air navigation services provider (ANSP), the approval should be provisional and should be confirmed only after obtaining a satisfactory result from the implementation of the first courses and after incorporating the lessons learnt into the training programme.

2.2 Guidance material regarding the approval of the training and assessment plans of a competency-based training and assessment programme, as well as the quality assurance system used by an approved training organization in implementing these programmes can be found in the *Manual on the Approval of Training Organizations* (Doc 9841).

2.3 One of the attributes of competency-based training and assessment, as defined in this document, is the use of an ongoing process for the evaluation of the training programme to ensure the effectiveness of the training and its relevance to the requirements of training environment in real-time operations. This aspect of regular evaluation is especially important during the initial implementation of an ATC OJTI competency-based programme.

2.4 The need for regular feedback from the ATO or ANSP to the authority on the progress and problems faced during and after delivery of the programme is important. How this feedback is to be provided to the authority shall therefore be clearly stated as part of the approval.

2.5 The success of the implementation of the ATC OJTI competency-based training and assessment depends to a large measure on effective coordination and cooperation between the authority, the ATO, the ANSPs employing the ATC OJTIs, and controller representative bodies. Authorities should encourage and facilitate such cooperation and coordination.

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Appendix 2 to Chapter 3

ICAO COMPETENCY FRAMEWORK FOR ATC ON-THE-JOB TRAINING INSTRUCTORS

1. The ICAO competency framework for ATC on-the-job training instructors provides the basis that shall be used to develop an adapted competency model suitable for the State, region or a specific ANSP's operating environment.

2. ATOs or ANSPs shall use the adapted competency model to develop their training programmes.

3. The ICAO competency framework for ATC OJTIs is generic and applicable to the provision of training for any ATC OJTI irrespective of rating category. The framework is independent of the type of equipment in use or of the major areas of application (en-route, approach, tower, etc.) or of the sharing of tasks on the controller working position.

4. The principles of threat and error management should be integrated in the development of competency-based training and assessment programmes.

ICAO COMPETENCY FRAMEWORK FOR ATC ON-THE-JOB TRAINING INSTRUCTORS (OJTIs)

Note 1.— This framework is intended for air traffic controllers who are providing instruction to trainees in the live operational environment.

Note 2.— This framework has not considered the competencies required for instructing in a simulated air traffic environment; although it is acknowledged that many of the competencies are similar.

Note 3.— This framework does not address the specific definition of duties and proficiency levels existing in the organization.

Note 4.— The competencies and observable behaviours in the table are not listed according to any pre-defined priority. Observable behaviours may include but are not limited to the observable behaviours listed in the table below.

Competency	*Description*	*Observable behaviours (OB)*
Situational Awareness	Comprehends current operational situation, anticipates future events and the impact of the trainee's performance on the operation	OB 1.1 Maintains own situational awareness while instructing OB 1.2 Monitors impact of trainee's actions on the traffic situation OB 1.3 Monitors impact of trainee's actions on adjacent sectors OB 1.4 Monitors the trainee's actions continuously OB 1.5 Monitors the trainee's behaviour for physical signs of cognitive overload or acute stress

Competency	*Description*	*Observable behaviours (OB)*
Safety and Efficiency Management	Ensures safety and efficiency of the operation during training	OB 2.1 Prioritises safety above teaching the trainee
		OB 2.2 Takes action to ensure safety is never compromised (e.g. correct errors, take over control)
		OB 2.3 Intervenes in a timely manner to maintain an orderly flow of traffic, when appropriate, and to ensure that safety is not compromised
		OB 2.4 Ensures traffic efficiency is maintained, including impact on adjacent sectors
		OB 2.5 Manages own and trainee's workload to ensure safe and efficient operations (e.g. sector splitting, increased spacing, adapting instructional techniques)
Mentoring	Supports trainee integration into the professional environment by mentoring, advising, guiding and creating a positive learning experience	OB 3.1 Develops a rapport with the trainee and provides encouragement and support
		OB 3.2 Promotes positive working relationships
		OB 3.3 Encourages a positive approach to learning
		OB 3.4 Demonstrates empathy and understanding, recognising situations when extra support is required
		OB 3.5 Encourages trainee to self-reflect to identify strengths and weaknesses and areas for improvement
		OB 3.6 Encourages trainee to look for positive learning experiences from each training session, even those that did not go well
		OB 3.7 Encourages trainee to extract maximum training value from any feedback, including negative points
		OB 3.8 Encourages trainee to ask questions as part of the overall learning experience
		OB 3.9 Helps trainee to build and maintain confidence through encouragement and motivation
		OB 3.10 Ensures sufficient repetition of learning activities
		OB 3.11 Ensures opportunities for increasing complexity

