ICAO

Doc 10106

Manual on Flight Operations Officers/Flight Dispatchers Competency-based Training and Assessment

First Edition (Revised), 2021

Approved by and published under the authority of the Secretary General

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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FOREWORD

The *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868) was developed initially by the Flight Crew Licensing and Training Panel (FCLTP) to implement the training required for the pilot licences and ratings found in Annex 1 — *Personnel Licensing*, including the multi-crew pilot licence (MPL). Subsequent amendments have included provisions for aircraft maintenance mechanics/technicians/engineers (AMMTEs), air traffic control officers (ATCOs), air traffic safety electronics personnel (ATSEP) and flight operations officers/flight dispatchers.

This manual provides guidance on applying the competency-based training methodology, as outlined in the PANS-TRG, to the development of training courses for flight operations officers (FOO)/flight dispatchers.

TABLE OF CONTENTS

Page

Foreword ..... **(*v*)**

Glossary ..... **(*ix*)**

Publications ..... **(*xiii*)**

Chapter 1. Introduction **1-1**

1.1 Purpose 1-1
1.2 Context 1-1
1.3 Introduction to competency-based training and assessment 1-1
1.4 Developing a competency-based training and assessment programme 1-2

Chapter 2. Target audience **2-1**

2.1 Operational control, responsibilities and development 2-1
2.2 Basic competence for all roles in operational control 2-1
2.3 From flight operations officer to flight dispatcher 2-2

Chapter 3. Workflow 1 — Analyse training needs **3-1**

3.1 Training needs analysis 3-1
3.2 Training targets 3-2
3.3 Responsibilities 3-2
3.4 Training and assessment specification 3-2

Chapter 4. Workflow 2 — Design local/national competency model **4-1**

4.1 Introduction 4-1
4.2 Workflow 2, Part 1 — Design the adapted competency model 4-1
4.3 Workflow 2, Part 2 — Design of the assessment and training plans 4-3

Chapter 5. Workflow 3 — Develop assessment and training standards and materials **5-1**

5.1 Introduction 5-1
5.2 Trainee progress monitoring and documentation 5-2
5.3 Minimum competency level for training start 5-2
5.4 Assessments — Training Phase 1 5-3
5.5 Assessments — Training Phase 2 5-5
5.6 Assessment record 5-7
5.7 Management standards 5-13
5.8 Instructor standards 5-16
5.9 Task and material standards 5-22
5.10 Communication standards 5-23

5.11 Quality control, compliance monitoring and administration 5-24

Chapter 6. Workflow 4 — Conduct the course 6-1

6.1 Student selection and integration 6-1
6.2 Supervision, inspection and support 6-2

Chapter 7. Workflow 5 — Evaluate the course 7-1

7.1 Introduction 7-1
7.2 Evaluation process 7-1
7.3 Evidence-based training, definition and update of training targets 7-2

Appendix A. Prerequisite learning objectives ..... App A-1

Appendix B. Flight operations officer (FOO) tasks ..... App B-1

GLOSSARY

ACRONYMS

The following abbreviations are used in this document:

ACAS	Airborne collision avoidance system
ACMI	Aircraft, crew, maintenance, and insurance
ACM	Aircraft flight manual
AD	Aerodrome
ADIRU	Air data inertial reference unit
AIP	Aeronautical information publication
AMMTE	Aircraft maintenance mechanic/technician/engineer
AOC	Air operator certificate
APV	Approach procedure with vertical guidance
ARM	Aircraft recovery manual
ASTEP	Air traffic safety electronics personnel
AT	Auto-throttle
ATC	Air traffic control
ATCO	Air traffic control officer
ATM	Air traffic management
ATO	Approved training organization
CAT	Category
CBTA	Competency-based training and assessment
CDL	Configuration deviation list
CG	Centre of gravity
CT	Classroom training
CTA	Classroom training and assessment
DGR	Dangerous goods regulations
DRM	Dispatch resource management
EBT	Evidence-based training
EFB	Electronic flight bag
EGT	Exhaust gas temperature
EPR	Engine pressure ratio
ETA	Estimated time of arrival
ETOPS	Extended range operations by twin-engined aeroplane
ETP	Equal time point
EVS	Enhanced vision system
FANS	Future air navigation systems
FCLTP	Flight Crew Licensing and Training Panel
FCOM	Flight crew operating manual
FCTM	Flight crew training manual
FD	Flight dispatcher (advanced competency level, operator/role specific)
FOD	Foreign object debris
FOO	Flight operations officer (basic competency level, not operator/role specific)
FM	Flight manual
FMA	Flight mode annunciator
FMS	Flight management system

FPL	Flight plan
GBAS	Ground-based augmentation system
HOT	Hold-over time
HPL	Human performance and limitations
HUD	Head-up display
ICAO	International Civil Aviation Organization
IDG	Integrated drive generator
IFR	Instrument flight rules
IGV	Inlet guide vane
IRS	Inertial reference system
KPI	Key performance indicator
LMS	Learning management system
LO	Learning objective
NCAA	National Civil Aviation Authority
MEL	Minimum equipment list
MMEL	Master minimum equipment list
MMO	Maximum Mach operating speed
MPL	Multi-crew pilot licence
MSA	Minimum sector altitude
NAV	Navigation
NAVAIDS	Navigational aids
OAT	Outside air temperature
OB	Observable behaviour
OCC	Operations control centre
OCO	Operations control officer (advanced competency level, operator/role specific)
ODM	Operating data manual
OM-A	Operations manual, Part A
OM-B	Operations manual, Part B
OPS ENG	Operations engineer (advanced competency level, operator/role specific)
PACOTS	Pacific Organized Track System
RAIM	Receiver autonomous integrity monitoring
RAT	Ram air turbine
RI	Remote interaction
ROC	Rate of climb
RWY	Runway
SMS	Safety management system
SOP	Standard operating procedure
SBAS	Satellite-based augmentation system
TAS	True air speed
TEM	Threat and error management
TO/LDG	Take-off and landing
VSI	Vertical speed indicators
VFR	Visual flight rules
WBM	Weight and balance manual

DEFINITIONS

Assessment (evidence) guide. A guide that provides detailed information (e.g. tolerances) 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.

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.

Flight operations officer/flight dispatcher. A person designated by the operator to engage in the control and supervision of flight operations, whether licensed or not, suitably qualified in accordance with Annex 1, who supports, briefs and/or assists the pilot-in-command in the safe conduct of the flight.

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

Operational Control. The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight.

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.

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PUBLICATIONS

(referred to in this manual)

Annexes to the Convention on International Civil Aviation

Annex 1 — *Personnel Licensing*

Annex 3 — *Meteorological Service for International Air Navigation*

Annex 19 — *Safety Management*

Procedures for Air Navigation Services (PANS)

Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444)

Procedures for Air Navigation Services — Training (PANS-TRG, Doc 9868)

Manuals

Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335)

Human Factors Training Manual (Doc 9683)

Safety Management Manual (SMM) (Doc 9859)

Chapter 1

INTRODUCTION

1.1 PURPOSE

This manual provides guidance to operators and training organizations to develop flight operations officer (FOO)/flight dispatchers competency-based training and assessment programmes. The manual supports the provisions outlined in the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868).

1.2 CONTEXT

1.2.1 Annex 6 — *Operation of Aircraft*, Part I — *International Commercial Air Transport — Aeroplanes*, specifies that the responsibility for the operational control of a flight be designated only to the pilot-in-command and to a FOO/flight dispatcher if the operator's approved method of control and supervision of flight operations requires the use of FOO/flight dispatcher personnel.

1.2.2 The *Manual of Procedures for Operations Inspection, Certification and Continued Surveillance* (Doc 8335) further clarifies that a system of operational control requiring the services of a FOO/flight dispatcher should be considered, due to the nature and extent of the duties and responsibilities involved in the supervision of flights.

1.2.3 Approval of the method of control and supervision of flight operations is required by the State of the Operator. In this context, the duties of the FOO/flight dispatcher are listed in Annex 6, Part I, 4.6.

1.2.4 The FOO/flight dispatcher may or may not be licensed depending on the requirements of the State of the Operator. Annex 6, Part I requires that licensing be done in accordance with Annex 1 — *Personnel Licensing,* which describes the requirements for the issue of the licence.

1.2.5 Section 3 of the PANS-TRG outlines the general provisions for competency-based training and assessment for FOOs/flight dispatchers and requires that licensed personnel achieve the final competency standards acceptable to the appropriate authority and in compliance with Annex 1.

1.2.6 The intent of this manual is to provide additional and specific details on the development of a competency-based training programme to meet the requirements in PANS-TRG, enabling the suitable training and qualification of FOOs/flight dispatchers, in line with the Standards and Recommendations of Annex 6, Part I and Annex 1 as described above.

1.3 INTRODUCTION TO COMPETENCY-BASED TRAINING AND ASSESSMENT

1.3.1 Aviation is an evolving field. The constant search for improved efficiency, driven by the need to reduce operating costs while maintaining safety and financial security, results in the greater use of technology and automation. As technology advances, the tools used to perform operational control tasks may change, but the basic requirements

remain the same. The increased availability of ever-larger amounts of operational data results in the potential to make better decisions but also introduces the risk of data overload and the need for focus and filtering. Interdependencies between different elements of the operation increase with the added complexity of the system, meaning that decisions taken are likely to have a greater impact over a longer time period. These decisions are often made under intense time pressure, adding to the risk.

1.3.2 As systems evolve and become more complex, the need emerges to provide training which produces personnel with the flexibility and adaptability to cope with both day-to-day challenges and longer-term changes.

1.3.3 With conventional training programmes, the focus is function-based. A trainee is taught how to complete the required tasks for their role, such as creating a flight plan or a network risk analysis. The training is closely linked to the system in use at the time and focusses on the functional aspects of the task. Such a system is limited by:

a) the inability of trainees to work outside of defined tasks;

b) the inability to anticipate and, therefore, train for all possible situations;

c) a lack of training resources or recurrent training to ensure the individual can keep up to date with evolving systems and procedures; and

d) the inability to prepare the individual to deal with a required but infrequent activity.

1.3.4 Due to the limitations highlighted above, it is beneficial to develop programmes that focus on the abilities required to do the job, rather than focussing on the completion of specific tasks or the acquisition of specific knowledge. This allows individuals to handle unexpected or infrequent events using the same abilities. These abilities are referred to as competencies.

1.3.5 Competencies describe abilities that can be learned or developed. They define what can be *done* versus what is *known*, placing the emphasis on the individual to adapt and utilize their abilities in any scenario. An example of a competency might be problem solving and decision making, which would be defined as “accurately identifies risks and resolves problems. Uses appropriate decision-making techniques”, as indicated in Chapter 5, Table 5-2.

1.3.6 Competencies allow people to formulate solutions for complex and difficult situations, including first time experiences. FOOs/flight dispatchers must deal with these situations effectively and in a safe and secure manner.

1.3.7 Competency-based training underpins the ability to deal with scenarios that could not have been anticipated or trained for explicitly. It also moves the emphasis away from the individual being provided with specific training for a set of tasks which define their expected role. It promotes greater accountability, focus on self-improvement and a professional approach to work that emphasises performance.

1.4 DEVELOPING A COMPETENCY-BASED TRAINING AND ASSESSMENT PROGRAMME

1.4.1 Figure 1-1 presents an overview of competency-based training and assessment workflows. The workflows relate to the components of competency-based training and assessment programmes.

1.4.2 Workflows 1 and 2 establish the training specification, adapted competency model, assessment plan and training plan. Workflows 3 and 4 develop and conduct the training course. Workflow 5 reviews the effectiveness of the training and assessment conducted and recommends improvements, as appropriate.

1.4.3 Detailed descriptions of each workflow are provided in Chapters 3 to 7 of this manual.

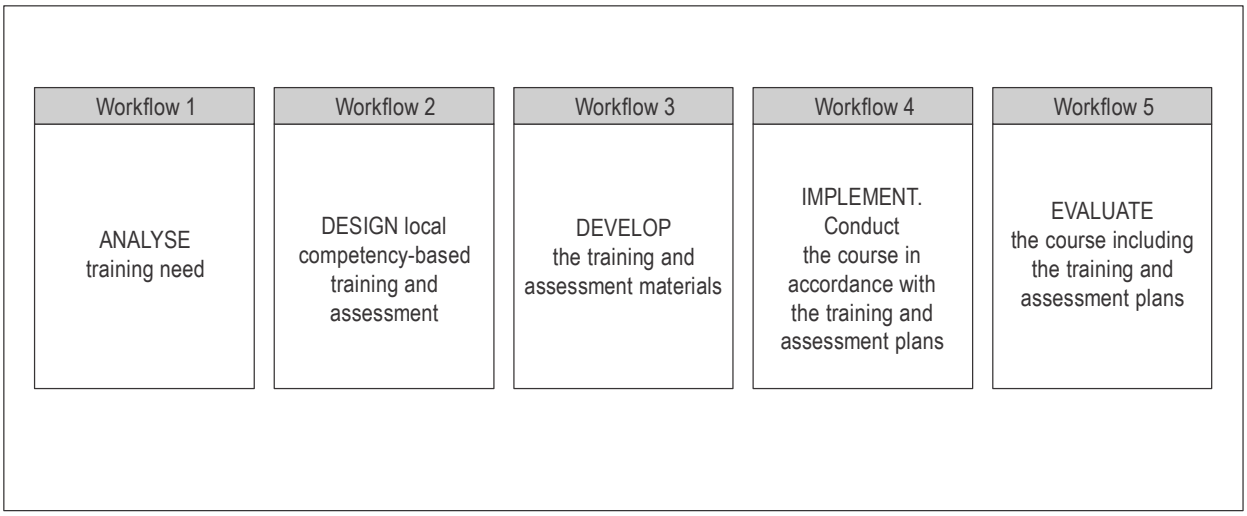

Figure 1-1. Competency-based training and assessment workflows

Chapter 2

TARGET AUDIENCE

2.1 OPERATIONAL CONTROL, RESPONSIBILITIES AND DEVELOPMENT

2.1.1 The responsibilities in operational control combine many factors such as regulations, standards, operational and commercial targets. The aircraft operator can individually delegate different areas of responsibility and roles to specific positions or functions. It is not realistic to define a worldwide standard set and title of responsibilities for specific positions or functions.

2.1.2 Since data handling and analysis of valid information becomes more important with the development of decision support systems, the operational control roles responsible for the data flow management will have a greater influence on the result of the risk management process as these systems develop.

2.1.3 Due to the dynamic environment, the processes, procedures and tools needed for operational control change frequently. The individuals involved must understand the relevant factors of influence on the general and flight-specific operational risks. They should also demonstrate a greater flexibility in the application of their competencies in this context.

2.1.4 As an example, an operator defines a working position for a short and long distance flight planning. Another position executes operations control for general operational and commercial risk management, problem solving and decision making in the network and on specific flights. For workload balance and after the introduction of advanced tools, this operator may delegate short-range flight planning tasks to the operations control position during night shifts. This allocation of tasks to different working positions might be limited because of inadequate basic competencies.

2.2 BASIC COMPETENCE FOR ALL ROLES IN OPERATIONAL CONTROL

2.2.1 All personnel involved in the system of operational control must be competent and qualified to ensure flight safety at a basic level, independent from the advanced operator and role specific qualification program. This manual describes the basic competency level provided during the initial flight operations officer training.

2.2.2 The basic qualification covers the relevant generic factors of the risk management process in operational control. Additional training should cover the operator and role-specific elements based on tasks defined in the operator's training manual.

2.2.3 Unless the advanced operator and role-specific qualification is achieved, the initial FOO training alone does not qualify for responsibilities in operational control duties.

2.2.4 The title "flight operations officer" distinguishes the individual of the basic qualification level from the higher role- and operator-related qualification level. The operator would typically name the job title, for example flight dispatcher or operations controller, according to the specific primary tasks delegated to this function.

2.2.5 A FOO should not be authorized for flight dispatch without operator- and role-specific training. Flight dispatcher and all other functions and roles in operational control require a successful initial FOO qualification and an operator- and role-specific qualification.

2.3 FROM FLIGHT OPERATIONS OFFICER TO FLIGHT DISPATCHER

2.3.1 While FOO qualification can be understood as a basic licence level, additional operator and role-specific qualification can be understood as a rating level, as shown in Figure 2-1.

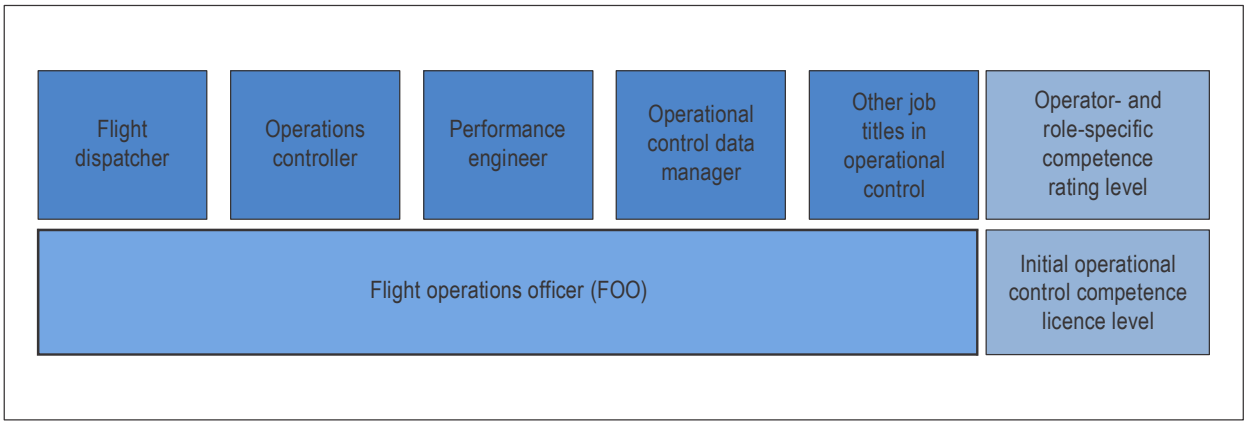

Figure 2-1. Operator- and role-specific qualifications

2.3.2 Examples of operator-specific roles involved in operational control duties include:

a) flight dispatcher: provides flight planning services, dispatch release and in-flight support;

b) performance engineer: provides technical support in relation to aircraft performance and flight planning services;

c) operational data manager: integrates navigation and operator data and policies for the application of flight planning, electronic flight bag (EFB) and flight management system;

d) operations and network controller: allocating operational risk management processes in the network, specific areas and flights. The operations and network controller is responsible for the initiation of problem-solving and decision-making processes by integrating safety, operational risks, direct operating costs and customer experience; and

e) operational engineer: integrates Aeronautical information publication (AIP), operator and aircraft data into a database to be used for performance calculations, flight planning and aircraft allocation. The operational engineer is responsible for data and policies integrated in flight planning applications, EFB and flight management systems (FMS).

2.3.3 Not all roles in the operations control centre (OCC) are delegated to the full set of operational control duties. For example, resource control for flight crews (crew control) or aircraft and maintenance resource (maintenance control) are not fully inside the scope of the definition of operational control.

2.3.4 For roles outside the scope of the FOO competency-based training and assessment (CBTA) manual, specific training programs and manuals should be developed. Workflow 1, further described in Chapter 3, should be applied for the determination of role-specific training specifications. However, essential elements of the FOO CBTA program could be integrated for simplification and standardization. During the development of specific training programs, interfaces between the different roles in the operational control process should be strengthened.

2.3.5 Smaller aircraft operators must allocate more roles per staff than larger operators. Smaller OCCs need to qualify, in terms of percentage, more people on the FOO initial competency standards because of their higher integration level of operational control-related tasks. Larger OCCs do not need to qualify the same percentage of staff according to FOO standards. Large OCCs have more specific roles and interfaces, resulting in higher risks for the data and information flow as well as problem solving and decision-making processes. With an increase in staff, essential operational control-related tasks should be integrated in the appropriate role-related training specification.

2.3.6 Without an understanding of the essential tasks in operational control, the quality of the operator problem-solving and decision-making process would be limited. This may consequently endanger flight safety due to low quality risk-management processes.

Chapter 3

WORKFLOW 1 — ANALYSE TRAINING NEEDS

3.1 TRAINING NEEDS ANALYSIS

The first step in the development of a competency-based training and assessment (CBTA) programme is to conduct a training needs analysis, as shown in Figure 3-1. During this analysis, the future purpose of the training is considered in relation to the local, national, operational, technical, regulatory and organizational requirements. A training specification lists the requirements to be fulfilled when designing the training.

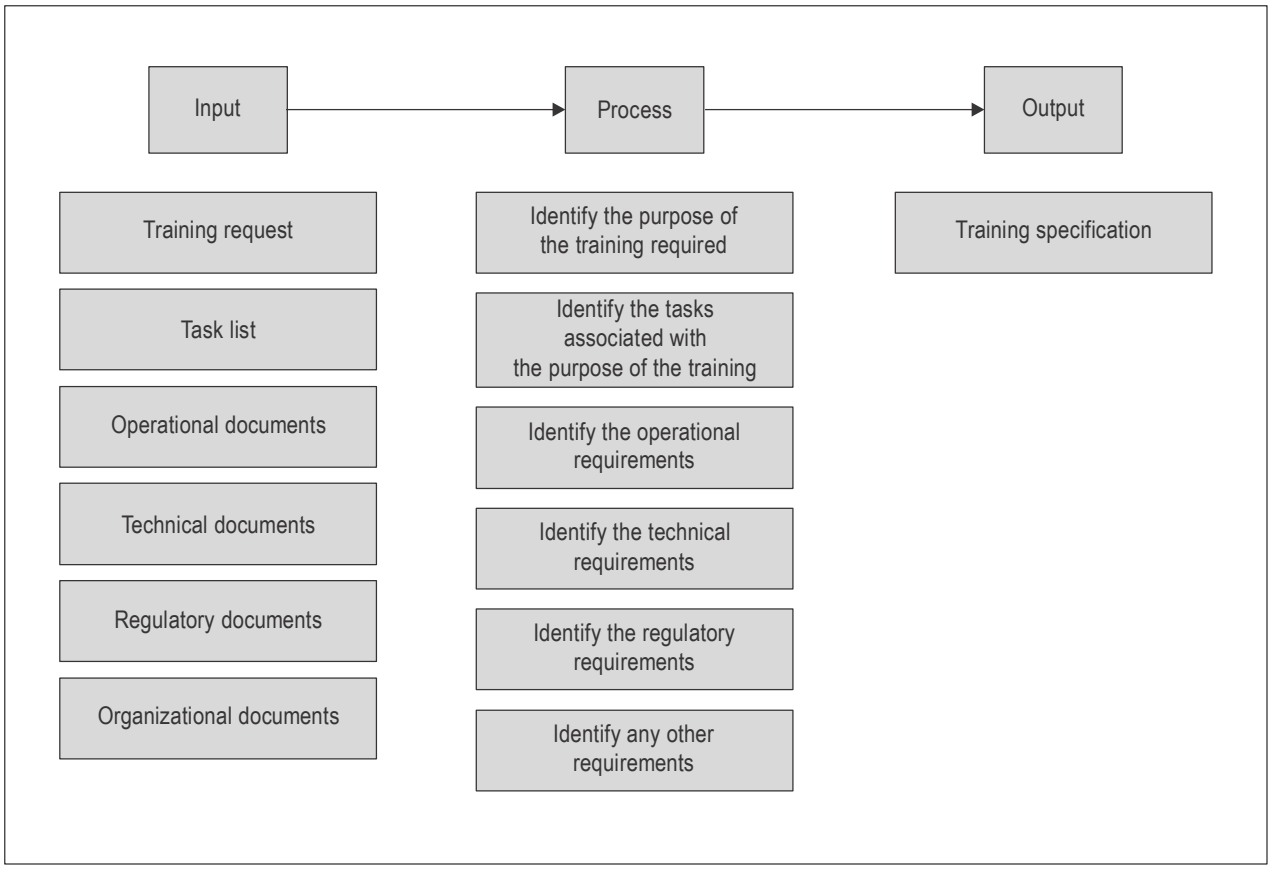

Figure 3-1. Analyse training needs and define training specifications

3.2 TRAINING TARGETS

3.2.1 Competency-based training and assessment should be based on meaningful and realistic tasks demonstrated during operational control duties. Unrealistic tasks will reduce the effectivity of the trainee target competency and will negatively influence the quality of operational risk management executed by the flight operation officer/flight dispatcher. The application of irrelevant tasks will also negatively affect the motivation of the instructor and trainees and may have an adverse impact on the results of the realistic task applications, which are still important for an acceptable training outcome. This training result risk is controlled by outlining clear training standards, strong oversight of the process of training need analysis, defining competency targets and selecting adequate training methods and resources (instructor, material and infrastructure).

3.2.2 This continuous improvement process should be organized by the stakeholder responsible for the oversight of operational control standards in flight operation and the National Civil Aviation Authority (NCAA). In coordination with the AOC holder and training organizations from the same region, the competency targets and criteria relevant for the actual and the future requirements should be discussed and standardized.

3.3 RESPONSIBILITIES

3.3.1 The national or regional civil aviation authority should be the responsible stakeholder to assure the attainment of training targets and flow of actual data, information and material from the aircraft operator to the approved training organization.

3.3.2 This process needs three stakeholders with clear responsibilities:

a) the local or national aircraft operator defines the competency targets as tasks and observable behaviour;

b) the training organization defines the training methods and assessment standards on the basis of tasks and observable behaviour; and

c) the NCAA keeps oversight, initiates the training need analysis and competency definition, monitors the training and assessment standards and executes organization and process audits.

3.3.3 The transfer from actual and real (evident) operational control processes should be the basis for the development of adequate tasks and learning objectives for training improvement. Operationally evident criteria, i.e. incidents, abnormal situations, accidents, flight safety reports of certified aircraft operator should influence the training and assessment programmes for basic and recurrent training.

3.3.4 The processes for the transfer of tasks, competency indicator, data and information from the aircraft operator to the approved training organization is crucial for the quality of CBTA.

3.4 TRAINING AND ASSESSMENT SPECIFICATION

3.4.1 The training specification should provide sufficient detail to answer the following questions.

What is the purpose of the training?

3.4.2 The competency development of personnel responsible for the exercise of relevant tasks in aircraft operational control duties.

What are the types of training (e.g. initial, refresher, advanced, recurrent and conversion training)?

3.4.3 CBTA elements defined for the initial FOO/flight dispatcher (FD) training should also be used for other types of training. Any recurrent training should be based on tasks defined for the Training Phase 2 (Chapter 5, 5.5 refers), but allocated to role- and operator-specific standard procedures, policies and data.

What qualification will the trainee achieve upon successful completion of the flight operations officer (FOO) initial training?

3.4.4 The initial qualification needs to be general and not role or operator specific. This general qualification level is called the flight operations officer (FOO). After this initial training, the specific aircraft operator is responsible for the advanced training of the FOO, to qualify the trainee to become, for example, an aircraft dispatcher, operations and network controller, operations data manager, operations engineer or aircraft performance engineer.

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

3.4.5 The local or national aircraft operators are responsible to define the typical tasks for a general FOO qualification. The tasks are one of two elements of the competency target description and should ensure the understanding of the operational control context as a whole. A task list may be extracted from an existing job and task analysis or may be taken from an aircraft operations manual that lists the various roles and responsibilities in the operational environment. To organize the input and to structure the tasks, a working group with representatives from local or national aircraft operators should be initiated under the supervision of the NCAA.

Note.— Appendix B provides a generic list of Flight operations officer (FOO) tasks developed by the ICAO CBTA Task Force.

Which operational procedures and generic set of operational manuals should be applied? Which configuration of the working environment has an influence on target competencies? Which non-routine situations are necessary for the successful completion of the training?

3.4.6 Parallel to the list of tasks, the aircraft operator working group should clarify these questions.

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

3.4.7 For the optimum solution to this question, close contact between the aircraft operator and approved training organizations (ATO) is recommended. These questions can then be answered by the ATO since they are responsible for the definition of training standards, methods, material and instructor for training and assessment.

Which rules and regulations are applicable?

3.4.8 Are there any regulatory requirements that will affect assessment procedures, course approval, minimum training standards in relation to instructor qualification and material, training or equipment standards?

3.4.9 Are there other regulatory aspects, such as student reporting, certification requirements, training documentation, feedback system and quality control?

3.4.10 Typical regulatory requirements may include a minimum number of hours of experience in the operational environment before the start of training. The pre-selection criteria and the minimum initial or general competence of students is checked by entry-level tests. Specific criteria for entry level tests are described in Chapter 4.

What organizational requirements may affect training?

3.4.11 This might include a minimum number of students to cover the requested or intended staff capacity, any scheduling criteria affecting the course design, i.e. distance learning and remote student and instructor interaction to allow part time training parallel to other duties. This question should be answered by the ATO, depending on market demand.

3.4.12 Independent from the pre-qualification of students, a training that focuses immediately on “tasks” is unrealistic. Specific aeronautical knowledge and some minor skills are prerequisites. Based on the local or national education system, prerequisite learning objectives must describe specific general and aeronautical knowledge.

Note.— Appendix A provides a generic list of prerequisite learning objectives developed by the ICAO CBTA Task Force.

What other requirements may affect training?

3.4.13 Any other requirements that may not have been covered in the previous questions, such as the language to be used in the training.

Chapter 4

WORKFLOW 2 — DESIGN LOCAL/NATIONAL COMPETENCY MODEL

4.1 INTRODUCTION

4.1.1 The purpose of Workflow 2 is to establish an adapted competency model that addresses the training specification identified in Workflow 1 and to design a training and assessment plan that will be used to develop and assess the competence of trainees.

4.1.2 Workflow 2 is divided into two parts:

a) part 1 deals with the design of the locally or nationally adapted competency model; and

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

4.1.3 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. The integration of training and assessment is an integral element of CBTA.

4.2 WORKFLOW 2, PART 1 — DESIGN THE ADAPTED COMPETENCY MODEL

4.2.1 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 4-1 shows the elements of Workflow 2, Part 1.

Note.— The Procedures for Air Navigation Services — Training *(PANS-TRG, Doc 9868) provides the competency framework as defined by the Competency-based Training and Assessment (CBTA) Task Force.*

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

4.2.3 Generally, the training specification completed in Workflow 1 may be used to identify conditions specific to an environment in which performance will be demonstrated. Most of the conditions will apply generically to all of the identified observable behaviours, as part of the adapted competency model.

4.2.4 Occasionally, specific conditions may be associated with some observable behaviours. 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.

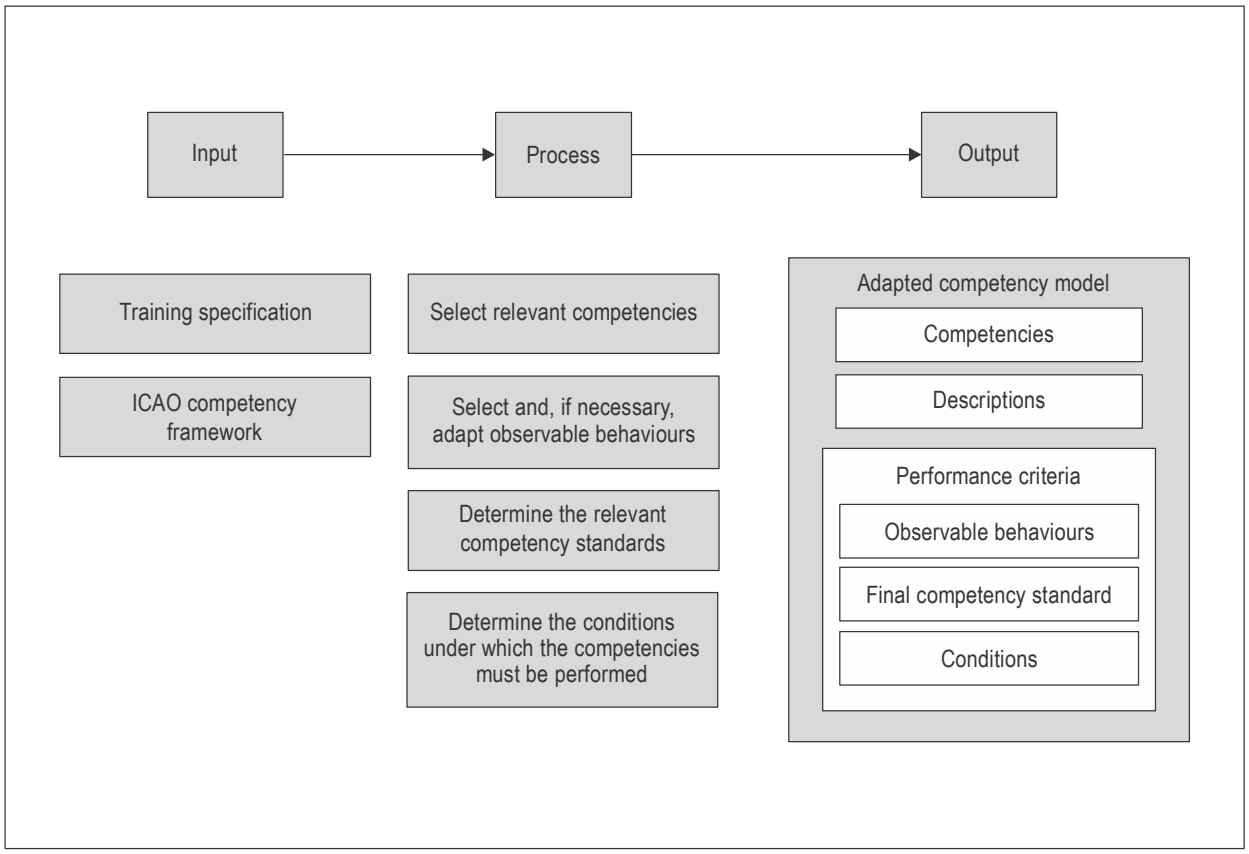

Figure 4-1. Workflow 2, Part 1 — Design the adapted competency model

4.2.5 There are different types of conditions that may be considered for the final competency standard including, but not limited to:

a) conditions relating to context, which are defined as the nature and complexity of the operational and environmental context; and

b) tools and systems or equipment to be used during the assessment and conditions relating to the level of support or assistance a trainee can expect from the instructor or assessor.

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

4.3 WORKFLOW 2, PART 2 — DESIGN OF THE ASSESSMENT AND TRAINING PLANS

4.3.1 Overview

4.3.1.1 The training concept should be based on the training targets defined by the aircraft operator under supervision by the National Civil Aviation Authority, the regulators framework and the technical requirements.

4.3.1.2 To assure operational relevance, the operator should integrate experience and consequences from incidents and accidents into this competency target description. The tasks and the prerequisite learning objectives should, as a consequence, be updated frequently and influence the assessment and training plan of the ATO. The oversight of this crucial CBTA process by the regional or National Civil Aviation Authority should be controlled, structured and organized within a State or region.

4.3.1.3 An ATO should generate training schedules providing flexibility. Flexibility is a prerequisite for individual student competency development and competency control (assessment, documentation, allocation of exercises and communication) which becomes a prerequisite for the training planning.

4.3.1.4 The training syllabus and schedule should not fix the timescale for each module or subject for all groups of students or individuals, but rather should show all mandatory items and scheduling options. Due to the nature of the CBTA concept, the training and assessment planning are integrated into one process under the responsibility of an ATO.

4.3.1.5 Additional inputs for training and assessment planning and scheduling include:

a) the division between classroom training and distance learning or remote interaction;

b) the distribution of basic material and exercises, if online and/or paper based;

c) the scheduling and training-related communication; and

d) the quality and competencies of training resources, i.e. instructors and material.

4.3.1.6 When developing the training and assessment plan, the following practical issues should also be considered:

a) methods of assessment and documentation of individual student competencies;

b) methods for communication and material distribution used by the learning management system (LMS);

c) definition of training standards for instructors and the methods of qualification; and

d) integration of training and assessments standards (see Chapter 5).

4.3.1.7 The development of a training and assessment plan, as shown in Figure 4-2, should be based on the identification of relevant FOO tasks, developed in Workflow 1. Appendix B contains a sample task list for reference. Where necessary this list should be supplemented by additional FOO tasks received from the operator in the respective region under supervision of the National Civil Aviation Authority responsible for oversight and supervision.

4.3.1.8 The definition of an adequate minimum entry competency level before starting the tasks should be established. The minimum entry level should be defined on the basis of general education and competencies. According to this minimum entry level and the given general education of students, a definition of prerequisite learning objectives (LOs) should be generated. Appendix A contains a sample list of prerequisite learning objectives for reference.

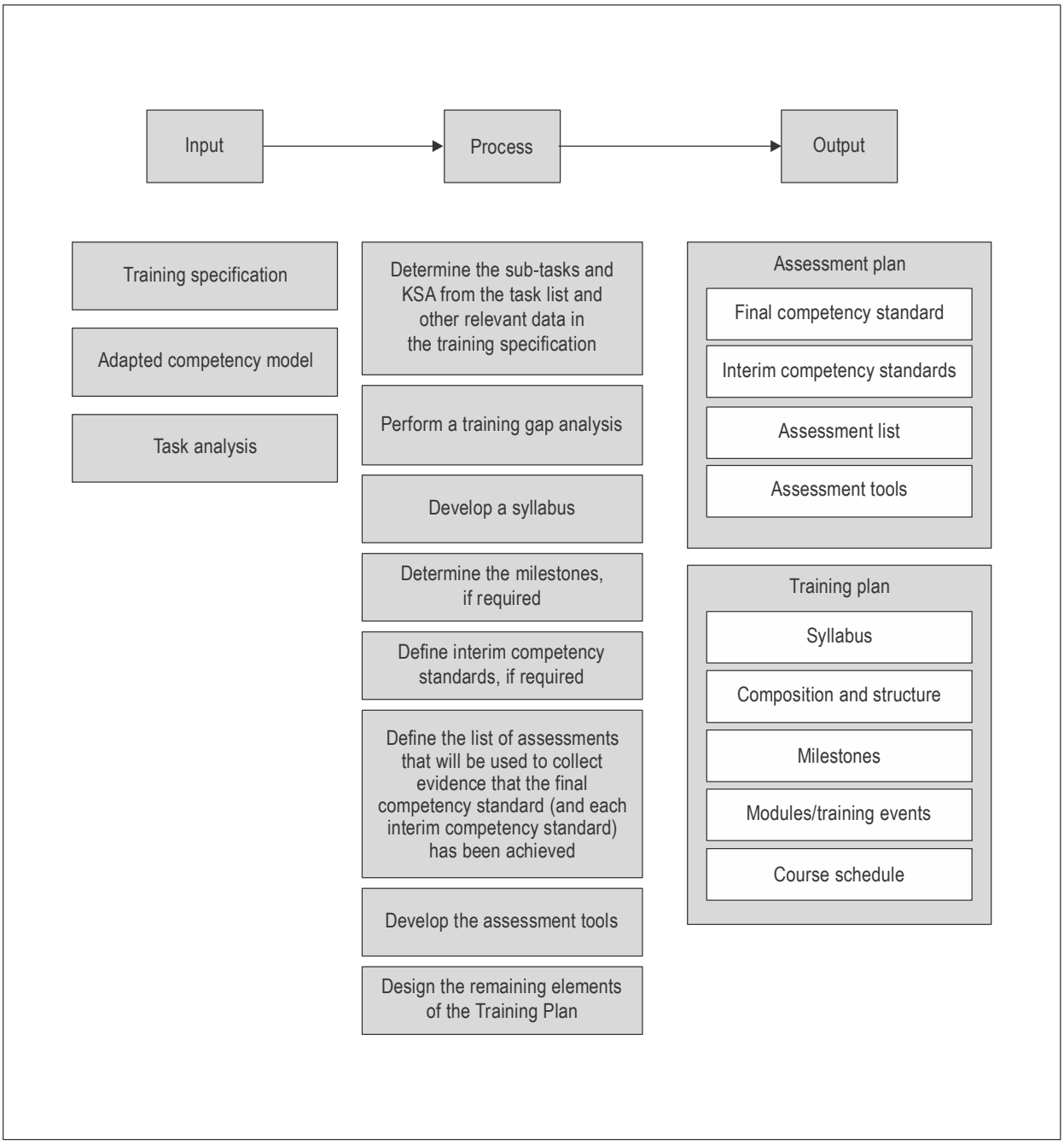

Figure 4-2. Workflow 2, Part 2 — Develop the assessment and training plan

4.3.1.9 Where required, additional prerequisite learning objectives should be included in cooperation with the stakeholder responsible for the definition of tasks (aircraft operator) and for oversight (NCAA).

4.3.1.10 The adequate minimum entry competency level before starting with the learning objectives in Training Phase 1 (Chapter 5, 5.4 refers) should also be defined. This general competency level should be evaluated during an entry level test as described in Workflow 3.

4.3.1.11 Learning objectives should be allocated to training modules in Training Phase 1, as required.

4.3.1.12 FOO tasks should be allocated to training modules in Training Phase 2, as required.

4.3.1.13 Descriptions of assessment methods and training and assessment progress documentation for each module should also be developed.

4.3.2 Allocation of tasks

4.3.2.1 The following schematic provides a sample workflow from the task family to the sub-tasks as provided in Appendix B, developed under the responsibility of the AOC and under the supervision of the NCAA.

4.3.2.2 ATOs should allocate the sub-tasks of specific training modules and develop exercises. In Figure 4-3, the PANS-TRG has been used to provide target competence criteria.