Competency	*Description*	*Observable behaviours (OB)*
Teaching, Instructing and Coaching	Provides instruction and facilitates learning in the operational environment	OB 4.1 Prepares to deliver tailored training for each training session, briefs the trainee prior to taking over the operational position and ensures the trainee understands what is required of him/her OB 4.2 Sets the goals for the session and explains clearly to the trainee the expected performance standards OB 4.3 Ensures the trainee understands the operational situation prior to assuming control OB 4.4 Maintains appropriate seating position and proximity to the trainee OB 4.5 Uses targeted training techniques to enable learning (e.g. talk aloud problem-solving techniques, demonstration, immediate bad habit correction, trainee involvement, questioning techniques) OB 4.6 Adapts training techniques and style to meet the needs of the trainee OB 4.7 Ensures appropriate timing of teaching opportunities OB 4.8 Recognises and responds appropriately to the trainee's behaviour (e.g. stress, under confidence, over-confidence) OB 4.9 Allows the trainee to make decisions appropriate to their level of competence and experience OB 4.10 Confirms understanding of the trainee's intended actions and plans (e.g. using questioning techniques) and, when appropriate, trusts the trainee to try their own plans OB 4.11 Remains calm when taking control from the trainee in circumstances dictating this type of intervention OB 4.12 Provides constructive and balanced feedback in a timely and appropriate manner OB 4.13 Debriefs the trainee after the operational session to review the performance emphasising positive actions, areas to work on and strategies for improvement OB 4.14 Helps trainee to develop strategies to overcome any gaps in competencies
Communication	Communicates effectively with the trainee in verbal, non-verbal and written form	OB 5.1 Listens actively OB 5.2 Encourages constructive discussion about the trainee's performance OB 5.3 Speaks clearly, accurately and in a calm and measured manner OB 5.4 Adjusts speech techniques to suit the operational and/or instructional situation (e.g. conveys a sense of urgency, speaks calmly) OB 5.5 Adapts content of communication to the needs of the trainee (e.g. does not overload with too much information) OB 5.6 Explains complex situations clearly (e.g. traffic situations, application of procedures, management of emergencies) OB 5.7 Explains cognitive strategies clearly (e.g. how to analyse situations, prioritize, select a course of action, distribute attention) OB 5.8 Does not allow explanations or questions to cause a distraction OB 5.9 Delivers difficult messages with tact and sensitivity

Competency	*Description*	*Observable behaviours (OB)*
Assessment	Evaluates the performance of the trainee for the purposes of enabling learning, monitoring progress and/or determining if competence has been achieved	OB 5.10 Writes objective and comprehensive reports on the trainee's performance OB 6.1 Gathers factual evidence of the trainee's performance against the objectives OB 6.2 Gathers factual evidence for all the required competencies OB 6.3 Evaluates the trainee's performance in relation to the competencies and previously set goals and performance standards OB 6.4 Analyses poor performance to determine root causes, when appropriate OB 6.5 Determines remedial actions required to address deficiencies in performance, when appropriate OB 6.6 Determines if the evidence gathered, supports a decision that the trainee is competent OB 6.7 Applies consistent standards when assessing performance
Collaboration	Collaborates with relevant parties to facilitate a robust training experience for the trainee.	OB 7.1 Gathers relevant information in advance for the purpose of tailoring the training approach and to maximise productivity of the training session (e.g. from the training organization, human resources department, previous training reports) OB 7.2 Engages with the trainee, other instructors and the training manager(s) for the purposes of tailoring the training approach OB 7.3 Requests supplementary resources to help the trainee, when required (e.g. learning support specialist, counselling, additional practice on a simulator) OB 7.4 Contributes information on the trainee's progress to the training team
Self-assessment	Improves teaching, instructional and coaching capabilities through self-assessment	OB 8.1 Remains open to feedback OB 8.2 Improves performance based on accurate and balanced feedback OB 8.3 Improves performance through self-evaluation of the effectiveness of actions OB 8.4 Maintains self-control in challenging training situations OB 8.5 Responds as needed to deal with the demands of challenging training situations
Ethics and integrity	Demonstrates openness, respect and fairness towards the trainee and considers the consequences when making a decision or taking action	OB 9.1 Treats the trainee respectfully, fairly and objectively regardless of differences OB 9.2 Answers questions truthfully without embellishment or attempt to cover up a lack of knowledge OB 9.3 Maintains privacy and confidentiality when appropriate OB 9.4 Manages professional relationships with appropriate role boundaries OB 9.5 Acts with integrity OB 9.6 Remains objective and starts each training session without prejudice or bias