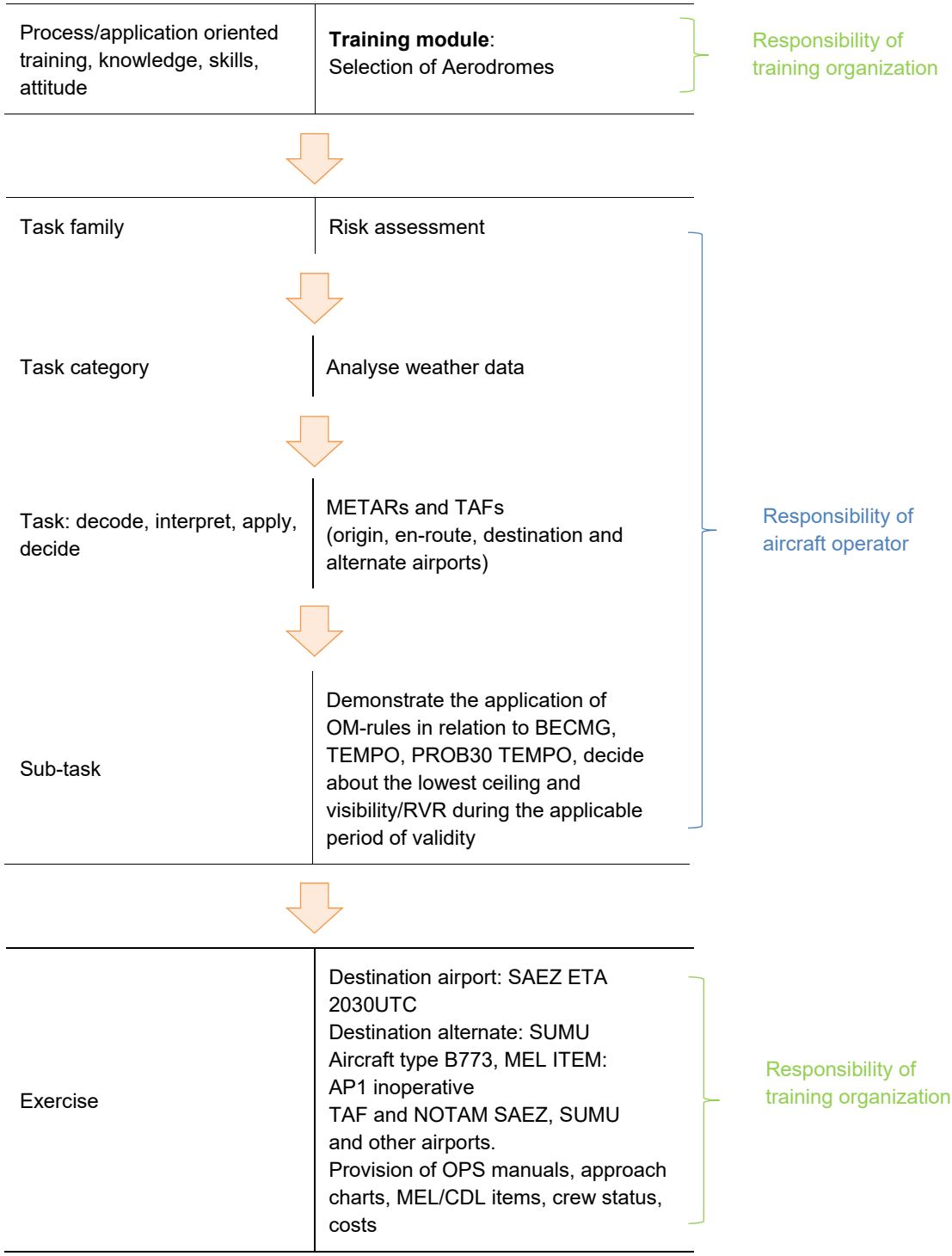

Figure 4-3. ATO responsibility and allocation of tasks using criteria from Appendix B

4.3.3 Training planning and scheduling

4.3.3.1 Workflow 2, Part 1 provides a process description to design the locally- or nationally-adapted competency model. A classical training approach, without a competency model, would reduce the training to a function-oriented knowledge transfer including some hard application skills. Such a training concept could be easily planned and scheduled, but the result would not align with the target competencies based on knowledge combined with soft skills and attitude. Integrating knowledge, skills (soft and hard) and attitudes from the competency model better describes the target competency and allows for a more detailed training and accurate evaluation of such competencies during the training and assessment phase. The training, planning and scheduling should support this concept; classical scheduling with fixed time scales would not be appropriate.

4.3.3.2 A fixed schedule training plan could be combined with the objectives of a competency-based training and assessment. Although, despite fixed schedules being easy to plan and maintain, the average rate of competency development in relation to the time required would be less effective than it could be. CBTA planning and scheduling should allow for a flexible training plan, as well as high training standards and a good communication between the instructor, the student and the training administration.

4.3.3.3 The description of a flexible and high standard CBTA in an ATO training manual should focus on how to achieve the target competencies rather than the provision of a fixed syllabus and a standard schedule.

4.3.3.4 A flexible training plan should integrate the student capability for self-learning, the individual capacity available for learning and the individual- or group-related provision of classroom training, distance learning and remote interaction between instructor and students.

4.3.3.5 It should be accepted that a combination of classroom training and individual elements could provide good results. Generally, the level of combination and integration depends on regional and cultural aspects.

4.3.4 Communication and interaction

4.3.4.1 Remote interactions using online chat functions, telephone-based team meetings, document sharing and video conferences could allow for training sessions of a higher quality and availability, if well-structured and organized. Without these methods, individual and flexible CBTA planning and course delivery would be difficult. ATOs should try to integrate individual training elements gradually if they are not using these techniques.

4.3.4.2 The training organization should provide guided discussions and learning forums. Sharing material and exercises in connection with discussions and group work will further develop competencies in communication, problem solving and decision making, teamwork and leadership. Without group work or any other form of interaction, important competencies cannot be trained and assessed.

4.3.4.3 Parallel to the organized group work, students should have the option to organize their own learning groups independently.

4.3.5 Platform

4.3.5.1 The provision of material, communication, schedules and other information on a standard platform would be beneficial when organizing the training process.

4.3.5.2 The learning platform can be a fully integrated LMS or a relatively simple homepage with download functions for material and basic tools for communication.

4.3.5.3 Independent of the chosen solutions, the following requirements should be fulfilled by such a platform:

a) provision of material in analogue, printed or digital form, i.e. documents, pictures, charts, videos and web-based training;

b) amendments to and revisions of material is seamless;

c) information and material can be downloaded or distributed;

d) availability of chat or forum functions for communication and feedback between the training administration, instructors and students;

e) ability to book modules and training sessions by the student and the oversight for all stakeholder of allocated and open learning and assessment events; and

f) appropriate reporting tools of individual student learning progress, assessment and grading, communication of results and recommendations.

4.3.6 Scheduling requirements

4.3.6.1 Knowledge can be exercised in the classroom during remote interactions with the instructor and instructor independent self-studies. More instructor and student interaction is required for the development of skills and attitude. This interaction should be performed in classrooms and remotely, if applicable. The ability of the instructor to provide mentorship and individual student support is important for competence development during remote interaction. Running CBTA with remote interaction and distance learning does not significantly reduce the resource capacity required by the instructor for classroom training.

4.3.6.2 The training organization needs to find the right balance of in class and remote interaction, based on the ability and motivation of students for self-study and the capability of the training organization.

4.3.6.3 Table 4-1 presents a sample CBTA training capacity plan showing training volume planning after the definition of training modules and the allocation of resources, and Table 4-2 presents a summary of the resource requirements.

Table 4-1. Sample CBTA training capacity plan

Learning objectives *Module, Phase 1*	∑	∑ *Student units (45 min each)*	*Classroom training/ assessment Q&A*	*Remote interaction assessment*	*Remote interaction training*	*Self-study*	*OCC interaction*
FOO CBTA Introduction		6	6	0	0	0	0
Human Perf. and Limitations (HPL)		32	14	1	2	18	0
Principles of Flight (POF)		32	14	1	2	18	0
Aircraft Systems (TEC)		32	14	1	2	18	0

Learning objectives *Module, Phase 1*	∑	∑ *Student units (45 min each)*	*Classroom training/ assessment Q&A*	*Remote interaction assessment*	*Remote interaction training*	*Self-study*	*OCC interaction*
Air Law (LAW)		38	14	1	3	24	0
Mass & Balance (M&B)		32	14	1	2	18	0
Meteorology (MET)		38	14	1	3	24	0
Navigation (NAV)		38	14	1	3	24	0
Operational Procedures (OPR)		38	14	1	3	24	0
Performance (PEF)		32	14	1	2	18	0
Phase 1 Final Exam		6	6	0	0	0	0
∑		324	138	9	22	186	0
∑ Student days	54	54					0
∑ Student days min., if high performer	36	60%	% Applicability of Training Events				
∑ Instructor days, one student	28,2		23,0	1,5	3,7		0,0

Tasks *Module, Phase 2*	∑	∑ *Student units (45 min each)*	*Classroom training Q&A*	*Classroom assessment*	*Remote interaction training*	*Self-study*	*OCC interaction*
Performance T/O and LDG (PEFLS)		21	12	3	2	6	
Perf. Cruise & Special Perf. (PEFHS)		21	12	3	2	6	
Selection of Aerodromes (SELA)		27	12	3	2	12	6
Flight Planning and Monitoring (FPL & FM)		34	13	3	2	18	
Operational Procedures (OPSSTD)		29	14	3	2	12	6

Tasks *Module, Phase 2*	∑	∑ *Student units (45 min each)*	*Classroom training Q&A*	*Classroom assessment*	*Remote interaction training*	*Self-study*	*OCC interaction*
DOC, Customer, Network (COMCL)		27	12	3	2	12	
Phase 2 Final Exam		6	0	6	0	0	
∑		165	75	24	12	66	12
∑ Student days	30	28					2
∑ Student days min., if high performer	12						
∑ Instructor days, one student	20		12,5	4	2		1

Table 4-2. Resource requirements

Students per course	*Total instructor days Phases 1 and 2, 10 students*	*Instructor days vs. student days Phase 1*	*Instructor days vs. student days Phase 2*	*Number of units, 45 min each, per day*	*Number of students simultaneously in OCC interaction*
10	76	52%	66%	6	2

4.3.6.4 The training volume is based on the assumption that all students successfully pass an entry-level test providing an adequate and harmonized competency at the beginning of the training. A lower or uneven general competency level of students at the beginning can result in an unexpected and uncontrolled extension of the training volume and duration.

4.3.6.5 The number of students per assessment event is limited, as the instructor or evaluator needs to assess the competency with dialog-oriented and written exams without multiple choice. The ATO should provide elements of questions and answers by remote interaction to reduce the time required in the classroom.

4.3.6.6 Self-study and remote interactions should be prepared during classroom training, focusing on explanations and mentoring. This preparation should support the ability of students for self-study.

4.3.6.7 Depending on the training capacity of students, the time interval between class time and remote interactions extends the total training time. The ATO should offer an adequate number of classroom events for the same subjects within one period. Additional CBTA events based on a flexible provision of instructor and classroom capacity can support a higher number of students per class.

4.3.6.8 Table 4-3 presents a sample training schedule based on ideal conditions where student competency is standardized by adequate entry-level tests, they are available full time for training and there is a high motivation for self-study. The training, volume and duration could be extended by (up to) 50 per cent if optimum conditions are not fulfilled. The modules are then sequenced and scheduled into a plan, as demonstrated by the example given in Table 4-3:

Table 4-3. Sample training modules and definitions

1	Phase 1 — Prerequisite learning objectives
2	Phase 2 — Tasks
CT	Classroom training, subject introduction, student motivation, group work
Q&A	Question and answer, discussion of open-ended questions and exercises, group work, as required
CA	Classroom assessment, dialog oriented, two or three students per group, each student develops questions and case studies, presentation and interaction assessment, written open questions
CA as required	Student individual classroom assessment, any subject, as required, or student individual self-study and remote interaction.
SY/RI/RA	Student individual: self-study/remote interaction/remote assessment
HPL	Phase 1 — Human performance and limitations
POF	Phase 1 — Principles of flight
TEC	Phase 1 — Aircraft systems and engines
LAW	Phase 1 — Air law and air traffic control
M&B	Phase 1 — Mass and balance
MET	Phase 1 — Meteorology
NAV	Phase 1 — Navigation
OPR	Phase 1 — Operational procedures
PEF	Phase 1 — Flight performance
PEFLS	Phase 2 — Performance low speed
PEFHS	Phase 2 — Performance high speed, special performance
SELA	Phase 2 — Selection of aerodromes
FPL&FM	Phase 2 — Flight planning and flight monitoring
OPSSTD	Phase 2 — Operation standards, resource limitation, risk management
COMCL	Phase 2 — Direct operating costs, resource planning, customer, network (commercial risks)

OCC	Phase 2 — Operations control centre interaction, exercise of prepared tasks under realistic conditions. Performed by contracted Aircraft Operator

Legend

Phase 1 Classroom activiites	Self study	*Phase 2* Classroom activities	On the job training

Table 4-4. Sample training module sequencing and scheduling

Week	*Phase*	*Weekday 1*	*Weekday 2*	*Weekday 3*	*Weekday 4*	*Weekday 5*
1	1	FOO CBTA introduction	CT introduction HPL	SY / RI / RA	SY / RI / RA	Q&A HPL
2	1	CA as required	CT introduction POF	SY / RI / RA	SY / RI / RA	Q&A POF
3	1	CA as required	CT itroduction TEC	SY / RI / RA	SY / RI / RA	Q&A TEC
4	1	CA as required	CT introduction LAW	SY / RI / RA	SY / RI / RA	SY / RI / RA
5	1	Q&A LAW	CA as required	CT introduction M&B	SY / RI / RA	SY / RI / RA
6	1	Q&A M&B	CA as required	CT introduction MET	SY / RI / RA	SY / RI / RA
7	1	SY / RI / RA	Q&A MET	CA as required	CT Introduction NAV	SY / RI / RA
8	1	SY / RI / RA	SY / RI / RA	Q&A NAV	CA as required	CT Introduction PEF
9	1	SY / RI / RA	SY / RI / RA	Q&A PEF	CA as required	CT Introduction OPR
10	1	SY / RI / RA	SY / RI / RA	SY / RI / RA	Q&A OPR	CA as required
11	1	SY / RI / RA	Phase 1 final exam	SY / RI / RA	Phase 1 final exam repetition	Introduction PEFLS
12	2	SY / RI	Q&A PEFLS	CA as required	Introduction PEFHS	SY / RI

Week	*Phase*	*Weekday 1*	*Weekday 2*	*Weekday 3*	*Weekday 4*	*Weekday 5*
13	2	Q&A PEFHS	CA as required	Introduction SELA	SY / RI	SY / RI
14	2	Q&A SELA	CA as required	Introduction FPL&FM	SY / RI	SY / RI
15	2	SY / RI	Q&A FPL&FM	CA as required	Introduction OPSSTD	SY / RI
16	2	SY / RI	OCC	Q&A OPSSTD	CA as required	Introduction COMCL
17	2	SY / RI	OCC	Q&A COMCL	CA as required	Phase 2 final exam

Note.— During Phase 1, the learning objectives of human performance and limitations (HPL) should be exercised and assessed parallel to the other modules. During Phase 2 the prerequisite HPL learning objectives should be integrated in the observable competence behaviour categories "leadership and teamwork", "problem solving and decision making" and "communication" and should be assessed during the exercise of tasks.

4.3.7 Sample sequencing restrictions

4.3.7.1 It is the responsibility of the FOO student to discuss the dates for the assessment or repetition of the assessment with the training administration. The assessment date or repetition date should be coordinated with the instructor, student and training administration and should be scheduled at a minimum of *n* days prior to the event.

4.3.7.2 Remote interaction between a student FOO and the instructor can take place regardless of time or place, on the basis of the scheduled availability of the instructor on specific weekdays. Organizing remote interaction (RI) is the responsibility of the scheduled instructor.

4.3.7.3 Feedback to questions provided to the student should follow the agreed minimum response time.

4.3.7.4 The scheduling for OCC interaction should be arranged as soon as Training Phase 2 starts because of capacity and competency constraints of the aircraft operator providing this service.

4.3.7.5 Classroom training and assessment should be taken in the indicated order. Deviations from this plan should be coordinated on the basis of agreed planning and communication standards.

4.3.8 Training and assessment documentation

4.3.8.1 In the CBTA process, a training record is helpful to control the learning progress, but it is not important for competency development. The added value of a training record depends on the ability and motivation of the students for self-study. Training courses with a high percentage of self-study and individual remote instructor and student interaction do not require a detailed training report.

4.3.8.2 The report of learning progress could be automatically documented via the LMS. However, a training record should be applied if required by national or regional regulations and if a fixed number of training days needs to be performed and documented.

4.3.8.3 Table 4-5 shows a sample training record template based on sample training modules.

Table 4-5. Sample training record template

Module	*Date*	*Instructor's name & signature*	*Student's name & signature*
Introduction			
Human performance and limitations (HPL)			
Principles of flight (POF)			
Aircraft systems (TEC)			
Air law (LAW)			
Mass and balance (M&B)			
Meteorology (MET)			
Navigation (NAV)			
Operational procedures (OPR)			
Performance (PEF)			
Selection of aerodromes (SELA)			
Flight planning and monitoring (FPL & FM)			
OPS standards (OPSSTD)			
DOC, customer, network (COMCL)			

Chapter 5

WORKFLOW 3 — DEVELOP ASSESSMENT AND TRAINING STANDARDS AND MATERIALS

5.1 INTRODUCTION

5.1.1 Conventional task- and knowledge-based training generally focuses on isolated elements of knowledge or task performance. In a competency-based approach, shown in Figure 5-1, the goal is to place knowledge and its application as much as possible within meaningful contexts or authentic job- or role-related activities. The exercises in Phase 1 of a competency-based approach should follow this concept in order to prepare the trainee for task-related exercises in training Phase 2. Basic knowledge may be imparted by short explanations, self-study, self-assessment and the skills required to apply this knowledge on a basic level. Even at this stage, knowledge and skill assessment with resilience on multiple choice questions should be avoided in order to have a more valuable competence development. The objective is to focus on meaningful learning and understanding. Multiple choice or objective format tests may focus on the teaching and learning of test-taking strategies.

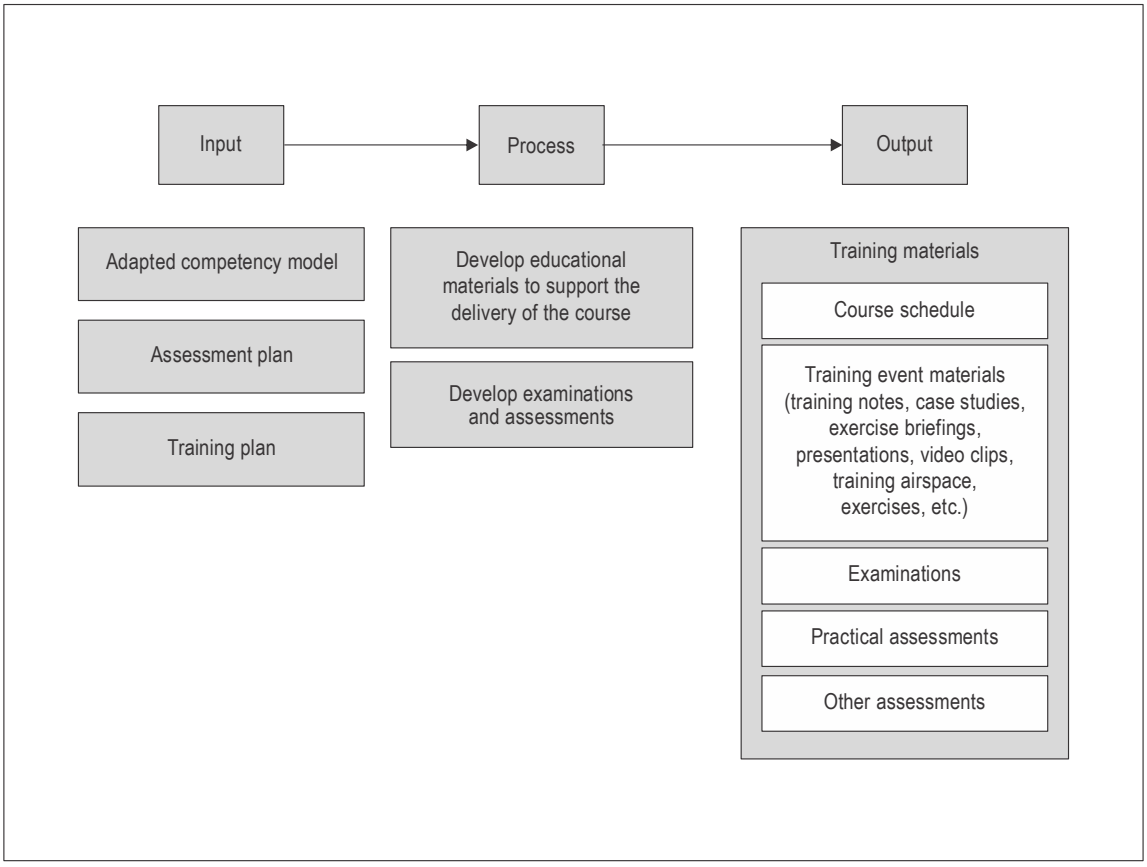

Figure 5-1. Workflow 3 — Develop assessment and training standards and materials

5.1.2 The competency-based approach involves a shift in thinking regarding learning and assessment. In contrast to the hard distinction between formative and summative evaluation encountered in traditional training, competency-based training strives to achieve continuous assessment and learning with exercises. The assessment should support the provision of individually tailored exercises to improve the learning process and transfer of competency. Assessments should not be eliminated and should be used to influence the selection of a training method that will drive decisions about the selection of subsequent exercises.

5.1.3 During the training process, each defined training module should be finished with a competency assessment for each student. The full FOO competence is achieved after passing the assessment of the last scheduled module. To assure a smooth transfer into the task-oriented training phase, it is recommended to repeat a basic knowledge check of all modules at the end of the course. The national or regional authority should monitor and audit the assessment process rather than assessing each individual student competence.

5.1.4 This format imposes a responsibility on the instructor who must be able to select, modify and create exercises that will drive the learning focus of the trainee at any given point in the training process.

5.2 TRAINEE PROGRESS MONITORING AND DOCUMENTATION

In order to select and implement appropriate exercises for the development and evaluation of competencies, instructors should be aware of the competency level of each trainee. This is important as students may interact with multiple instructors during process-oriented training. Preceding instructors should document the status of completed exercises for each trainee with detailed assessment results, comments and recommendations. This information should be available to all subsequent instructors and training coordinators via paper documentation or some form of electronic record keeping methodology such as a web-based LMS.

5.3 MINIMUM COMPETENCY LEVEL FOR TRAINING START

5.3.1 Training without a confirmed minimum competency level at the beginning of the training phase is ineffective. An entry-level test should provide information for an appropriate starting point for each individual student.

5.3.2 All duties in the context of operational control require a minimum analytical and problem solving competence, at a low failure rate and within an appropriate time. A job specification should specify a minimum set of skills and the expected attitude to have before the start of training. Candidates with insufficient general competencies should not be accepted as students. Without sufficient mental skills, students may not develop the appropriate competencies during a training and also throughout operational control duties, within the appropriate amount of time. When this is the case, the candidate could receive notification of preliminary education needs or specific remediation requirements before taking part in a training.

5.3.3 The entry-level test must address relevant basic knowledge and skills of:

a) general educational background and aptitude;

b) abstract and analytical thinking;

c) spatial and logical reasoning;

d) mathematics and physics;

e) English proficiency (other language if applicable), preferably ICAO level 4;

f) communication skills; and

g) general motivation and attitude.

5.3.4 The results of the test could be as follows:

a) acceptance into the FOO training course;

b) selection of appropriate remediation strategy and a repetition of the entry level test; and

c) non-acceptance into the FOO training course.

5.3.5 The initial competence evaluation of pre-qualified students with sufficient working experience, i.e. airline operations staff or pilots, can address more FOO-related target competencies. The approved training organization (ATO) can then offer individual schedules allowing for training shortcuts, but this cannot be done for assessments.

5.3.6 With different entry levels and flexible individual scheduling, the training and assessment process and the manner in which it is documented becomes more important.

5.3.7 CBTA allows individual support to identify and to apply the right training method for the trainee based on their competency assessments throughout the course.

5.3.8 After each module is completed, the ATO will perform a competency assessment. The ATO will release the student to the next module if they meet the competency targets. The student should repeat each training module as appropriate before taking the assessment.

5.4 ASSESSMENTS — TRAINING PHASE 1

5.4.1 Learning objectives (LOs) are to be used during Training Phase 1 to measure the level of knowledge, skill and attitude. The requirement for LOs is the acquisition of knowledge, but dialog-oriented assessments can help assess a broader understanding of technical context, evaluation of information and results while also assessing skills and attitudes such as communication and the attitude taken for problem solving. Multiple-choice tests should be avoided, as they are inadequate for competency assessment.

5.4.2 The objective is for students to communicate and interact with each other. During this interaction, soft skill-oriented observable behaviours could be assessed.

5.4.3 The following is a sample of a specific assessment during Training Phase 1. The basic condition is one assessment per training module, one assessor and two or three students. The example below has students preparing questions and then posing these to fellow students:

a) the students are informed about the assessment concept and the technical knowledge level provided in the form of Los, there should be no additional or hidden competency requirement added on short notice;

b) the preparation for each assessment is already an element of the training process;

c) each student should prepare questions, examples and small case studies including answers. The quality of the material will be graded in view of structure, presentation, context and the preparation of guidance material. The quality of the preparation is an indicator of individual attitude;

d) the level of technical knowledge and skills required to answer the questions is defined with the LO itself;

e) each student should assume, one after the other, the role of the student asking and the student responding;

f) the grading should be based on the quality of the communication and interaction during this question and answer session. Students should be graded individually;

g) the simplest elements are questions derived direct from learning objectives;

h) the student asking the questions will be graded by the quality of the questions, the elements used (see above), the style of the presentation and the ability to evaluate the quality of the answers from the student responding;

i) the grading of the student responding is based on their ability to abstract the information provided, develop it and adequately present a correct solution;

j) the assessor shall ask their own questions under the umbrella of the published LOs and cross check the results from the presentation or the LOs of other sections; and

k) the duration of the dialog-oriented assessment should be not less than 90 minutes per group.

5.4.4 Alternatively, another solution would be a combination of LOs to a story line, i.e. in a small case study. The development and the quality of a story line by the student would improve their grading status. Elements of a story line include:

a) asking to outline a solution;

b) transfer a specific result to another context;

c) initiate a discussion about pros and cons; and

d) provide good and structured feedback to the partner-student.

5.4.5 Additional written assessments could verify the student's knowledge of details. Since the interactive assessment described above depends on each student not sharing their questions and case studies with other students beforehand, a written element should be integrated based on the published LOs. If required, the LOs should be transformed into adequate questions. The sample list of LOs provided in Appendix A to this document could be used for basic knowledge checks. Basic conditions of a simple but effective written test may include:

a) one written assessment per training module;

b) in written tests more than one student can be assessed simultaneously;

c) the questions should be exactly according to the LOs and provided as open-ended questions, for example: "State the definition of ASDA";

d) an average duration for each LO or question should be defined and an expected total duration of each written Phase 1 module assessment should also be determined;

— duration sample: three minutes for each LO or question, not more than 90 minutes total duration per assessment. In this relation, 30 LO or open-ended questions should be applied;

e) the grading of open-ended answers should be indicated, for example: a maximum of four points per LO or question:

— each answer should be graded in relation to the maximum amount of points, i.e. four points if the answer is complete and fully within the expectation; three points if, for example, one important aspect is missing; two points if two items are missing and one point if the answer is far below the expectation. Zero points should be allocated if the answer is wrong or no answer was provided; and

f) the minimum pass mark should be defined.

5.4.6 Examples of prerequisite LOs or questions are:

a) State, in general terms, the intent of the ICAO aerodrome (AD) reference code (location indicator) as well as its composition (Annex 14 — *Aerodromes*, Volume I — *Aerodrome Design and Operations*); and

b) Define the following terms: accuracy, cyclic redundancy check, data quality, integrity of aeronautical data, light failure and lighting system reliability.

5.5 ASSESSMENTS — TRAINING PHASE 2

5.5.1 The selection of exercises considers relevant tasks, according to the training module and an adequate number and selection of observable behaviour markers from the adapted competency model. Each exercise meets the requirements of the task and permits the demonstration of observable behaviours during training and assessments. Competencies include the aforementioned conditions and criteria, which should be appropriate to the phase of training.

5.5.2 The competency development in relation to the number and the complexity of the selected exercises provides a sufficient overview for the planning of succeeding modules, lessons or exercises.

5.5.3 The competency behaviour observed during the completion of tasks indicates the readiness of the student for assessment. Students should be assigned to a module assessment based on behaviours observed by the instructor during classroom training or by checking uploaded solutions of exercises during self-study.

5.5.4 The concept, method and complexity of exercises and tasks used during the assessment should mirror those demonstrated during training. These exercises and tasks should also be equal to those of realistic FOO duties. Assessment methods outside this definition are generally unacceptable. Multiple-choice tests are not an acceptable method of competency assessment and must not be used. The student will typically put more effort into preparing for a dialogue-oriented assessment. Less effort is made towards an abstract test method, which does not reflect the training environment.

5.5.5 Each student should execute one written exercise individually. All written statements in this exercise could be graded independently or even summarized as passed or failed. The maximum duration of this individual exercise should be clearly defined.

5.5.6 Two or three students should execute an exercise simultaneously as a team task. The exercise should provide several options for a problem solving and decision making process. During this process, the attitude-related competencies could be observed, such as communication, teamwork and leadership, process improvement, situational awareness, problem solving and decision making. The exercise should simulate a realistic, operational control-related situation or problem.

5.5.7 The result of this group work and the quality of the written statement could be graded separately as passed, failed or summarized to one result for each student.

5.5.8 The assessor should ask additional questions, if appropriate. The maximum duration of this group work should be clearly defined.

Example exercise

5.5.9 Table 5-1 presents an extract from the flight operations officer task list (Appendix B refers). As an example, the exercise could integrate the following aspects:

> The student needs to identify the adequate airports during a bad weather situation at destination and surrounding alternates. AD reference codes, the core data of airports and their approach procedures should be checked during the application of airport certification requirements learned during Training Phase 1: “Accuracy, cyclic redundancy check, data quality, integrity of aeronautical data, light failure, lighting system reliability”.

Table 5-1. Extract from the flight operations officer task list

NOTAMs (NAVAIDS, airport facilities)	Extract NOTAMs for all airports relevant to the operation (departure, destination, en-route and destination alternates).
	Evaluate NOTAMs, i.e. NAVAIDS and procedures, adequate RWY, handling facilities, AD opening hours and assess potential risks for the suitability.
Potential risks of given delays in relation to the actual risks and consequences based on MET, ATM and AIP standards, policies, data and SOPs.	Given conditions of airport infrastructure (RWY, TWYs, apron) against the published status from AIP and NOTAMs.
	Define an appropriate method of data collection and analysis.

5.5.10 In view of the infrastructure availability and realistic operational consequences, the application of sample NOTAMs could offer data conflicts to be handled by the student. The weather forecast should be decoded and applied in relation to the standard procedures used during training. After the decision regarding suitable airports is made (including a discussion about all pros and cons) within the assessment team, the requirements for operator-related NOTAM and data handling processes could be evaluated. The student should describe realistic risks caused by incomplete or incorrect data flow or data handling for the following processes affecting the OCC team, flight crew, handling provider, ops engineering and others as appropriate.

5.5.11 Material provided for this exercise includes:

a) the description of a flight situation: point of departure and destination, schedule, aircraft type, load and fuel information;

b) sample weather information and forecasts;

c) sample NOTAMs;

d) Flight Operations Manual for operator-related SOPs;

e) Aircraft Operation Manual, including MEL and performance data;

f) route documentation, charts, landing minima, airport core or standard data; and

g) Annex 14 — *Aerodromes* and the *Manual on Certification of Aerodromes* (Doc 9774), if applicable.

5.5.12 The format or the tools used for the provision of data, procedures and information should be independent from specific operator-related procedures, tools and interfaces. The provision should be as simple as possible, since during Training Phase 2, the focus must be on the identification of relevant information, the ability of the FOO to ask the right questions and the application of data according to standard procedures based on national or regional standards and regulations.

5.6 ASSESSMENT RECORD

5.6.1 In remote interaction and self-study programs, the assessment should be allocated on the basis of the individual student competence development. As described in the training and assessment standards, the purpose of the assessment is to identify competency gaps to support the training process. Each training module should be assessed separately.

5.6.2 Table 5-2 presents a detailed sample competency check sheet which is used to:

a) identify the training module assessed;

b) select and mark the observable behaviour items to be evaluated during the assessment; and

c) identify the task, sub-task or exercise used during the assessment.

Table 5-2. Sample competency check sheet

Student name	*Assessor name*	*Date/time*	*ATO*

Mark the training module assessed: HPL, POF, TEC, LAW, M&B, MET, NAV, OPR, PEF, PEFLS, PEFHS, SELA, FPL&FM, OPSSTD, COMCL

Competency	*Mark the selected competency observable behaviours for assessment*		*Passed yes/no*	*Selected task or exercise (Reference/ID) for assessment*
Application of procedures and regulations *Identifies and applies procedures in accordance with operating instructions and applicable regulations.*		Interprets SOPs appropriately and uses flexibility included in these where necessary		
		Identifies and follows all operating instructions in a timely manner		
		Complies with applicable regulations and procedures		
Technical expertise *Applies and improves individual technical knowledge and skills*		Retrieves the applicable data and operating procedures		
		Explains the intent of the applicable procedure for a given context		
		Considers factors of influence to make optimum decisions in operations control using accurate and appropriate operational information (meteorological, airports, crew, aircraft, network, general)		
		Uses standard and non-standard information distribution systems and sources		
		Keeps up to date on technical knowledge and skills		
Process improvement *Contributes to the continuous improvement of the system*		Consistently provides appropriate guidance to stakeholders and colleagues on how to implement procedures		
		Analyses evidence to identify opportunities for process improvement		
		Proposes process improvements for approval or adoption by management		
		Provides suitable justification for proposed improvements		
		Recognizes trends in practice of one’s own technical area and anticipates changes		

Competency	*Mark the selected competency observable behaviours for assessment*		*Passed yes/no*	*Selected task or exercise (Reference/ID) for assessment*
Communication *Communicates through appropriate means in normal and non-normal 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 Provides clear and concise answers to technical questions and 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		
		Correctly interprets required company and flight documentation		
		Accurately interprets and responds to communication in English		
Situational awareness *Perceives and comprehends all of the relevant information available and anticipates what could happen that may affect the operation*		Identifies and assesses risks and consequences arising from complex operational situations		
		Assesses the available resources (infrastructure, IT-systems, personnel) and adjusts the operation in response to changes		
		Identifies and assesses the status of the operation (technical status of aircraft, weather conditions, NOTAMs, industrial action etc.)		
		Monitors current operations to anticipate and resolve emerging issues		
		Develops contingency plans sufficiently in advance of an identifiable threat or risk		
		Identifies and manages threats to the safety of operations		

Competency	*Mark the selected competency observable behaviours for assessment*		*Passed yes/no*	*Selected task or exercise (Reference/ID) for assessment*
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		
		Maintains self-control in all situations Offers and accepts assistance, delegates when necessary		
		Anticipates and recognizes overload and asks for help early		
		Reviews, monitors and cross-checks actions		
		Verifies that essential tasks are completed with the expected outcome		
		Manages and recovers from interruptions, distractions and failures		
		Maintains mental and physical fitness required to perform the role safely		
Problem solving and decision making *Accurately identifies risks and resolves problems. Uses appropriate decision-making techniques*		Distinguishes between irrelevant and relevant data required for the analysis of operational situations		
		Abstracts and applies the correct information, relations, coefficients, etc.		
		Makes appropriate decisions when confronted with conflicting, unexpected or incomplete information		
		Adapts decision making to available time		
		Evaluates options in view of safety, costs and operational stability		
		Works through options and defines the limiting deadlines Uses appropriate decision-making processes and tools		
		Evaluates own decision making to improve performance		

Competency	*Mark the selected competency observable behaviours for assessment*		*Passed yes/no*	*Selected task or exercise (Reference/ID) for assessment*
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 goals and positive results*		Manages professional relationships with appropriate role boundaries		
		Gains the trust and confidence of others		
		Inspires others to collaborate and strive towards excellence Addresses and resolves conflicts and disagreements in a constructive manner		
		Admits mistakes and takes responsibility		
		Identifies and provides relevant information and solutions to others		
		Provides and seeks effective and constructive feedback		

Note.— It might be helpful to create specific competency check sheets for each specific training and assessment module to shorten the list of adequate observable behaviour items.

5.6.3 During the CBTA process, the ATO should list all assessments with the respective recommendations. This overview should be available for the training organization, the instructor, the assessor and the student. The learning platform used for communication and message exchange should be used to document the learning progress as well as the assessment results.

5.6.4 The assessor should describe any corrective actions required to bring the student closer to the target competency. This description should be presented in free text or in any other adequate form.

5.6.5 A simple CBTA *level reached* indicator (yes/no) should be sufficient, combined with the suggestion which describes the individual recommendation on how to continue the training. Even where the record shows that the CBTA level has been reached, there should also be recommendations included. Information in percentages or points could be used to provide additional information.

5.6.6 All documentation should be as simple and clear as possible to support the training process. Table 5-3 provides an example format for recording this information.

Table 5-3. Sample assessment record form

Module	*Assessor name*	*CBTA level reached*		*Recommendations*
		yes	*no*	
HPL				
POF				
TEC				
LAW				
M&B				
MET				
NAV				
OPR				
PEF				
PFLS				
PEFHS				
SELA				
FPL&FM				
OPSSTD				
COMCL				

5.6.7 A clear assessment failure policy provides clarification about the consequences in the case of failed competency assessments and defines procedures for the implementation of solutions and an adjusted training plan.

Example of FOO competency assessment failure policy

5.6.8 If after three assessments of the same training module the student competency is still inadequate, the FOO chief instructor must initiate a structured solution process to identify an adequate course of action. The participants during this assessment are:

a) the FOO chief instructor or head of FOO training;

b) the instructor involved in the affected training module; and

c) the student.

Discussion should include the following aspects:

i) the root causes of the inadequate competency progress;

ii) identification of a lack of self-awareness and/or a lack of motivation and proper attitude of the student;

iii) identification of adequate measures to improve the motivation and attitude of the student;

iv) identification of inadequate training methods or material;

v) identification of additional and/or alternative training methods; and

vi) decision and documentation about further action by the FOO chief instructor.

The possible outcomes of this review could be:

1) additional training and assessment; or

2) an immediate exclusion of the student from further FOO training activities.

5.7 MANAGEMENT STANDARDS

5.7.1 The ATO needs to identify the basic duties, responsibilities, accountabilities and management standards in the Organization Management Manual or equivalent document.

5.7.2 The material, instructor, training and assessment standards should be described in a training manual.

5.7.3 These training and management standards are required regardless of the size of the organization, as all training organizations need to define certain standards.

5.7.4 The CBTA programme delivered by the ATO should meet the specific requirements as set out in the National Aviation Law (if applicable), the relevant Standards in Annex 1 — *Personnel Licensing*, Annex 6 — *Operation of Aircraft*, specifically in the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868), and in this document.

5.7.5 The standards described in an organization management manual should be comprised of or cover at least the following:

a) a description of the organization: commitment, policies, objectives, reporting and requirements;

b) documentation standards;

c) management system: duties, responsibilities and processes;

d) compliance monitoring program;

e) safety management;

f) contracted activities;

g) customer relation; and

h) a general section: glossary and revision.

5.7.6 The basic duties, responsibilities and accountabilities of the management roles are described below. Typically, in a larger organization, each management role would be allocated to an individual. If acceptable by the State of the ATO, more than one role could be allocated to each individual: in the extreme case all roles may be handled by only one such individual.

Head of FOO Training, accountable manager

5.7.7 The Head of FOO Training is a nominated person who ensures that the ATO remains in compliance with the applicable requirements for the FOO qualification. The Head of FOO Training should report directly to the Head of ATO Training (if applicable and if more than one training course is managed within the ATO) and is responsible to coordinate training activities and supervise the training progress of each student of the FOO training course. The Head of FOO Training should be a holder of a FOO licence or certificate and have experience as an instructor for the training of staff in operational control duties, for example flight dispatcher and operations controller.

5.7.8 The Head of FOO Training collaborates on the planned objectives of the management system and complies with the quality and safety policy of the ATO.

5.7.9 Due to the complexity of the offered training courses, and if applicable, the FOO Chief Instructor supports the Head of FOO Training.

5.7.10 It is the responsibility of the Head of FOO Training to describe standard procedures. The list of standard procedures should be provided to all students and ATO personnel by suitable means, for example on a communication and learning management system (LMS). This list should include the following standard procedures:

a) instructor requirements, selection, qualification and standardization;

b) tasks and material standards;

c) student administration, booking and scheduling;

d) administration, feedback, reporting; and

e) instructor and student interaction and communication standards.

5.7.11 The Head of FOO Training at the ATO must ensure that the results of regular instructor standardization meetings are transferred to the State of the ATO. The State should organize a national or regional actualization and standardization of the task list and prerequisite learning objectives.

Note 1.— The State of the ATO defines technical and regulatory standards and requirements for FOO qualification.

Note 2.— The aircraft operator (AOC holder within the same region or State) defines training objectives and tasks for the role and operator specific level.

5.7.12 The Head of FOO Training should represent the specific ATO in the process of task, data and information transfer from the AOC holders to the ATO, under supervision and oversight of the State of the ATO. All ATOs and all AOC holders within one State or region should participate in this process.

5.7.13 The Head of FOO Training must ensure that all regulatory requirements, training objectives and tasks are available from the AOC holders in the same region or State.

5.7.14 The Head of FOO Training is responsible for the definition and documentation of processes and procedures of the FOO training and assessment standards.

FOO Chief Instructor

5.7.15 The FOO Chief Instructor coordinates the instructor and training standardization activities of the CBTA for FOOs at the ATO. They should possess a national or regional FOO licence or certificate and have experience as an instructor for the training of professional FOOs.

5.7.16 For the FOO basic training and customized refresher or recurrent training, the FOO Chief Instructor should nominate a project-related FOO Training Coordinator as a contact person from the ATO, according to the customer specific contract.

5.7.17 The FOO Chief Instructor is responsible to ensure that actual operational standards and policies derived from the national or regional CBTA targets and framework improvement, under oversight of the State of the ATO, are integrated in the training and assessment process accordingly.

FOO Training Coordinator, ATO and AOC (air operator certificate)

5.7.18 The FOO Chief instructor should nominate an FOO Training Coordinator for each specific training event.

5.7.19 The FOO Training Coordinator should possess an FOO licence or certificate and have experience as an instructor for the training of personnel in operational control duties.

5.7.20 The ATO should establish contact with the customers FOO Training Coordinator (the training coordinator in the AOC holder).

5.7.21 The FOO Training Coordinator nominated by each AOC holder (as a stakeholder in the CBTA improvement process) should deliver operational details resulting from abnormal situations, incidents and accidents, general data, information and specific policies required for FOO training, to the FOO Training Coordinator and ATO.

Safety Manager

5.7.22 The Safety Manager acts as the focal point and is responsible for the development, administration and maintenance of an effective safety management system (SMS).

5.7.23 The Safety Manager facilitates hazard identification, risk analysis and management, and monitors the implementation of actions taken to mitigate risks. They maintain safety management documentation, ensure that safety management training is available and that it meets acceptable standards.

5.7.24 The Safety Manager should also provide periodic reports on safety performance, advice on safety matters and ensure initiation and follow-up of internal occurrences and accident investigations.

Compliance Monitoring Manager

5.7.25 The Compliance Monitoring Manager ensures that the activities of the organization are monitored for compliance with the applicable regulatory requirements, along with any additional requirements as established by the organization. They ensure that these activities are being carried out properly under the supervision of the relevant head of the respective functional area.

5.7.26 The Compliance Monitoring Manager must ensure that the compliance monitoring programme is properly implemented, maintained and continually reviewed and improved. They should perform internal audits and inspections to verify this. One or more auditors may be appointed to assist with this role, by choosing personnel having the related competences either from within or outside the organization, assuring their independence.

5.7.27 The Compliance Monitoring Manager should have direct access to the Accountable Manager, as well as access to all parts of the organization, and as necessary, any contracted organization.

5.7.28 They should be able to demonstrate relevant knowledge, background and appropriate experience related to the activities of the organization, including knowledge and experience in compliance monitoring.

5.8 INSTRUCTOR STANDARDS

5.8.1 Overview

5.8.1.1 Instructor selection, qualification and standardization protocols must be defined according to the ATO training standards described in training manuals or the organization management manual. CBTA requires competent instructors with experience in operational control and high competencies (according to the competency framework).