Chapter 4

COMPETENCY-BASED TRAINING AND ASSESSMENT FOR AIR TRAFFIC SAFETY ELECTRONICS PERSONNEL (ATSEP)

4.1 INTRODUCTION

4.1.1 This chapter provides the procedures for establishing a competency-based training and assessment programme for ATSEP, which is recommended for ATSEP training organizations, ANSPs or authorities.

4.1.2 Air traffic safety electronics personnel (ATSEP) is the recognized ICAO terminology for personnel proven to be competent in the installation, operation and/or maintenance of a CNS/ATM system.

4.1.3 It is the responsibility of the air navigation services provider (ANSP) to define the scope of ATSEP activities. The appropriate authority should approve this definition.

4.1.4 The ICAO competency framework for air traffic safety electronics personnel provided in Appendix 2 to this chapter should be used as a basis for the development of an adapted competency model.

4.2 ASSESSMENT

4.2.1 Authorities may choose to validate the training and assessment process for ATSEP, including the adapted competency model required for assessing applicants.

4.2.2 In the case of a State validated assessment process for ATSEP, the ATSEP shall meet the final competency standards of the adapted competency model.

4.3 TRAINING

4.3.1 The competency-based training and assessment programme for ATSEP shall include routine evaluation of the effectiveness of the training programme that is acceptable to the authority or the employing ANSP. The evaluation shall ensure that:

a) the training and assessment plans are relevant to the work of air traffic safety electronics personnel in the specific context and environment to which they may be assigned after training;

b) the training plan is designed to enable the trainees to meet the interim (if defined) and final competency standards; and

c) remediation actions are taken if in-training or post-training evaluation indicates a need to do so.

4.3.2 A competency-based training and assessment programme for ATSEP shall include sufficient and appropriate practical and/or on-the-job training to ensure that the competencies appropriate to the exercise of duty are consistently achieved. Practical training should be performed under the supervision of an instructor qualified and competent in the technical domain for which the competency will be awarded. When on-the-job training is provided, the instructor shall be qualified and competent in the technical domain for which the competency will be awarded, and the training shall be conducted under the SMS of the ANSP. Refer to the guidelines for the implementation of competency-based training and assessment for ATSEP in Appendix 1 to this chapter.

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Appendix 1 to Chapter 4

GUIDELINES FOR THE IMPLEMENTATION OF COMPETENCY-BASED TRAINING AND ASSESSMENT FOR AIR TRAFFIC SAFETY ELECTRONICS PERSONNEL (ATSEP)

1. Introduction

This appendix provides guidance to authorities, approved training organizations (ATOs) and air navigation services providers (ANSPs) on the measures to be taken to facilitate efficient implementation of competency-based training and assessment for air traffic safety electronics personnel (ATSEP).

2. General considerations

Approved training organizations and air navigation service providers may select to initially develop competency-based training and assessment for unit or continuation training. Detailed guidance on how to structure competency-based training and assessment for ATSEPs in different phases of training can be found in the *Manual on Air Traffic Safety Electronics Personnel Competency-based Training and Assessment* (Doc 10057).

3. Guidelines for the authority

These guidelines are useful to authorities choosing to validate ATSEP training programmes.

a) In view of the developmental nature of a first competency-based ATSEP programme in a training organization or ANSP, the validation should be provisional and should be confirmed only after obtaining a satisfactory result from the first courses and after incorporating the lessons learnt into the training programme.

b) Guidance material regarding the approval of training and assessment plans of competency-based training and assessment programmes can be found in the *Manual on the Approval of Training Organizations* (Doc 9841).

c) One of the attributes of competency-based training and assessment, as defined in this document, is the use of an ongoing process for the evaluation of the training programme to ensure the effectiveness of the training and its relevance to real-time operations. This aspect of regular evaluation is especially important during the initial implementation of an ATSEP competency-based programme.

d) The training organizations or ANSP should provide regular feedback as applicable to the authority on the progress and problems faced during and after delivery of the programme. How this feedback is to be provided to the authority shall therefore be clearly stated as part of the validation process.

e) The success of the implementation of ATSEP competency-based training and assessment programmes depends to a large measure on the effective coordination and cooperation between the authority if applicable, the training organizations and the ANSPs employing the ATSEP, and ATSEP representative bodies. Such cooperation and coordination should be encouraged and facilitated by stakeholders.

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Appendix 2 to Chapter 4

ICAO COMPETENCY FRAMEWORK FOR AIR TRAFFIC SAFETY ELECTRONICS PERSONNEL

1. The ICAO competency framework for air traffic safety electronics personnel provides the basis that shall be used to develop an adapted competency model suitable for the environment of the ANSP. Using this ATSEP competency framework will promote harmonization of competencies and enable the use of best practices in ATSEP training and assessment.

2. ATOs or ANSPs should use the adapted competency model to develop their training and assessment programmes.

3. The ICAO competency framework for air traffic safety electronics personnel is generic and does not address the specific type of technology in use, organizational schemes, or the scope of maintenance activities conducted.

ICAO COMPETENCY FRAMEWORK FOR ATSEP

Note 1.— This framework needs to be adapted to the local context of the organization. The competencies and observable behaviours in the table are not listed according to any pre-defined priority. Observable behaviours may include but are not limited to the observable behaviours listed in the table below.

Note 2.— The framework does not address the specific definition of duties, sharing of tasks, qualifications and proficiency levels existing in the organization.

Competency	*Description*	*Observable Behaviours (OB)*
Engineering	Collaborate in developing, modifying and integrating systems, networks and equipment	OB 1.1 Demonstrates technical knowledge and reasoning OB 1.2 Demonstrates ability of engineering reasoning and problem solving OB 1.3 Demonstrate the knowledge and reasoning of interoperability in terms of global systems and environments OB 1.4 Demonstrates ability to set system requirements OB 1.5 Develops modelling of system and ensures requirements can be met OB 1.6 Manages development projects effectively OB 1.7 Designs implementation process effectively OB 1.8 Tests, verifies, validates and certifies new systems, equipment or installations OB 1.9 Supports system and equipment implementation OB 1.10 Optimizes systems and network elements OB 1.11 Supports system life cycle

Competency	*Description*	*Observable Behaviours (OB)*
		OB 1.12 Anticipates and organizes system and equipment decommissioning OB 1.13 Contributes to risk management processes OB 1.14 Determines, prescribes and ensures compliance of systems and network elements with the performance-based operational context OB 1.15 Manages system resources and safeguards them (e.g. frequency spectrum)
Situational awareness	Comprehend the current status of the ATM system and anticipate future events	OB 2.1 Monitors the CNS/ATM systems in own area of responsibility and contributing areas as well OB 2.2 Monitors the environmental conditions that have an impact on own and adjacent areas of responsibility and understands the impact on systems and services OB 2.3 Monitors the relevant elements of the ATC operational situation OB 2.4 Maintains awareness of the people involved in or affected by the operation OB 2.5 Obtains information from all available monitoring sources OB 2.6 Analyses information from all available monitoring sources OB 2.7 Predicts future system load (e.g. network, computing capacity and other parameters) OB 2.8 Identifies potentially hazardous situations OB 2.9 Checks for data integrity
Service provision	Ensure availability and reliability of CNS/ATM systems and capabilities	OB 3.1 Uses systems monitoring and diagnostic capabilities effectively OB 3.2 Evaluates the operational consequences of CNS/ATM system anomalies or failures OB 3.3 Switches from monitoring to intervention in a timely manner OB 3.4 Uses prescribed operation procedures properly OB 3.5 Ensures that technical interventions take into account the ATC operational situation OB 3.6 Coordinates technical interventions with other technical units, the different stakeholders and ATC OB 3.7 Monitors the execution of technical interventions OB 3.8 Uses a variety of methods to effectively manage system anomalies and degraded situations