5.8.1.2 The followings general requirements must be fulfilled by CBTA instructors:

a) strong knowledge, skills and attitude in relation to operational control tasks;

b) abstract operational situations and experiences into tasks and exercises;

c) combine tasks and prerequisite learning objectives into learning concepts;

d) combine tasks and sub-tasks in a wider context, i.e. as a case study;

e) define targets of case studies and the priority and sequence of tasks and sub-tasks;

f) design the material for tasks and case studies using different tools (digital platforms, software, regulations, SOPs, data);

g) identify the right approach for individual students (based on competency gaps);

h) assess the results of trainees' performance;

i) identify the right training method for individual trainees based on competency gaps;

j) provide an adequate form of feedback;

k) self-assess during training;

l) appropriate attitude and motivation to develop own knowledge and skills;

m) identify and understand the role and responsibility of the instructor, trainee and other stakeholders;

n) manage conflicts between instructors and trainees and within the group of trainees;

o) experience in prioritizing operational tasks, time-management, problem solving and decision making; and

p) apply different training methods based on different operator-specific standards and regulations.

5.8.1.3 Specific requirements for human performance and limitations (HPL) and/or advanced dispatch resource management (DRM)

a) create communication standards;

b) manage conflicts;

c) apply HPL/DRM concepts;

d) use team synergy;

e) lead the training focusing on error management;

f) lead the training focusing on decision making;

g) specify requirements for HPL/DRM concepts;

h) identify and apply the theory of human factors;

i) demonstrate training need analysis in relation to human factors;

j) identify adequate competency behaviour markers for the development of human factor-related competencies;

k) create exercises to meet the training requirements related to human factors;

l) transfer and explain the concept to the DRM instructor; and

m) handle intercultural topics.

5.8.1.4 To cope with the intercultural issues, a CBTA instructor must also be aware of the following relevant risk drivers in the training process:

a) understand cultural factors and backgrounds for potential conflicts;

b) verify conflicts through adequate communication;

c) identify the right level of information flow and the complexity level of exercises;

d) transfer the verified conflicts into solutions; and

e) apply an adequate behavioural action.

5.8.2 Example CBTA instructor selection process

5.8.2.1 The following outlines a typical selection process applicable to instructors for an FOO CBTA training course.

5.8.2.2 *Curriculum vitae and application letter.* Assessed by the ATO.

5.8.2.3 *Telephone interview.* During this phase, the instructor requirements and the CBTA concept should be discussed in view of competencies, training capacity, flexibility, qualification development and contract-related aspects.

5.8.2.4 *Personal interview.* After passing the telephone interview, this should be conducted to check FOO knowledge and skills by completion of tasks and case studies. The purpose is to check how the candidate handles given questions and exercises proficiently.

5.8.2.5 *Scenario.* A training scenario administered by the ATO would require the candidate to prepare and deliver a brief training presentation covering motivation of the students, an explanation of the lesson target, the engagement of the students and a competency assessment. The ATO should explain the conditions for the proposed tack, as required, including the material, the media, the time frame, the condition of the target group and the duration.

5.8.2.5.1 The ATO should recognize the limit of the candidate's competency to check self-confidence and the ability to accept limits. The candidate should identify areas for development and consider methods to close any competency gaps. Spontaneously, the candidate should demonstrate the ability to explain a certain context based on any given case study.

5.8.2.6 *Instruction session.* By providing a short lecture, the candidate should demonstrate a task in the form of an exercise from Training Phase 2. The duration should be 30 to 60 minutes. This exercise should include the general lesson target, a briefing of the situation, a description of the problem, a question or objective, the provision of data and the SOPs and policies required to handle this task. The evaluator should take the role as trainee and evaluate the effect of the selected training method used, the communication, the level of interaction, the provision of motivation and the flexibility. The candidate can select any training method for the task, as long as the following aspects are demonstrated:

a) student motivation;

b) training flow and adequate speed;

c) competency targets;

d) structured process;

e) individual interaction with the students;

f) response to questions; and

g) remain focused even after disruptions.

5.8.2.7 The candidate should be informed of the assumed competency status of the "students", for example, their completion of Training Phase 1 with all necessary basic knowledge, but with low application skills.

5.8.3 Instructor training

After accepting the instructor candidate, the instructor training should combine the theories of teaching and methodology, since human factors (soft skills) are the major objective in this instructor qualification. In parallel, individual technical training should cover gaps in technical competencies as required. Typical contents of the instructor training are shown in Table 5-4.

Table 5-4. Typical instructor training syllabus

Topic	*Details*
Introduction to training process	Dimensions of social skills
Instructor and student tasks and development	General tasks Motivation Behaviour and attitude
Function and responsibility	Understands: – function and responsibility; – interpretations from others; – rules and procedures; and – how to identify conflicts.
Teaching and learning	Learning objectives Definition of content Selection of teaching methodology Performance checks
Coaching	Student motivation Conflict management Basics of structured discussion Feedback rules
Case study	How to convey the given topics including capture of the requirements, operational risks with the solutions.

Topic	*Details*
Role as instructor, mentor, assessor and training partner	Definitions to distinguish the different roles Risks if roles are unclear Setting of own expectations in each role, communication of expectations to the student Definition of new exercises for training and assessment Structured identification of own and student competency gaps Definition and monitoring of attitude
Teams and their roles	Definition of team work and team dynamics Phases of cooperation Conflicts in team work Criteria of a high performance team
Objectives	What is the goal and how to explain it
Learning and learning objectives	Learning techniques: deductive and inductive learning, learning rules, amplifier, promotional factors.
	Development of appropriate competency assessment.
Motivation	Fundamentals of motivation and avoidance of demotivation Capturing of factors, negotiation with disinterest and excessive demand Dealing with negative attitudes
Leadership	Organizational leadership and situational leadership Self-assessment matrix Use of management tools: motivation, recognition, support, delegation, control, criticism and feedback talks, sustainability in agreements
Conflicts	Advantages and disadvantages of conflict resolution strategies Compromise, cooperation
Video training	Conducting conversations and training units with difficult counterparts
Communication and feedback	Concise, simplicity, structure, stimulation, active listening, theory and practice, feedback, error, conditions, constructive feedback, order effects

Topic	*Details*
Decisions	What decisions must one make as an FOO Instructor? Decision models, measures and decision flow: facts, options, risks, benefits, decision, check Sustainability, fault management, checklists, exercise
45 minutes, 8 units per day	
3 days	

5.8.4 Familiarization and ongoing standardization process

5.8.4.1 An organized familiarization phase should prepare a new instructor for their training duties. This phase comprises trainer participation in on-going courses, the development of exercises and the handling of standard procedures.

5.8.4.2 The standardization of new and active instructors should be a regular and ongoing process to allow for an exchange of experience, with essential factors of influence on the training result. Feedback from students and instructors is required to improve the quality of the training and to optimize the training flow.

5.8.4.3 Certain factors of influence may include:

a) evidence-based training (EBT): transfer operational evidence into the training development, realistic and adequate operational situations and scenarios shall be presented to update the training methods;

b) materials used: the transfer of relevant operational materials and data into the training development. Actual standard procedure and actual data must be integrated into the development of training material and exercises;

c) human factors: the transfer of experiences from the relationship of instructors to trainees (human factors). The risk factors during the interaction of instructor and trainees in relation to the complexity of tasks, the selected training and assessment method;

d) communication system: the function, applicability and standardization of technical communication tools (chat, e-mail, telephone) and the degree of instructor flexibility;

e) trainee support: the availability and scheduling of sufficient and regular instructor capacity for training content related to trainee support in web-lessons and individual question and answer;

f) training administration: the availability of the training organization for administrative and scheduling related questions from instructors and trainees. Information about revised regulations and procedures by the training management;

g) trainee representation and feedback: discussing feedback from trainee representatives and the feedback tools used in the training programme and schedule, the training methods and material and the quality of the trainee support. The transfer of lessons learned for the improvement of the training organization; and

h) Learning management system: the standards and procedures for the LMS in view of the integration of new or updated content, user administration, user interface and technical aspects;

i) training flow and scheduling: adjusting the sequence of modules and the content of exercises and case studies and scheduling modules and instructors to optimize the training flow;

ii) assessment standards: the interval, methods, material, data and tools used during the assessment of trainee competence in relation to the trainee competence level and the training progress; and

iii) documentation standards: the interval, method and tools used to document the trainee competency progress, the feedback from trainees, using LMS content and the individual trainee attendance in modules, case studies and exercises.

5.9 TASK AND MATERIAL STANDARDS

5.9.1 According to the ATO training manual and the organization management manual (if applicable), the material required for FOO basic training will be stored, distributed and allocated according to established and documented procedures. Any material must be relevant, realistic and suitable for the intended competency level. Cooperation between the ATO and aircraft operator would facilitate the exchange of information to update the training tasks and the material to be used.

5.9.2 If an aircraft operator provides an internal basic FOO training, a good solution could be to integrate elements of the operator- and role-related (Phase 3) training in Training Phase 2. In this case the IT applications for specific roles, for example flight dispatcher, could be used during Phase 2. Focus should remain on the analytical component during basic training. This important basic competence development becomes more difficult if an interface, such as a flight planning tool, provides a wide range of relevant and irrelevant data and information.

5.9.3 If an independent training organization provides the basic FOO training, it is unrealistic to plan to use sophisticated applications (IT tools) during the FOO basic training. Independent training organizations should evaluate the options for basic level application as provided on applications such as Class 1 EFBs. However, independent ATOs should organize the transfer of realistic tasks, training criteria, valid standard procedures, route documentation, data and other information by a regular and structured process. The responsibility for this update process should be described in the organization management manual.

5.9.4 The nominated FOO Training Coordinator from the ATO (as described in an organization's management manual) should establish contact with the FOO Training Coordinator from the AOC holder as per their agreement (as described in an organization's management manual).

5.9.5 The actual material should include relevant manuals based on the results from the training needs analysis (Chapter 1 refers), delivered by the contracted aircraft operator training coordinator, and monitored and checked by the nominated FOO Training Coordinator from the ATO. Such documentation should include, but is not limited to:

a) Flight Operations Manual (FOM, OM-A);

b) Aircraft Operation Manual (AOM, OM-B) of relevant types;

c) route documentation (OM-C, charts and aeronautical data), i.e. selected airports, decoding and abbreviations, route descriptions and charts;

d) training manual (OM-D) including FOO training and assessment requirements;

e) customer data, i.e. city pairs, standard direct operating costs, AOC approvals, passenger and aircraft handling standards, standard costs of delay, product information;

f) definition of the target group, their functions and tasks;

g) selection or definition of competency behaviour markers per target group;

h) evident operational criteria, i.e. abnormal situations, incidents and accidents;

i) specific target competence criteria, as per the standard competency framework or as per regional or national requirements; and

j) agreement of the assessment standards and failure policy.

5.9.6 Exercises should be based on the above data and information. If the contracted AOC holder does not provide detailed tasks, the FOO Training Coordinator from the ATO should select appropriate tasks from Appendix B to this document.

5.9.7 The FOO Training Coordinator from the ATO is responsible to ensure that only actual data provided by the FOO Training Coordinator from the AOC holder are used during the training.

5.9.8 The FOO Training Coordinator from the AOC holder is responsible to ensure that all relevant material and data updates are provided.

5.10 COMMUNICATION STANDARDS

Every student should receive the following documents and data before training starts:

a) a copy of the ATO training manual;

b) description of the training phases and modules;

c) course schedule;

d) training record including all check forms;

e) documents, manuals, data and information required for training;

f) training standards and the failure policy;

g) access to material, exercises, web based training and other data, i.e. by an online LMS;

h) contact information: e-mail address and/or telephone number of instructor, administration and help desk if applicable;

i) technical standards and an introduction to the communication platform, if applicable;

j) standards and rules for instructor response time; and

k) standards and rules for student feedback.

5.11 QUALITY CONTROL, COMPLIANCE MONITORING AND ADMINISTRATION

5.11.1 An organization and management manual describes the responsibilities for the functions and duties required to organize training and assessments. A description of standard procedures, as standard operating procedures outside the ATO manuals, helps to simplify update processes.

5.11.2 The following typical standard procedures should be described:

a) student and instructor feedback, documentation, reporting and corrective actions taken;

b) EBT and its integration into exercises;

c) responsibility of stakeholders: operator for competency targets, training organization for training method, State if the ATO for oversight;

d) communication and standardization procedures for the transfer of updated manuals and information into the CBTA process;

e) training and assessment documentation;

f) transfer of assessment results to the training plan and scheduling;

g) course scheduling, instructor scheduling, provision of material and data;

h) document storage and update management;

i) data storage and data security;

j) accounting and reporting;

k) instructor and student data monitoring and administration;

l) instructor qualification and standardization;

m) student administration;

n) LMS standards;

o) certificate issuance;

p) communication with the State of the ATO during training progress, if applicable;

q) infrastructural standards and rules;

r) handling of classroom installation and equipment;

s) application and IT hardware administration, update and handling; and

t) user helpdesk for applications, IT hardware and other infrastructure.

Chapter 6

WORKFLOW 4 — CONDUCT THE COURSE

6.1 STUDENT SELECTION AND INTEGRATION

6.1.1 Applicable pre-entry competencies based on experience in the operational control environment or from qualification in similar areas such as pilot, ATCO or flight operations assistance, could be accepted as a qualification credit.

6.1.2 It is difficult to transfer results from traditional training courses (i.e. pilots) to the FOO competency targets. To avoid any misinterpretation, all applicants with an acceptable pre-qualification should pass all assessments during the FOO training.

6.1.3 The ATO can evaluate the student competence before training start and allow credits for the training effort. Credits for assessments are not recommended, otherwise the competence development would be uncontrolled and possible competency gaps may go unidentified, as shown in Figure 6-1.

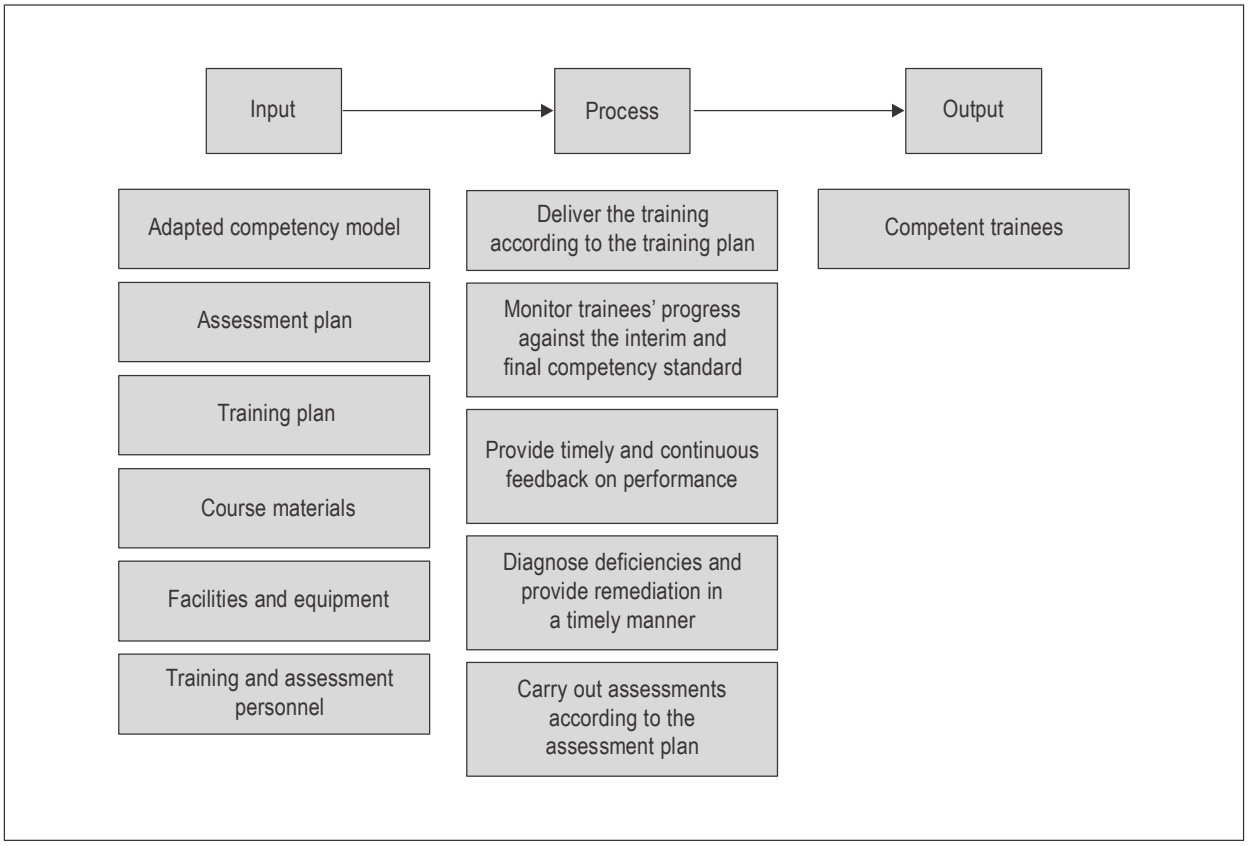

Figure 6-1. Workflow 4 — Conduct the course in accordance with the training and assessment plans

6.1.4 The number of training events depend on the recommendation from the initial competency assessment. To guarantee a controlled competency development, the number of assessments should remain unchanged, even in the case of a reduction in training events. Additional training requirements should be defined on the basis of competency gaps identified during the assessment. The ATO should adjust the individual training and assessment plan accordingly. In any case, the training organization and not the student is responsible to allocate minimum training events to assure the defined FOO competency targets.

6.2 SUPERVISION, INSPECTION AND SUPPORT

6.2.1 The State of the ATO should supervise and inspect the training and assessment process within the State. As part of an ATO, inspectors should be granted access to the LMS, providing actual status information of:

a) process descriptions;

b) definition of responsibilities and the allocation to individuals, i.e. FOO Chief Instructor, Head of Training;

c) actual scheduling of information, names and the status of individual participants;

d) information about scheduled assessments, time and location and the ability to participate with or without pre-notification during student assessments; and

e) inspection of the administration and documentation process.

6.2.2 The targets of the inspections are:

a) during assessment participation, the inspector should assess the preparation of the assessment, the structure and performance of the process and the applied procedures;

b) the quality of the feedback provided to the students after assessment and the documentation of the results;

c) the inspector should not assess the individual student competency; and

d) the inspector assesses the competency of the training and assessment standards of the ATO.

6.2.3 During the development of CBTA standards, the State of the ATO should provide support to the AOCs of one region or State for the definition of training objectives and targets and the harmonization of standards.

6.2.4 The State of the ATO should monitor the communication and interaction processes within the group of AOC holders and the transfer of training and objectives or targets to training providers. This transfer could alleviate any misunderstanding in the interpretation of tasks and observable behaviour markers, and decrease the risk of inadequate or outdated training results.

6.2.5 Working groups for the definition of prerequisites such as learning objectives and general competency level for training entries should be established. The participants in such a working group should come from AOCs, ATOs, FOO and flight dispatcher associations and the NCAA. The working group should discuss and define prerequisites such as learning objectives, general competency levels for training entry and specific training method requirements. Without the definition of training and competency prerequisites, task-oriented training becomes difficult.

6.2.6 The investment in the descriptions of training requirements and competency targets reduces the effort required to organize and to conduct training and assessments. If the targets are clear, the instructor and the students are sure about the expectations and the training organization can develop and select the adequate training and assessment method.

6.2.7 Appropriate training methods include a fixed scheduled classroom training or a flexible hybrid concept with elements of classroom training, self-study and remote interactions.

———————————

Chapter 7

WORKFLOW 5 — EVALUATE THE COURSE

7.1 INTRODUCTION

At the end of a period of training, feedback for on-the-job performance from trainees, instructors, assessors and employers is gathered to determine the effectiveness of the course in 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 to the course. Figure 7-1 illustrates the process of evaluating a course.

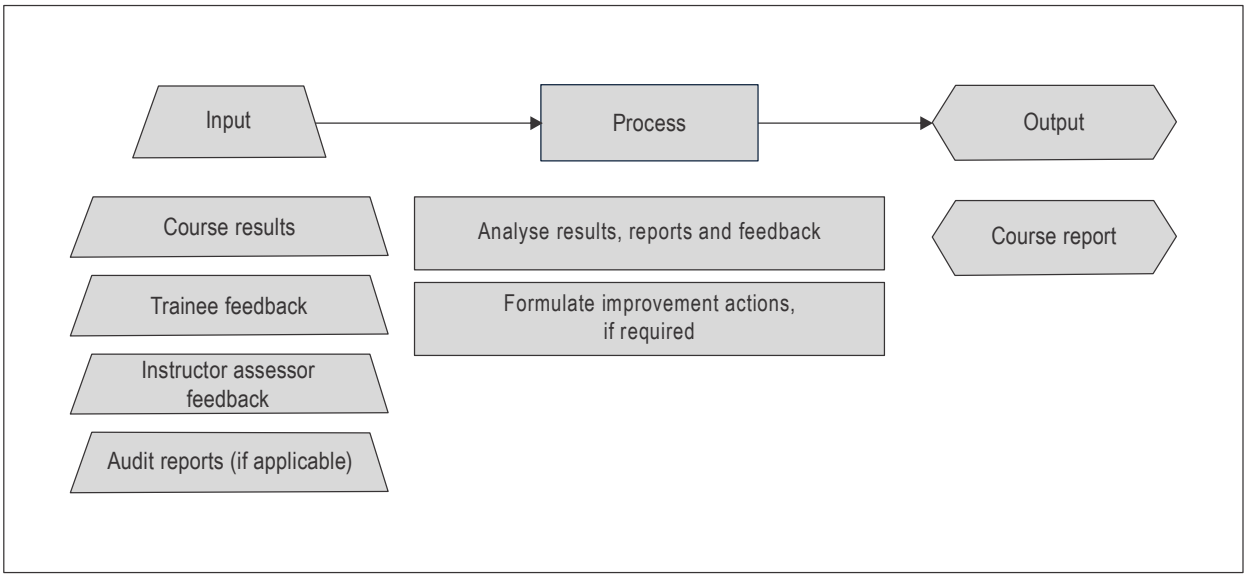

Figure 7-1. Evaluate the course

7.2 EVALUATION PROCESS

7.2.1 The evaluation process should be integrated into the process of standardization. As shown in Figure 7-1, results from previous courses, student feedback, instructor feedback and reports of any audits (if conducted) should be used to refine the course and improve the required outcomes.

7.2.2 The following should be considered when reviewing the course:

a) selection and integration of tasks and learning objectives and operational criteria;

b) selection of criteria for the entry level test;

c) training and assessment planning criteria and the transfer of tasks into exercises;

d) communication and documentation standards;

e) material, infrastructure and equipment standards;

f) instructor standards and qualifications;

g) student grading and corrective actions;

h) safety issues and mitigations, incident report evaluations; and

i) violation reports, non-compliance with rules and regulations, evaluation of mitigations.

7.3 EVIDENCE-BASED TRAINING, DEFINITION AND UPDATE OF TRAINING TARGETS

7.3.1 The aircraft operators are responsible for the description of realistic training targets, based on actual and relevant operational risks and other criteria observed during the operation of aircraft. Results from the safety management system (SMS) gap analysis should also be reflected in the definition or through an adjustment of the training targets. Non punitive policies that encourage the open reporting of safety issues are crucial to an effective SMS in operational control processes.

7.3.2 Training processes should close the competency gap between the training targets and the required competence of the OCC personnel responsible for operational control. It would be advantageous to evaluate the actual individual competency level regularly using a structured process.

7.3.3 The requirements for competency evaluations and gap analysis include:

a) non-punitive policies are in place;

b) the documentation of the average competency of a specific OCC target group is measured, not the individual OCC team member;

c) the assessors should be selected and standardized on the basis of the same or at least similar CBTA processes;

d) the typical performer in the OCC, who is able to monitor and analyse impartially without emotional influence, should be selected for evaluation, rather than the highest performing individual;

e) additional standards for non-punitive measurement and reporting should be applied during qualification and standardization;

f) the assessors must be acceptable for the majority of the involved and observed staff;

g) the assessors should keep the individual results strictly confidential;

h) the assessment method should be selected according to the requirement for the OCC position or role to be observed. The assessment should include the observation of specific behaviour marker together with process handling and technical results;

i) technical results derived from key performance indicators should be defined, for example the number of information investigations, quality and density of information flow, situational awareness, speed of decision making, deviations from SOPs, etc.; and

j) open information to the OCC staff on the targets, advantages and risks of a non-punitive competency gap analysis.

7.3.4 Following such a review of competency and gap analysis, subsequent actions might include:

a) initiation of a change management process, potentially supported by the OCC external provider, such as another area of the aircraft operator, or even from a fully external provider;

b) selection of the target group, selection of key performance indicators (KPIs) to be delivered, selection of the assessment method to provide the requested KPIs, selection of the assessor requirements;

c) selection of the methods for documentation and reporting; and

d) selection of assessors, training and standardization.

7.3.5 The assessment should result in a list of observed behaviours within a context of specific conditions and situations, while reflecting a majority of KPIs. For example:

> Thirty per cent of the operations controllers could not evaluate a critical weather situation and the potential influence on the network within an adequate time (i.e. 2 minutes). From this group, 33 per cent of the operations controllers were aware of the situation but unable to decode the information or data and unable to find the applicable standard procedure or rule required for problem solving and decision making.
>
> Sixty-six per cent of this group were unable to demonstrate the situational awareness required to initiate the risk evaluation process.

7.3.6 Based on the example above, the tasks and observable behaviour markers could be defined for the subsequent (recurrent) training program and a team of instructors could develop exercises accordingly. The instructors should be informed of the relevant training targets only, not of the individual staff demanding these exercises (in line with the need for a non-punitive environment).

7.3.7 Such an evaluation on a regular basis could provide an overview on the competency status of the OCC team and could influence the description and selection of tasks and observable behaviour markers relevant for the basic and recurrent training.

Appendix A

PREREQUISITE LEARNING OBJECTIVES

Index *Page*

Prerequisite learning objectives: Air law ..... App A-2
Prerequisite learning objectives: Flight performance ..... App A-19
Prerequisite learning objectives: Navigation ..... App A-28
Prerequisite learning objectives: Human factors in aviation ..... App A-38
Prerequisite learning objectives: Aircraft general knowledge and instrumentation ..... App A-43
Prerequisite learning objectives: Meteorology ..... App A-69
Prerequisite learning objectives: Mass and balance ..... App A-78
Prerequisite learning objectives: Operational procedures ..... App A-82
Prerequisite learning objectives: Principles of flight ..... App A-106

To distinguish between prerequisite learning objectives and tasks: prerequisite learning objectives are not realistic tasks for real duties in operational control functions but are mandatory for the development of competencies.

Action verbs applied for the prerequisite learning objectives:

— *Apply*. Apply given data or variables in a procedure or formula.

— *Compare*. Compare given data, procedures or conditions.

— *Calculate*. Calculate results from given variables.

— *Decode.* Decode abbreviation and provide basic interpretations.

— *Define*. Provide the definition and the context of data, procedures or regulations.

— *Distinguish*. Distinguish between more than one result, procedure or condition.

— *Evaluate.* Evaluate data, variables or other information in a wider context.

— *Extract*. Extract data or procedures from tables or graphs.

— *Name*. Provide the name of data, procedures or conditions, without context.

— *Name effect on practice.* Name expected/realistic consequences or results.

— *Sketch*. Sketch/draw graphical for simplified explanation.

— *State*. State the properties of data, procedures or conditions, with basic context.

Prerequisite learning objectives: Air law

International law

— State the general prerequisites for worldwide standards in air navigation (*Convention on International Civil Aviation* (DOC 7300), Part I — Air Navigation):

- general principles and application of the ICAO Convention;
- flight over territory of contracting States;
- nationality of aircraft;
- measures to facilitate air navigation;
- conditions to be fulfilled with respect to aircraft; and
- ICAO Standards and Recommended Practices (SARPs), especially the notification of differences and validity of endorsed certificates and licences.

— State the application of the following terms in civil aviation:

- sovereignty; and
- territory, high seas, according to the United Nations Convention on the High Seas.

— Define the following terms and state how they apply to international air traffic:

- right of non-scheduled flight (including the two technical freedoms of the air);
- scheduled air services;
- cabotage;
- landing at customs airports;
- applicability of air regulations;
- rules of the air; and
- search of aircraft.

— State the duties of Contracting States in relation to:

- documents carried in aircraft;
- certificate of registration;
- certificates of airworthiness;
- licences of personnel;

- recognition of certificates and licences;
- cargo restrictions; and
- photographic apparatus.

— State the organization and duties of the ICAO Assembly, Council and Air Navigation Commission (*Convention on International Civil Aviation* (DOC 7300), Part II — The International Civil Aviation Organization).

— State the hierarchy of ICAO publications (SARPs, documents):

- Annexes to the Convention;
- documents; and
- circulars.

Conventions and agreements

— State the two technical freedoms of the air.

— State the three commercial freedoms of the air.

— State the facts that led to the Conventions and supplements thereto concerning unlawful acts against the safety of civil aviation.

— State the meaning of unlawful acts committed on board.

— State the meaning of the *Convention for the Suppression of Unlawful Seizure of Aircraft* (Doc 8920).

— State the meaning of the *Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation* (Doc 8966).

— Name measures and actions to be taken by the operator and the Pilot-in-Command (PIC) of an aircraft in order to suppress unlawful acts against safety (*Protocol for the Suppression of Unlawful Acts of Violence at Airports Serving International Civil Aviation*, Doc 9518).

— State the reason for the existence of the database of the World's Air Services Agreements (formerly Doc 9511).

International private law

— Name the meaning of the convention designed to cover liability towards persons and goods in accordance with the Warsaw System.

— State the legal significance of the issue of a passenger ticket and/or of baggage/cargo documents.

— State that the liability towards persons and goods may be unlimited, on the basis of the Montreal Convention.

— State the consequences of the regulation about passenger rights in case of delay, cancellation or denied boarding (i.e. European Commission Regulation 261/2004).

— State the liability limit in relation to the destruction, loss, damage or delay of baggage.

— State the meaning of conventions and protocols designed to cover liability towards persons and goods on the ground based on the International Convention for rules relating to damage caused by aircraft.

— State the meaning of rules relating to international recognition of rights in aircraft and the rules relating to precautionary arrest of aircraft.

International, regional and national organization and regulations

— State the relationship and harmonization of ICAO with other regional and national organizations.

— State the general organization and objectives of the regional or national rule-making system.

— State the position of the National Civil Aviation Authorities (NCAAs).

— State the general organization and objectives of IATA:

- aircraft and passenger handling standards;
- standards for data exchange and interfaces;
- dangerous goods regulations (DGR) standards;
- IATA Operational Safety Audits;
- airline lobbyism; and
- training.

— State the objectives of regional/international cooperation “Single Sky” (i.e. Single European Sky).

— State the purpose of regional air traffic capacity management organizations and state the communication methods with the operator.

— State the purpose of local or regional methods of data exchange and processing for flight planning data (i.e. initial flight plan processing system (IFPS) in Europe).

— State the general message content in view of regional flight planning and flow control data processing.

National organizations and rule-making process

— State the national/regional functions established for the rule-making process.

— Name the rules relating to operation of aircraft and the certification of the operator.

— Aircraft nationality and registration marks.

— Provide the definitions of the following terms from ICAO Annex 7 — *Aircraft Nationality and Registration Marks*:

  • heavier-than-air aircraft; and

  • State of Registry.

— State the combination of nationality and registration marks (sequence, use of hyphen).

— State the responsibility for assigning registration marks.

Rules of the air, general

— State the territorial application and the compliance with ICAO Annex 2 — *Rules of the Air.*

— State the primary responsibility on board an aircraft for the safe operation in accordance with the rules of the air.

— Indicate under what circumstances deviation from the rules of the air may be allowed.

— State visual flight rules (VFR) for navigation based on visual references.

— State instrument flight rules (IFR) for navigation based on instrumental references.

— State VFR minima for navigation defined on the basis of:

  • minimum lateral and vertical distance to clouds;

  • minimum flight visibility; and

  • minimum visibility to the ground.

— State IFR minima defined on the basis of:

  • navigation system performance and accuracy;

  • availability of published navigation procedures; and

  • minimum visibility to runway installations.

Air traffic service standards

— Define the concept flight levels.

— Distinguish between altitude and flight level.

— State the requirements for the submission of an air traffic service (ATS) flight plan.

— State the responsibility and required action in case of ATS and operational flight plan (OFP) change or delay.

— State the actions to be taken in case of inadvertent changes to track, speed and time estimate affecting the flight plan.

— State the procedures for closing an ATS flight plan.

— State for which flights an air traffic control clearance shall be obtained.

— State the reasons for changing between IFR and VFR rules in flight.

— State that the position report to the appropriate ATS-unit includes the waypoint, the flight level, the time overhead and the next waypoint inclusive estimate time abeam or overhead.

— State the necessary action to be taken when an aircraft is experiencing a communications failure.

— State what information an aircraft being subjected to unlawful interference shall give to the appropriate ATS unit.

— Name the possible reasons for intercepting a civil aircraft.

— State the reason for a Global Air Traffic Management Operational Concept (GATMOC) and name the prerequisites:

  • standard data definition and interfaces;

  • data integration and data integrity; and

  • standard communication concepts, system wide information management.

— State the actual programs supporting global ATM (i.e. Single European Sky ATM Research (SESAR), NextGen, system-wide information management (SWIM), future air navigation systems (FANS), controller-pilot data link communications (CPDLC)).

— State the potential, advantages and risks of global ATM programs.

Departure, arrival and approach

— Name the factors of influence on the design of instrument arrival and departure procedures.

— Define the terms “straight departure” and “turning departure”.

— State the responsibility of the operator when unable to utilize the published departure procedures.

— Name the conditions for the publication of a SID, STAR, approach and/or RNAV route.

— Name the general criteria of approach procedure design:

  • instrument approach areas;

  • accuracy of fixes and tolerance factors;

  • approach area dimension; and

- descent gradient.

— Name the reason of the typical segments of an instrument approach procedure.

— State the reasons for establishing aircraft categories for the approach.

— State the minimum obstacle clearance provided by the minimum sector altitudes (MSAs) established for an aerodrome.

— State in general terms the location of obstacle lights.

— Name the most significant performance factor influencing the conduct of instrument approach procedures.

— State the meaning of OCA/OCH in relation to:

- precision approach procedures;
- non-precision approach procedures; and
- visual (circling) procedures.

— State in general terms the factors of influence on the definition of operational minima.

— State the meaning of and the relationship between the terms DA/DH, OCA/OCH, MDA/MDH.

— State the meaning of and the relationship between the terms IAF, IF, FAF, MAPt and TP.

— Name the navigational accuracy expressed in required navigation performance (RNP) for the quality of directional guidance.

— State where an arrival route normally starts and ends.

— State the main task for the initial, intermediate and final APP segment.

— State realistic consequences if a NAVAID becomes inoperative during APP.

— State the main purpose of a missed approach procedure.

— State at which height/altitude the missed approach is initiated.

— State the pilot’s action in case of go-around by reaching MAP without required visual reference.

— State what is meant by “visual manoeuvring (circling)”.

— State the risk of circling approaches in view of obstacle clearance within the visual manoeuvring.

— State the consequences if visual reference is lost while circling to land from an instrument approach.

— State the provisions that must be fulfilled before carrying out RNP approaches.

— State the advantage/disadvantages of the conventional and RNP system.

— Name the factors of influence on the navigational accuracy of the conventional and RNP system.

— Distinguish between a precision and a non-precision approach procedure.

— State the meaning of lateral and vertical navigation.

— State the function of a head-up display (HUD) and an enhanced vision system (EVS).

— State the prerequisite for RNP approaches by GNSS to allow operating minimum according to precision approach minimum.

— State the provisions and the advantages for flying conventional non-precision approach procedures using FMS/RNAV equipment.

Holding

— State why deviations from the in-flight procedures of a holding are dangerous (*Procedures for Air Navigation Services — Aircraft Operations*, Doc 8168).

— Name the following criteria that must be fulfilled for the use of standard holding pattern:

  • standard bank angle and standard rate of turn;

  • entry procedure varying with the aircraft/pattern position-relation;

  • standard pattern, i.e. race track; and

  • standard flight level or altitude, speed and time.

— Simultaneous operation on parallel or near-parallel instrument runways.

— Distinguish independent and dependent parallel approaches.

— State the following different operations:

  • simultaneous instrument departures;

  • segregated parallel approaches/departures;

  • semi-mixed operations; and

  • mixed operations.

— State under which circumstances parallel instrument approaches may be conducted.

— Secondary surveillance radar, transponder and airborne collision avoidance system (ACAS).

— State when and where the pilot shall operate the transponder.

— Indicate when the pilot shall operate Mode C.

— State the reasons for the use of specific transponder modes:

- state of emergency;
- communication failure; and
- unlawful interference.

— State the consequences of a transponder failure in flight.

— State the consequences of a surveillance RADAR (secondary) outage.

— State the main reason for using ACAS.

— Indicate whether the “use of ACAS indications” stated in Doc 8168, Volume III is absolutely mandatory.

— State the significance of traffic advisories in view of possible resolution advisories.

— State why a pilot should follow resolution advisories immediately.

Air services and airspace

— Provide the definitions of air traffic services (ATS) given in Annex 11 — *Air Traffic Services*.

— State the three basic types of air traffic services.

— State a standard procedure for the transfer of an aircraft from one ATC unit to another.

— State the purpose for establishing FIRs and UIRs and describe the typical vertical and lateral dimensions.

— State the purpose establishing control areas and control zones and describe the typical vertical and lateral dimensions.

— Distinguish between control, separation and flight information service (FIS) and alerting service.

— State the name and the purpose of different classes of airspace in which ATC shall be provided.

— Name the ATS units providing ATC service (ground control, tower, departure control, en-route control centre(s), approach control).

— State which units may be assigned with the task to provide specified services of apron control.

— Name the purpose of clearances issued by an ATC unit.

— State the aim of clearances issued by ATC with regard to IFR, VFR or special VFR flights.

— State the various aspects of clearance co-ordination between ground, tower, departure, arrival and en-route Sector.

— State that the traffic rate as aircraft movements per time interval is a limiting factor for aircraft movements.

— State the reason why movement control of vehicles and towed aircraft on aerodrome shall be controlled by the aerodrome tower.

Aeronautical information broadcast

— List the sources of weather information available for aircraft in flight.

— Explain the meaning and application of automatic terminal information service (ATIS), meteorological information for aircraft in flight (VOLMET).

— Describe the automated data transfer for routine meteorological observations by aircrafts and weather balloons.

— Describe the information/data transfer for special meteorological observations in flight, i.e. heavy turbulence, wind shear, icing.

— Name the major types of operational FIS broadcasts.

— Name the basic information concerning ATIS broadcasts (e.g. frequencies used, number of ads included, updating, identification, acknowledgment of receipt, language and channels, ALT setting).

Alerting service

— State who is providing the alerting service.

— State who is responsible for initiating the appropriate emergency phase.

— Indicate the aircraft to which alerting service shall be provided.

— Name the unit which shall be notified by the responsible ATS unit immediately an aircraft is considered to be in a state of emergency.

— Name the three stages of emergency and State the basic conditions for each kind of emergency.

— Define INCERFA, ALERFA and DETRESFA.

— State the limiting conditions for the information of aircraft in the vicinity of an aircraft being in a state of emergency.

Lateral navigation (LNAV) procedures

— Distinguish between the concepts of RNAV and PBN.

— State the meaning of the expressions RNP 4, RNP 1, etc.

— State the factors of influence on the definition of the RNAV/RNP category.

— State the reason for establishing a system of route designators and required navigation performance (RNP).

— State whether or not a prescribed RNP type is considered an integral part of the ATS route designator.

— State the composition of an ATS route designator.

— State the advantage using RNAV based procedures for approaches.

Vertical navigation procedures

— Distinguish between non-precision approach (NPA) and precision approach (PA) and name the factor of influence on the definition of NPA/PA.

— State the concept used for vertical navigation:

- Glide path
- Barometric/DME
- GNSS

— Distinguish the methods in view of the signal processing and accuracy in relation to the landing minima.

Air traffic management

— State the function and the meaning of the abbreviation PANS-ATM, DISTRESS, URGENCY.

— State whether or not a clearance issued by ATC units does include prevention of collision with terrain.

— State the responsibility for the provision of flight information and alerting service within a flight information region (FIR), within controlled airspace and at controlled aerodromes.

— State the requirement of standardized flight plan data flow between ATC-units from the same or from different regions/States.

— State the requirement of standard user data interfaces and standard procedures for air traffic flow management.

ATC separation and clearances

— State the responsibility for maintaining applicable rules and regulations whilst flying under the control of an ATC unit.

— Name the primary purposes of clearances issued by ATC units.

— State what is meant by the expression “clearance limit”.

— State the readability scale.

— Describe the quality and range of radio transmissions in the VHF and HF band.

— State the requirement to read back ATC route clearances, runway in use and other clearances including conditional clearances.

— State the reason for speed control by ATC.

— Define commonly used air traffic control abbreviations:

  • flight conditions;

  • airspace;

  • services;

  • time; and

  • miscellaneous.

— Identify the terms used in conjunction with approach and holding procedures.

— Name AFTN and SITA as worldwide standard message/data format.

— Apply the ICAO phonetic alphabet used in aviation radiotelephony.

— Identify the occasions when words should be spelt.

— Describe the method of transmitting numbers:

  • pronunciation; and

  • single digits, whole hundreds and whole thousands.

— Describe the methods of transmitting time.

— Explain the techniques used for making good R/T transmissions.

— Define the meaning of standard words and phrases.

— Distinguish between ATC clearance and ATC advisory information.

— Describe the flight clearance and information elements from start-up to on block:

  • start-up and departure clearance;

  • taxi clearance;

  • take-off clearance;

  • en-route clearance and position reporting;

  • landing clearance; and

  • taxi clearance.

— Explain when the suffix “HEAVY” and “SUPER HEAVY” should be used with an aircraft call sign.

— State how a wake turbulence category shall be indicated on the ATS flight plan.

— Name radar vectoring as an element of radar service.

— Describe the procedures used in case of communication failure for IFR flights, i.e. position report via relay aircraft, holding procedures at specific waypoints, follow flight plan route.

— State the consequences and actions if:

  • the aircraft must depart from its assigned track;

  • the aircraft must depart from its assigned cruising level; and

  • the aircraft is unable to notify an ATS unit of the unlawful interference.

— State the function of the transponder in case of abnormal and/or emergency situation.

— State the special priority an aircraft in a state of emergency can expect from ATC.

— State the expected action of aircraft after receiving a broadcast from ATS concerning the emergency descent of an aircraft.

— State the standard procedures used for IFR communication failure.

— State the expected activities of an ATS unit after having learned that an aircraft is being intercepted in or outside its area of responsibility.

— State the minimum level for fuel dumping and the reasons for this.

— Determine the task of an air traffic incident report.

— State the wake turbulence categories of aircraft.

— State that wake turbulence separation minima depending of the wake turbulence category.

— State the function of selective calling system (SELCAL) for ATC and the operator.

— Define the following terms:

  • transition level;

  • transition layer; and

  • transition altitude.

— Define the expression “lowest usable flight level”.

— Determine how the vertical position of an aircraft on a flight en-route is expressed.