Competency	*Description*	*Observable Behaviours (OB)*
Coordination	Manage coordination with operational stakeholders and with other affected stakeholders	OB 4.1 Coordinates effectively with internal stakeholders OB 4.2 Coordinates effectively with external stakeholders OB 4.3 Selects the coordination method based on circumstances and in a timely manner OB 4.4 Uses common coordination terminology as required by the prescribed operational procedures OB 4.5 Adjusts timing of coordination, taking into account current factors affecting the technical team OB 4.6 Conducts effective briefings during position handovers and transfer of maintenance tasks
Management of non-routine situations	Detect and respond to emergency and unusual situations related to the ATC operation and/or CNS/ATM systems and capabilities	OB 5.1 Recognizes, from the information available, the possibility of an emergency, urgent or degraded situation developing OB 5.2 Determines the nature of the emergency OB 5.3 Prioritizes actions based on the urgency of the situation OB 5.4 Follows prescribed procedures for responding to non-routine situations OB 5.5 Follows prescribed procedures for communication and coordination of urgent situations OB 5.6 Creates solutions when no procedure exists for responding to non-routine situations OB 5.7 Identifies potentially hazardous events requiring coordination with stakeholders
Problem solving and decision making	Find and implement solutions for identified hazards and associated risks	OB 6.1 Takes into account the existing rules and operating procedures when determining possible solutions to a problem OB 6.2 Implements a chosen solution to a problem OB 6.3 Organizes tasks in accordance with determined priorities OB 6.4 Applies appropriate mitigation strategies for the identified hazards OB 6.5 Works through problems without reducing safety OB 6.6 Considers expediency and efficiency in decision making
Self-management	Demonstrate personal attributes that improve performance and maintain an active involvement in self-learning and self-development	OB 7.1 Takes responsibility for own performance, detecting and resolving own errors OB 7.2 Improves performance through self-evaluation of the effectiveness of actions OB 7.3 Seeks and accepts feedback to improve performance OB 7.4 Maintains self-control and performs adequately in adverse situations OB 7.5 Changes behaviour and responds as needed to deal with the demands of the changing situation
Workload management	Use available resources to prioritize and perform tasks in an efficient and timely manner	OB 8.1 Manages tasks effectively in response to current and future workload OB 8.2 Determines if and when support is necessary based on workload OB 8.3 Delegates tasks when necessary to reduce workload

Competency	*Description*	*Observable Behaviours (OB)*
		OB 8.4 Selects appropriate tools, equipment and resources to support the efficient achievement of tasks OB 8.5 Contributes to balancing team workload in normal and non-routine situations
Teamwork	Operate as a team member	OB 9.1 Provides feedback constructively OB 9.2 Shows respect and tolerance for other people OB 9.3 Carries out actions and duties in a manner that supports a team environment OB 9.4 Uses negotiating and problem-solving techniques to manage unavoidable conflict when encountered OB 9.5 Raises relevant concerns in an appropriate manner OB 9.6 Accepts feedback constructively OB 9.7 Shares experiences with the aim of continuous improvement
Communication	Communicate effectively in all situations	OB 10.1 Selects communication methods that take into account the requirements of the situation OB 10.2 Speaks clearly, accurately and concisely OB 10.3 Uses appropriate vocabulary and expressions for communications with stakeholders OB 10.4 Demonstrates active listening by asking relevant questions and providing feedback OB 10.5 Verifies comprehension of counterparts and corrects as necessary OB 10.6 Where applicable, uses eye contact, body movements and gestures that are consistent with verbal messages OB 10.7 Interprets non-verbal communication correctly

Procedures for
Air Navigation Services

TRAINING

Part V

TRAINING AND ASSESSMENT
FOR AERODROME PERSONNEL

[Reserved]

Procedures for
Air Navigation Services

TRAINING

Part VI

TRAINING AND ASSESSMENT
FOR OTHER AVIATION PERSONNEL

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