— State in what kind of clearance the QNH altimeter setting shall be included.

— Indicate the item of a position report which may be omitted if SSR Mode C is used.

— Define the general function and the standard procedures required for the use of controller-pilot data link communications (CPDLC).

— Define the factors of influence on the CPDLC capability and on the flight planning process.

— State the general provisions for the separation of controlled traffic.

— Name the different types of separation used in aviation.

— Understand the difference between the types of separations provided within the various classes of airspace and between the various types of flight.

— State who is responsible for the avoidance of collision with other aircraft when operating in VMC and IMC.

— State how vertical separation is obtained and state the required vertical separation minimum.

— State the methods for lateral and longitudinal separation.

— State the circumstances under which a reduction in separation minima may be allowed.

— State the method of Mach number technique.

— State the condition to enable ATC to initiate a visual approach for an IFR flight.

— Indicate whether or not separation will be provided by ATC between an aircraft executing a visual approach and other arriving or departing aircraft.

— State the priority that will be given to aircraft for a landing.

— Define the term “expected approach time” and state the procedures for its use.

— State the reasons which could probably lead to the decision to use another take-off or landing direction than the one into the wind.

— Name the possible consequences if the “runway-in-use” is not considered suitable for the operation involved.

— Name the elements of information which shall be transmitted to an aircraft as early as practicable if an approach for landing is intended.

— State the factors that influence the approach sequence.

— Name the aerodrome (AD) equipment that needs to be immediately reported by the tower in case of operational failure or irregularity.

— State the term “runway-in-use” and the factor of influence leading to this selection.

— State that an ATIS or report of surface wind direction given to a pilot by the TWR is magnetic.

— State to what extent the use of radar in air traffic services may be limited.

— State what radar-derived information shall be available for display to the controller as a minimum.

— Name the basic identification procedures used with radar.

— Name the possible forms of position information passed to the aircraft by radar services.

— Define the term “radar vectoring”.

— State the procedures for the conduct of surveillance radar approaches (SRAs).

Aeronautical information service (AIS) and publications

— State, in general terms, the objective of the AIS.

— State the primary purpose and the content of the AIP, including its supplement.

— Distinguish between AIP amendment, AIP supplement and aeronautical information regulation and control (AIRAC).

— Distinguish between danger area, prohibited area and restricted area.

— Name in general terms the types of aeronautical information and data provided by AIS to the operator.

— State that temporarily and short-term AIP updates are published by NOTAM.

— State the Q codes as an option for NOTAM data processing.

— Distinguish between textural NOTAMs and Q code NOTAMs.

— State the function of AIRAC.

— Summarize the additional current information relating to the AD of departure that shall be provided as pre-flight information.

— State how a recapitulation of current NOTAM and other information of urgent character shall be made available to flight crews.

— State which post-flight information from aircrews shall be submitted to AIS for distribution as required by the circumstances.

Aerodrome design and operations

— State in general terms airport data relevant for flight operation.

— Define the following terms: navigational accuracy, NAV failure, NAV equipment reliability, data quality, cyclic redundancy check.

— State, in general terms, the intent of the ICAO AD location indicator as well as its composition (Annex 14 — *Aerodromes,* Volume I — *Aerodrome Design and Operations*).

— Define the terms aircraft classification number (ACN) and pavement classification number (PCN)[1] and name the factors of influence on the resulting gross weight.

1. As of 28 November 2024, the terms ACN and PCN will be replaced by aircraft classification rating (ACR) and pavement classification rating (PCR).

— Define the term LCN and name the factor of influence on the single isolated wheel load (SIWL).

— State the different types of conditions on movement area and relating facilities to be reported by the operator to ATS or AIS.

— State where a threshold should normally be located.

— State the reason of a displaced threshold and the relation to TORA, TODA, ASDA, LDA.

— Define the term “runway strip”.

— State the term use of “runway end safety area” and “runway turning pad”.

— State the required clearance between the outer main wheels and the edge of the taxiway.

— State the reason for a taxiway widening in curves.

— State the reasons and the requirements for rapid exit taxiways.

— Define the term holding position.

— State the influence of a runway holding position on the procedures on an aerodrome.

— State where a RWY designation marking shall be provided.

— State the application and characteristics of:

- RWY edge lights;
- RWY threshold and wing bar lights;
- RWY end lights;
- RWY centre line lights;
- RWY lead in lights;
- RWY touchdown zone lights;
- stopway lights;
- taxiway centre line lights;
- taxiway edge lights;
- stop bars;
- intermediate holding position lights;
- RWY guard lights; and
- road holding position lights.

— State the safety considerations regarding elevated approach and RWY lights or markers close to RWY end.

— State the relationship of the use of a RWY/approach intensity control in connection with daytime and visibility.

— State the influence of light outage on the published landing minima (list of downgraded equipment).

— State (in general terms) the location of obstacle lights.

— Name the principal objective of aircraft rescue and fire fighting (ARFF)/rescue and fire fighting service (RFFS).

— Name the most important factors bearing on effective rescue in a survivable aircraft accident.

— Define the factors of influence on the RFFS category at the airport.

— State what is meant by the term “response time”.

— State the reason for providing a special apron management service.

— State the responsibility for the activation of emergency services during ground operation.

— State the purpose of a radio altimeter operating area.

Annex 9 — Facilitation

— Provide the purpose of a general declaration provided by the aircraft operator.

— State the reasons for the use of Crew Member Certificates (CMCs) for flight crews and cabin attendants engaged in international air transport.

— Name the documents required for the departure and entry of passengers and their baggage.

— State the arrangements in the event of a passenger being declared an inadmissible person.

— Name the documents required for the departure and entry of cargo.

Search and rescue (SAR)

— Provide the definitions of: alert phase, distress phase, emergency phase, operator, pilot-in-command, rescue coordination centre, State of Registry, uncertainty phase.

— State how Contracting States shall arrange for the establishment and prompt provisions of SAR services.

— State the establishment of SAR regions by Contracting States and the services established by Contracting States.

— State for which areas rescue coordination centres shall be established.

Security

— Define the following terms: airside/landside, aircraft security check, screening, security control, security restricted area and unidentified baggage.

— State the objectives of security and distinguish security from safety.

— State the general security tasks according international standards.

— Name the general conditions of objects not allowed on board an aircraft.

— State the consequences if the passenger flow of checked and unchecked passenger would be mixed.

— State the considerations for officers carrying weapons on board an aircraft.

— State what is meant by “access control” at an aerodrome.

— State the service provided by a Contracting State after an act of unlawful seizure.

— State the principles of the written operator security programme.

— State the special considerations pertaining to flight crew compartment doors with regard to aviation security.

— State the requirement of a minimum distance of isolated aircraft parking position unlawful interference.

— State the operator’s policy towards unruly passengers.

Flight safety, accident and incident

— Provide the definition of: accident, aircraft, flight recorder, incident, investigation, maximum mass, serious incident, serious injury, State of Design, State of Manufacture, State of Occurrence, State of the Operator, State of Registry (as it appears in Annex 13 — *Aircraft Accident and Incident Investigation*).

— Distinguish between incident, serious incident and accident.

— Sate the rules to issue a report to the appropriate Civil Aviation Authority (CAA).

— State the objectives of an investigation.

— Define the principles and the aim of a safety management system.

ATS flight plan (FPL)

Extract the entries of an ATC FPL (PANS-ATM, Doc 4444), particularly for the following:

- aircraft identification (Item 7);
- flight rules and type of flight (Item 8);
- number and type of aircraft and wake turbulence category (Item 9);

- equipment and capabilities (Item 10);
- departure aerodrome and time (Item 13);
- route (Item 15);
- destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s) (Item 16);
- other information (Item 18); and
- supplementary information (Item 19),

Prerequisite learning objectives: Flight performance

Certification standards

— Name the airworthiness and flight performance requirements according to regional/national certification specifications CAR 23, i.e. CS/FAR23.

— Name additional aircrafts certification requirements for large transport aircrafts under CAR 25 (i.e. CS/FAR25).

Operational regulations

— Interpret the ICAO operating standards according to regional/local OPS regulations related to aircraft performance.

— Name and define the performance classes for commercial air transportation according to regional/local OPS regulations.

General performance theory

— Describe the following stages of flight:

- take-off,
- climbing flight,
- level flight,
- descending flight; and
- approach and landing.

— Define “steady” flight.

— Resolve the forces during steady climbing and descending flight.

— Determine the opposing forces during horizontal steady flight.

— Interpret the “thrust/power required” and “thrust/power available” curves.

— Describe the meaning of excess thrust and power using appropriate graphs.

— Describe the effect of excess thrust and power on speed and/or climb performance.

— Calculate the climb gradient from distance flown and height change.

— Distinguish between angle and gradient.

— Define the terms flight path angle and flight path gradient.

— Define the terms descent angle and descent gradient.

— Distinguish between climb/descent angle and flight path angle.

— Define service and absolute ceiling.

— Define the terms clearway (CWY) and stopway (SWY) in relation to TODA and ASDA.

— Define the terms take-off run available (TORA), take-off distance available (TODA) and accelerate-stop distance available (ASDA).

— Define screen height.

— Define the terms “range” and “endurance”.

— Define aircraft specific fuel consumption (SFC).

— Define aircraft specific range (SR).

— Define the following terms:

- critical engine;
- speed for best angle of climb (VX); and
- speed for best rate of climb (VY).

Influencing variables on performance

— State the factors that affect aircraft performance, particularly:

- temperature;
- air density;
- wind;
- aircraft mass;
- aircraft configuration;

- aircraft antiskid system status;
- aircraft centre of gravity;
- aerodrome runway surface; and
- aerodrome runway slope.

— Explain the effect of the critical (multi) engine inoperative on total drag and resulting power required.

— Explain the effect of engine failure on controllability.

Take-off Performance Class A under CAR 25 (i.e. CS/FAR25)

— State the essential forces affecting the aircraft during take-off in one engine inoperative condition:

- longitudinal acceleration or deceleration;
- yawing after further acceleration with one engine inoperative; and
- vertical acceleration after lift-off.

— Explain the effects on take-off performance of brake energy and tire speed limits.

— Define the following speeds and their interdependences:

- 1g stall speed at which the aircraft can develop a lift force (normal to the flight path) equal to its weight — VS1g;
- minimum control on ground speed — VMCG;
- minimum control speed take-off rotation/unstick;
- minimum control speed in the air — VMCA;
- minimum control speed, approach and landing — VMCL;
- engine failure speed — VEF;
- critical engine failure speed — V1;
- rotation speed — VR;
- minimum take-off safety speed — V2;
- lift-off speed — VLOF;
- max brake energy speed — VMBE;
- max tire speed — V Max Tire; and
- reference landing speed — VREF.

— Define the following distances:

- take-off run with all engines operating and one engine inoperative;
- take-off distance with all engines operating and one engine inoperative; and
- accelerate-stop distance with all engines operating and one engine inoperative.

Take-off distances

— State the effects of the following runway (RWY) variables on take-off distances:

- RWY slope;
- RWY surface conditions, dry, wet and contaminated; and
- RWY elevation.

— State the effects of the following aircraft variables on take-off distances:

- aircraft mass;
- take-off configuration; and
- bleed air configurations.

— State the effects of the following meteorological variables on take-off distances:

- wind;
- temperature; and
- pressure altitude.

— State the influence of errors in rotation technique on take-off distance:

- early and late rotation;
- too high and too low rotation angle; and
- too high and too low rotation rate.

— State the take-off distances for specified conditions and configuration for all engines operating and one engine inoperative.

— State the effect of using clearway on the take-off distance required.

— State the influence of V1 on take-off distance.

— State the effect of a miscalculation of V1 on the take-off distance required.

Accelerate-stop distance

— State the accelerate-stop distance for specified conditions and configuration for all engines operating and one engine inoperative.

— State the effect of using a stopway on the accelerate-stop distance required.

— State the effect of miscalculation of V1 on the accelerate-stop distance required.

— State the effect of runway slope on the accelerate-stop distance.

— State the use of brakes, antiskid, use of reverse thrust, ground spoilers or lift dumpers, brake energy absorption limits, delayed temperature rise and tire limitations.

Balanced field length concept

— Define the term balanced V1.

— State the relationship between take-off distance, accelerate-stop distance in balanced V1 conditions.

— State the advantage of a balanced V1.

Take-off climb

— Define the segments of the actual take-off flight path.

— State changes in the configuration, power, thrust and speed in the take-off flight path segments.

— State that differences in climb gradient requirements exists for two-, three- and four-engine aircraft.

— State the maximum bank angle as a limiting factor when flying at V2.

— State the effects of aircraft configuration, speed, bank angle and meteorological variables on take-off climb limitations.

— State the advantage of increased V2 (improved climb) in view of climb limited performance.

— State the risks of increased V2/VR/V1 for aircraft handling on the RWY.

Obstacle-limited take-off

— State the operational requirements for obstacle clearance on the basis of the net flight path:

  • obstacle position within the applicable departure corridor; and

  • 35 ft above obstacle height.

— State additional climb gradient requirements depending on the number of engines.

— State that net flight path plus the additional gradient requirements defines the actual flight path.

— State the actual flight as a basis for performance evaluations.

— State the effects of aircraft and meteorological variables for obstacle limited take-off mass.

Performance-limited take-off mass

— Define performance-limited take-off mass.

— Distinguish between the effect of dry, wet and contaminated RWY.

— State the advantages and disadvantages of using different take-off flap settings for optimized performance-limited take-off mass.

Use of reduced and derated thrust

— State the conditions where derated thrust may and may not be used:

  • runway contamination; and

  • MEL items.

— State the effect of using reduced and derated thrust on take-off speeds, take-off distance, climb and obstacle performance.

Climb and descent

— Distinguish the effect of climb or descent with constant IAS and Mach number.

— State the reason of standard climb and descent speeds for jet aircrafts in relation to crossover altitude.

— Describe the following limiting speeds for climb and descent:

  • maximum operating speed (VMO); and

  • maximum Mach operating speed (MMO).

— State the effect of aircraft mass on the rate of climb (ROC).

— State the effect of meteorological variables on the ROC.

Cruise

— Distinguish cruise procedures based on “maximum endurance” and “maximum range”.

— Define the term “maximum range cruise”.

— Define the term “long range” cruise.

— Distinguish maximum range cruise and long range cruise in relation to specific range and automated speed control capability.

— State the effect and centre of gravity (CG) position and actual mass of aircraft on range and endurance.

— State the effect of altitude on range and endurance.

— State the effect of meteorological variables on range and endurance.

— Define the term “optimum altitude”.

— State the factors of influence on optimum and maximum altitudes.

— State the necessity for step-climbs in relation to optimum altitude and flight level allocation.

— Define the term “buffet onset boundary”.

— Name the bank angle, mass and buffet onset as a factor of influence on maximum altitude.

Cost index

— Define the term cost index as a relation of cost of time to cost of fuel.

— Name examples of variable time cost elements:

- crew overtime;
- costs of additional handling services; and
- costs of delay.

— Name ACMI costs as an indicator of resource productivity.

— Extract or determine aircraft performance data:

- maximum range;
- maximum endurance;
- high speed and normal cruise; and
- high and low speed buffet (speed/Mach number only).

— Name the factor of influence on the selection of cruise speed and altitude:

- relation of time costs to fuel costs (cost index);
- clear air turbulence, passenger comfort; and
- schedule, handling and delay.

Drift down

— Name the minimum obstacle clearance height prescribed in regional/local OPS regulations as a factor of influence on drift down.

— State the basic procedure during drift down:

  • deceleration to the speed of optimum one engine inoperative glide (drift down speed); and

  • descent to one engine inoperative level off altitude.

— State the factors of influence on the drift down performance:

  • OAT;

  • configuration; and

  • GW.

Approach and landing based on CAR 25

— State the approach climb requirements:

  • one engine inoperative;

  • approach configuration; and

  • minimum climb gradient.

— State the landing climb requirements:

  • all engines;

  • landing configuration; and

  • minimum climb gradient.

— State that approach climb is more limiting than landing climb.

— Name engine performance as a limiting factor for approach climb.

— State the demonstrated landing distance as a landing distance out of 50 ft reference height.

— State the required landing distance as a factored demonstrated landing distance.

— Name the factor of influence on the required landing distance:

  • approach speed V REF;

  • runway slope;

  • runway condition: dry, wet or contaminated;

- configuration, i.e. flap setting, ground spoiler; and
- brake system configuration, i.e. anti-skid, auto brake.

— State the influence of standing water on the effect of hydroplaning.

— State that the landing distance available (LDA) is published by airport authorities.

— State the effect of OAT, pressure altitude to the approach speed and consequently to the required landing distance.

— State the effect of gusty wind and the danger of wind shear during approach and landing and the countermeasure of an increased V REF.

— State the influence of increased V REF on the required landing distance.

Quick turnaround limit

— State the quick turnaround limit based on maximum brake energy limits controlled by a minimum cooling period between landing and take-off.

— State the factors of influence on the brake temperature after landing:

- actual V REF;
- actual landing weight; and
- application of reverser and spoiler during landing.

— State the factors of influence on the cooling period before take-off:

- operational brake cooling fans; and
- wind speed and OAT during ground operation.

— State the essential factors of influence on the expected brake energy during aborted take-off:

- TOW;
- pressure altitude;
- wind component; and
- V1.

— State that a brake temperature indication is important for decision making in relation to quick turnaround.

— State consequences for the applicable standard procedures if a brake temperature indication fails.

Prerequisite learning objectives: Navigation

Basics of general navigation

- Define the term “zenith” as the point on the sky vertically overhead an observer.
- State that the Earth is not a true sphere. It is flattened slightly at the poles.
- State that the Earth may be described as an “ellipsoid” or “oblate spheroid”.
- Define a great circle in relation to the surface of a sphere.
- State the great circle distance as the shortest between two waypoints.
- State that the circumference at Equator is 21 600 NM which equals 360° x 60 NM.
- Define a rhumb-line as a line of equal track.
- Define oppler convergence.
- State the latitude as a factor of influence on the NM-distance between longitudes.
- State the limitation of navigation systems in high latitudes due to flight track variation rate.

Latitude, difference of latitude

- Define geographic latitude and longitude.
- Calculate the difference of latitude between two positions on one longitude.
- Convert the difference of latitude to distance.
- Calculate the mean latitude between two positions.
- State that the Greenwich meridian is the prime meridian at 000° longitude.
- State that the Greenwich anti-meridian is 180° longitude.
- Extract latitude and longitude on the basis of a map position.
- Enter a map position on the basis of a latitude and longitude.
- Calculate the distance between two meridians on the Earth along a parallel of latitude.
- Given two positions on the same meridian (or one on the anti-meridian), calculate the distance between these positions.

Time and time conversions

- Explain the principles of time zones.

— State that the Earth's rotation 360° in 24 hours.

— State that the local mean time on the Greenwich meridian is selected as Greenwich Mean Time (GMT) and equivalent to the Coordinated Universal Time (UTC).

— Convert arc longitude to time and time to arc longitude on the basis of 360°/24 hours.

— Convert UTC to LMT.

— State that time zones are defined by States or regions.

— State that some countries Daylight Saving Time (DST), or summer time.

— State that conversion from UTC to standard time and vice versa is usually done using extracts from the air almanac published in appropriate documents.

— Given appropriate documents, convert from UTC to ST of a specific country and from ST of a specific country to UTC.

— State that the dateline does not follow exactly the 180° E/W meridian.

— State that when crossing the dateline one day is lost or gained depending on the direction of travel.

— Calculate conversions of UTC and ST for cases involving the International Date Line.

Determination of sunrise, sunset and civil twilight

— State that sunrise (SR) or sunset (SS) is when the sun's upper edge is 6° at the observer's horizon.

— State how atmospheric refraction affects this apparent sighting.

— State that SR and SS occur at different times on the same meridian depending on the latitude for a given day.

— State that SR will occur earlier and SS occurs later with increase in altitude.

— State that the times for SR and SS given in the air almanac based on the Greenwich meridian conditions.

— State that the reason for the variation of the duration of daylight and night throughout the year is the inclination of the Earth's rotation axis to the ecliptic.

— State that SR and SS times are tabulated against specified dates and latitudes.

— State that at the Equator, SR is always close to 06:00 LMT and SS close to 18:00 LMT (within 15 minutes).

— Calculate examples of SR and SS at mean sea level (MSL) in ST or UTC, given SR and SS tables, latitudes and longitude of the place in question and the date.

— Explain the meaning of the term twilight (6°-12°).

Directions

— State that all meridians run in north-south direction and the true north direction is along any meridian towards the geographic north pole.

— State that true directions are named track and measured clockwise as an angle in degrees from true north (TN).

— State that a freely suspended compass needle will turn to the direction of the local magnetic field. The direction of the horizontal component of this field is the direction of magnetic north (MN).

— State that a track corrected by local variation is a magnetic course.

— State that the magnetic poles do not coincide with the geographic poles.

— State that the magnetic variation fluctuates as a function of time due to the movement of the northern magnetic pole.

— Define magnetic dip or inclination as the angle between the horizontal and the total component of the magnetic field.

— State that the angle of inclination at the magnetic poles is 90°.

— Explain that the accuracy of the compass depends on the strength of the horizontal component of the Earth's magnetic field.

— State that, in the polar areas, the horizontal component of the Earth's magnetic field is too weak to permit the use of a magnetic compass.

— State that the angle between the true north and magnetic north is called variation (VAR) being measured in degrees east (+ or E) or west (- or W) of true north.

— State that the effect of the aircraft magnetism on the compass changes with different headings, as well as different latitudes.

— State compass north (CN) as the resultant of the Earth's magnetic field and the magnetic field of the specific aircraft.

— State that a magnetic course corrected by aircraft specific deviations is a compass course.

— Define an isogonal as a line joining positions of equal variation.

— Convert between true track, magnetic course and compass course on the basis of variation and compass deviation.

— State the purpose of a grid north (GN) based on a suitable meridian on a polar stereographic chart (reference or datum meridian).

Distance

— Name the units of distance and height used in navigation: nautical miles, statute miles, kilometres, metres and feet.

— Define the nautical mile as a distance being equal to 1 852 km.

— In maps/charts, the distance between two positions is measured along a meridian at mean latitude, where one minute of latitude represents 1 NM.

— State that when dealing with heights and altitudes, the unit used is metres or feet, subject to the choice of individual States.

— Convert between the following units: nautical mile (NM), statute mile (SM), kilometre (km), metre (m) and foot (ft).

Charts

— Define the term “conformal”.

— State that on a conformal chart the angles measured on the chart are the same as on the Earth.

— State that different chart projections are used, depending on the application and area of use involved.

— State that all charts, although they have been developed mathematically, are designated as projections.

— State that the following projection surfaces are used when projecting charts:

- plane;
- cylindrical; and
- conical.

— Define the scale of a chart as the ratio of the chart length compared to the distance on the Earth that it represents.

— Use the scale of a chart to calculate particular distances.

— Define the term chart convergence as the angle between two given meridians on the chart.

— Define parallel of origin as the parallel where the projection surface touches the surface of the reduced Earth.

— State that the direct mercator is a cylindrical projection. The parallel of origin is the Equator.

— State that the scale increases with increasing distance from the Equator.

— State that the Lambert conformal chart is based on a conical projection.

— Define the term standard parallel as the latitudes where the cone cuts the reduced Earth.

— State that at the parallel of origin Earth convergence is equal to chart convergence.

— State that the parallel of origin is close to the mean latitude between the standard parallels in a Lambert projection.

— Explain the scale variation throughout the charts as follows:

  • the scale indicated on the chart will be correct at the standard parallels; and

  • the scale will increase away from the parallel of origin.

— State that the Polar Stereographic projection is specifically for the projection of charts in Polar Regions

Position

— Enter positions on a chart using range and bearing from a VOR/DME station and derive geographical coordinates.

— Enter positions on a chart using geographical coordinates and derive tracks and distances.

— Plot DME ranges on an aeronautical chart and derive geographical coordinates.

— Extract conventional signs and symbols on ICAO and other most frequently used charts.

Track, course, heading, distance and speed

— Given two positions, measure the track and distance.

— Define the triangle of velocities, e.g. true heading/TAS, W/V and true course (track)/GS.

— Explain the concept of vectors including adding together or splitting in multiple directions.

— Calculate wind velocity components on the basis of appropriate data:

  • head wind component (HWC);

  • tailwind component (TWC); and

  • cross wind component (CWC).

— Extract TAS from IAS/CAS and Mach number on the basis of given appropriate data.

— State the navigation purpose of TAS and GS.

— State that the purpose of IAS and Mach number is for the application of standard procedures and the observation of overspeed and stall protection (limitations).

— Calculate groundspeed given appropriate data.

— Calculate ETO of waypoints, flying time from distance and GS.

— Calculate drift, wind correction angle (WCA) given appropriate data.

— State that a course corrected by WCA is a heading.

— Calculate the heading on the basis of course and WCA.

— Calculate speed, time and distance on the basis of given appropriate data.

— State the aim of nautical air mile (NAM).

— Distinguish between statute mile (SM), nautical mile (NM) and nautical air mile (NAM).

— Apply the relation of TAS/GS to NAM/NM and evaluate the distance on the basis of NAM and NM.

— Calculate the trip fuel on the basis of average fuel flow and flight time.

— Calculation of air speed, including IAS/TAS and Mach number, given appropriate data.

— Define the term true airspeed (TAS) effective in view of CWC.

— Evaluate the influence of a high CWC on the TAS effective and name its effect on practice.

In-flight navigation

— Calculate ETA revisions based upon observed fixes and revised ground speed.

— Given relevant operational flight plan data, calculate the missing data.

Basics of radio navigation

— State that radio waves travel at the speed of light.

— Define frequency as the number of cycles occurring in one second in a radio wave expressed in Hertz (Hz).

— Name the function, advantage and disadvantage of low and high frequencies for transmission.

— Define carrier wave as the radio wave acting as the carrier or transporter.

— State that the ionosphere is the ionized component of the Earth’s upper atmosphere.

— State that layers in the ionosphere can reflect or absorb radio waves and their depth varies with the ecliptic of the sun.

— Define ground waves and space waves.

— State that high frequency radio waves propagate as space waves.

— State that low and middle frequency radio waves propagate as ground waves and sky waves.

— State that the Doppler effect is a phenomenon where the frequency of an electromagnetic wave will increase or decrease if there is relative motion between the transmitter and the receiver.

— Define skip distance as the distance between the transmitter and the point on the surface of the Earth where the first sky return arrives.

— State that skip zone/dead space is the distance between the limit of the surface wave and the sky wave.

— Describe the term fading as a situation when a receiver picks up the sky signal and the surface signal, and the signals will interfere with each other causing the signals to be cancelled out.

Radio aids for navigation: NDB and locator beacon

— Define the acronym NDB (non-directional beacon) as the ground part of the system.

— Define the acronym ADF (automatic direction finder) as the airborne part of the system.

— State that NDB operates in the LF and MF frequency bands.

— State the function of a locator beacon.

— State that the advantages/disadvantages of NDB signals in relation to other NAVAIDS.

Radio aids for navigation: VHF omnidirectional radio range (VOR)

— State that VOR operates in the VHF band.

— Distinguish different types of VOR:

- conventional VOR (CVOR);
- Doppler VOR (DVOR); and
- VOR and TACAN combination (VORTAC).

— Distinguish different uses of VOR:

- en-route VOR for use by IFR traffic;
- terminal VOR (TVOR);
- test VOR (VOT); and
- as transmitter of ATIS information.

— State that VOR stations are related to the magnetic north.

— State the advantages/disadvantages of VOR information in relation to other NAVAIDS.

Radio aids for navigation: Distance measuring equipment (DME)

— State that the distance measured by DME is slant range.

— Sketch that a position line using DME is a circle with the station (VOR/DME or VOR/TACAN) at its centre.

Radio aids for navigation: Instrument landing system (ILS)

— Name the two main components of an ILS:

  • the localizer (LLZ); and

  • the glide slope/path (GP).

— State the site locations of the ILS components:

  • the localizer antenna should be located on the extension of the runway centre line at the stop-end; and

  • the glide path antenna should be located 300 metres beyond the runway threshold, laterally displaced approximately 120 metres to the side of the runway centre line.

— Define the use of marker beacons and/or DME to identify predetermined distances along the ILS glide path.

— State that the ILS LLZ operates in the VHF band.

— State that the ILS GP operates in the UHF band.

— State that the back beam from the LLZ antenna may be used as a published “non-precision approach”.

— State that according to Annex 10 — *Aeronautical Telecommunications*, the nominal glide path is 3°.

— State that automatic ground monitoring system is a requirement for ILS installation.

— Name the following ILS operation categories:

  • Category I;

  • Category II;

  • Category IIIA;

  • Category IIIB and

  • Category IIIC.

— State why the accuracy requirements are progressively higher for CAT I, CAT II and CAT III ILS.

— State the ILS critical area and their influence on low visibility operations.

Radio aids for navigation: radar

— Name the different applications of radar with respect to ATC, MET observations and airborne weather radar.

— State that primary radar provides bearing and distance of targets.

— State that primary ground radar is used to detect aircraft that are not equipped with a secondary radar transponder.

— State that the air traffic control (ATC) system is based on the replies provided by the airborne transponders in response to interrogations from the ATC secondary radar.

— State the advantages of SSR over a primary radar:

  • Mode A: transmission of aircraft transponder code;

  • Mode C: transmission of aircraft pressure altitude; and

  • Mode S: aircraft selection and transmission of flight data for the ground surveillance.

— Name the two main tasks of the weather radar in respect of weather and navigation.

Area navigation (RNAV) and flight management systems (FMS)

— Define area navigation (RNAV) (Annex 11 — *Air Traffic Services*).

— State that basic RNAV (B — RNAV) systems require RNP 5.

— State that precision RNAV (PRNAV) systems require RNP 1.

— State that a 2D RNAV system is able to navigate in the horizontal plane only.

— State that a 3D RNAV system is able to navigate in the horizontal plane and in addition has a guidance capability in the vertical plane.

— State that a 4D RNAV system is able to navigate in the horizontal plane, has a guidance capability in the vertical plane and in addition has a timing function.

— Define the basic principles of required navigation performance (RNP) in accordance with the *Performance-based Navigation (PBN) Manual* (Doc 9613).

— State that RNP is a concept that applies to navigation performance within an airspace.

— State that RNAV equipment operates by automatically determining the position of the aircraft.

— State the advantages of using RNAV techniques over more conventional forms of navigation.

— State that RNP may be specified for a route, a number of routes, an area, a volume of airspace or any airspace of defined dimensions.

— State that airborne navigation equipment such as an air data inertial reference unit (ADIRU) uses inputs from navigational systems such as VOR/DME, DME/DME, GNSS, INS and IRS.

— State that in an automatic warning system, minimum RNP and actual RNP are automatically compared and indicated.

— Identify sample navigation equipment failure by using the MEL and name the consequences.

Flight management system (FMS) and database

— State that an FMS has the ability to monitor and direct both navigation and performance of the flight

— State the FMS functions lateral navigation (LNAV) and vertical navigation (VNAV).

— State that the navigation database may contain all data from the route manual of the operator.

— State that the navigation database is updated every 28 days.

— State that the performance database of the FMS/FMC contain all data from the manufacture manuals/data.

— State that flight parameters are input data to the FMC.

— State that output parameters are used for auto flight and indication:

- command signals to the flight directors and autopilot;
- command signals to the auto-throttle;
- information to the EFIS displays through the symbol generator; and
- data to the CDU and various annunciators.

Global navigation satellite system (GNSS)

— State the main GNSSs currently in operation:

- NAVSTAR global positioning system (GPS);
- global navigation satellite system (GLONASS); and
- GALILEO.

— State that all three systems (will) consist of a constellation of satellites which can be used by a suitably equipped receiver to determine position.

— State that the GPS health message is used to exclude unhealthy satellites from the position solution. Satellite health is determined by the validity of the navigation data.

— State that GPS uses the WGS 84 model (World Geodetic System 1984).

— State that satellites are using a very accurate time reference.

— State that a GPS receiver is able to determine the distance to a satellite by determining the difference between the time of transmission by satellite and the time of reception.

— State receiver autonomous integrity monitoring (RAIM) as a technique whereby a receiver processor determines the integrity of the navigation signals.

— State that errors in the satellite orbits are due to:

  • solar wind; and

  • gravitation of the sun, moon and planets.

Satellite augmentation systems

— State that ground-based and space-based augmentation systems (GBAS and SBAS, respectively) measure the signal errors transmitted by GNSS and relay the measured errors to the user for correction.

— State that GBAS based on GPS is sometimes referred to as satellite-based augmentation system (SBAS).

— State that GNSS with augmentation systems can provide approach procedure with vertical guidance (APV) and precision approach service.

— Evaluate the advantages and disadvantages of GPS-based IFR approaches.

Prerequisite learning objectives: Human factors in aviation

Accident analysis

— Give an estimate of the accident rate in commercial aviation in comparison to other means of transport.

— State in general terms the percentage of aircraft accidents which are caused by human factors.

— State the importance for flight safety in understanding the causes and categories of accidents and incidents.

Flight safety concepts

— Name the three sources for external error generation in the cockpit.

— State the difference between internal and external factors in error generation.

— Interpret the concept of the error chain.

— Explain James Reason’s Swiss Cheese Model.

— Differentiate between an isolated error and an error chain.

— State examples of an isolated error and an error chain.

— Explain the three components of the threat and error management model (TEM).

Threat and error management

— Explain and give examples of predictable threats.

— Explain and give examples of known and unpredictable threats.

— Explain and give examples of latent threats.

— Define the term “situational awareness”

— List factors which influence one’s situational awareness both positively and negatively and stress the importance of situational awareness in the context of flight safety.

— Define the term “error”.

— Explain and give examples of procedural error.

— State the difference between forms/types of errors (e.g. Rasmussen, reason).

— Name possible sources of internal error generation.

— Name the three main sources for external error generation in the cockpit.

— Name (and describe) strategies which are used to reduce human error.

— Explain the concept of “standard operating procedure” (SOP).

— Illustrate examples and the purpose of SOPs in operational control functions.

— Define the term “environment capture”.

Safety culture

— Distinguish between “open” and “closed” cultures.

— Illustrate how safety culture is reflected by national culture.

— Question the set expression ‘safety first’ in a commercial entity.

— State important factors that promote a good safety culture.

— Distinguish between “just” and “non-punitive” cultures.

— Identify and explain the interaction between flight crew and management as a factor in flight safety.

Stress and stress management

— State the relationship between arousal and stress, referring to the effects of “good” and “bad” stress.

— State the relationship between stress and performance.

— State the effects of anxiety on human performance.

— State the relationship between stress, attention and vigilance.

— State the effect of human under/overload on work.

— Name typical common physiological and psychological symptoms of human overload.

— Explain the term “stress”.

— Why is stress a natural human reaction?

— Name the symptoms of stress.

— State the general effects of acute stress on the human system.

— State the basic categories of stressors.

— Name major stress factors.

— Name the major environmental sources of stress in aviation.

— Name the process which is responsible for the individual differences in experiencing stress.

— State that stress is cumulative and that stress from one situation can be transferred to a different situation.

— Name the differences between stress factors and risk factors.

— State the difference between psychological, psychosomatic and somatic stress reactions.

— State that the successful completion of a stressful task will reduce the amount of stress experienced when a similar situation arises in the future.

— Explain the biological reaction to stress by means of the “general adaptation syndrome”.

Risk assessment and decision making

— State the factors upon which an individual’s risk assessment is based.

— Explain the relationship between risk assessment, commitment, and pressure of time on decision-making strategies.

— Describe the main human attributes with regard to decision making.

— Describe the main error sources and limits in an individual’s decision-making mechanism.

— State the factors upon which an individual’s risk assessment is based.

— Explain the relationship between risk assessment, commitment, and pressure of time on decision-making strategies.

— Describe the positive and negative influences exerted by other group members on an individual’s decision-making process.

— Name the major factors on which making a decision should be based (in EU/EASA, e.g. FORDEC).

Communication

— Define the term “communication”.

— List the most basic components of interpersonal communication.

— Name the advantages of two-way communication as opposed to one-way communication.

— Explain the statement “one cannot not communicate”.

— State the difference between verbal and non-verbal communication.

— Name the functions of non-verbal communication.

— Describe general aspects of non-verbal communication.

— Define the term “meta-plane”.

— State the attributes of using “professional” language.

— Name and explain major obstacles to effective communication.

— Name examples for misunderstanding arising from inadequate communication.

— Name the effect of incompatibility on the difference between verbal and nonverbal communication.

— Name the various levels of communication:

- factual level;
- appeal level;
- self-disclosure level; and
- relation level.

Body rhythm and sleep

— Explain the term “circadian rhythm” in the context of the window of circadian low internal clock.

— Explain the significance of the “internal clock” in regulating the normal circadian rhythm.

— State the effect of the circadian rhythm of body temperature on an individual’s performance standard and the effect on an individual’s sleep patterns.

— List and describe the stages of a sleep cycle.

— Differentiate between REM and non-REM sleep.

— Explain the function of sleep and describe the effects of insufficient sleep on performance.

— Explain the simple calculations for the sleep/wake credit/debit situation.

— Explain how sleep debt can become cumulative.

— State the time formula for the adjustment of body rhythms to the new local time scale after crossing time zones.

— State the problems caused by circadian dysrhythmia (jet lag, shift pattern) on an individual's performance and sleep.

— State the relevant factors in the process of fatigue risk management (i.e. preceding rest time, preceding time zone in relation to home base, environmental conditions, local departure time, rest during flight).

— State the phenomenon of fatigue.

Human information processing

— Differentiate between "attention" and "vigilance".

— Differentiate between "selected" and "divided" attention.

— Define "hypervigilance".

— Identify the factors which may affect the state of vigilance.

— Name factors that affect a person's level of attention.

Group, team and leadership

— Explain the function of role and norm in a group.

— Name the different role patterns which occur in a group situation.

— Illustrate the influence of interdependence in a group.

— Define the term "group think".

— State and explain the elements of multi-team concepts.

— Illustrate the purpose and procedure of team briefings.

— Describe the function of communication in a coordinated team.

— Explain the term "synergy".

— Define the term "risk shift".

— State the essential conditions for good teamwork.

— Summarize examples of attitudes and behaviour which, if prevalent in a team member, might represent a hazard to flight safety and their signs hazardous attitudes.

— Describe the personality attitude and behaviour patterns of an ideal team member.

— Understand that only an individual can make an aeronautical decision and is responsible for the decision.

— Teams can only make recommendations.

— State different leadership styles (Blake Moutin leadership) and judge their influence on communication patterns and behaviour of team members.

Prerequisite learning objectives: Aircraft general knowledge and instrumentation

System design, loads, stresses, maintenance

— Name the following structural design philosophy:

- safe life;
- fail-safe (multiple load paths);
- damage-tolerant; and
- redundancy.

— Name the following terms:

- stress;
- strain;
- tension;
- compression;
- buckling;
- bending;
- torsion;
- static loads;
- dynamic loads;
- cyclic loads; and
- elastic and plastic deformation.

— State the phenomenon of fatigue.

— Define the following terms:

- hard time maintenance;

- soft time maintenance; and
- on condition maintenance.

— Name that the following are composite fibre components:

- carbon;
- glass; and
- aramid (Kevlar).

— Name the following types of construction:

- cantilever; and
- non-cantilever (braced).

— Name the following structural components:

- spar;
- rib;
- stringer;
- skin; and
- torsion box.

— State following structural components of a fuselage:

- frames;
- bulkhead;
- stiffeners, stringers, longerons;
- skin, doublers;
- floor suspension (crossbeams);
- floor panels; and
- firewall.

— State the loads on the fuselage due to pressurization.

— State the following loads on a main landing gear:

- touchdown loads (vertical and horizontal);
- taxi loads on bogie gear (turns); and

- shear loads during high speed turns and T/O run with one engine inoperative.

— State the structural danger of a nose wheel landing with respect to:

- fuselage loads; and
- nose wheel strut loads.

— State the structural danger of a tail strike with respect to fuselage and aft bulkhead damage (pressurization).

— Name door and hatch construction for pressurized and unpressurised aeroplanes including:

- door and frame (plug type);
- hinge location; and
- locking mechanism.

— State that flight deck windows are constructed with different layers.

— State the implication of a direct vision window.

— State the need for an eye reference position.

— State the function of floor venting (blow out panels).

— Define and state the following maximum structural masses:

- maximum ramp mass;
- maximum take-off mass;
- maximum zero fuel mass; and
- maximum landing mass.

— State that airframe life is limited by fatigue, created by alternating stress and the number of load cycles.

— For all relevant aircraft systems components, decode applicable MEL/CDL items and describe the consequences for the operation of aircraft.

— Decode the MEL/CDL rectification interval and ATA chapter and define the term “flight day”.

Hydraulics

— State the relationship between system pressure and volume flow.

— Name the desirable properties of a hydraulic fluid:

- thermal stability;

- corrosiveness;
- flashpoint and flammability;
- volatility; and
- viscosity.

— State that different types of hydraulic fluids cannot be mixed.

— State that at the pressures being considered, hydraulic fluid is considered incompressible.

— State the working principle of a hydraulic system.

— Name the main advantages and disadvantages of system actuation by hydraulic or purely mechanical means with respect to:

- weight;
- size; and
- forces.

— Name the main users of hydraulic aircraft systems.

— State the power sources of a hydraulic pressure pump:

- manual;
- engine gearbox;
- electrical;
- air (pneumatic and ram air turbine); and
- hydraulic (power transfer unit) or reversible motor pumps.

— State the working principle and functions of the following hydraulic system components:

- reservoir (pressurized and unpressurized);
- accumulators;
- case drain lines and fluid cooler, return lines;
- piston actuators (single and double acting);
- hydraulic motors; and
- filters.

— State the function of demand hydraulic pumps.

— State how redundancy is obtained by giving examples.

— State the indications and the implications of the following malfunctions:

- system leak or low level
- low pressure; and
- high temperature.

Landing gear

— State the advantage and disadvantage of nose wheel and tailwheel configurations.

— Name the function of the following components of a landing gear:

- shock strut;
- axles;
- bogies and bogie beam;
- drag struts;
- side stays/struts;
- torsion links;
- locks (over centre); and
- gear doors and retraction mechanisms (normal and emergency operation).

— State how landing gear position indication and alerting is implemented.

— State the various protection devices to avoid inadvertent gear retraction on the ground:

- ground lock (pins); and
- protection devices in the gear retraction mechanism.

— Name the speed limitations for gear operation (VLO and VLE).

— Name methods for emergency gear extension including:

- gravity/free fall; and
- manually/mechanically.

— State the operating principle of nose-wheel steering.

— State the options of directional control during ground operation:

- rudder movement;
- differential braking;
- hand wheel steering; and
- rudder pedal nose wheel steering.

— State the purpose of main wheel (body) steering.

— State the basic operating principle of a disk brake.

— State the different materials used in a disc brake (steel, carbon) and state their advantages and disadvantages such as:

- weight;
- temperature limits;
- internal friction coefficient; and
- wear.

— State the limitation of brake energy and state the operational consequences.

— State the reason for the brake temperature indicator.

— State that the heat capacity of a brake is a limiting design factor.

— State the multi disk brakes based on rotor and stator.

— State how brakes are actuated.

— Sate the function of an in-flight brake system.

— State the function of a brake accumulator.

— State the function of the parking brake.

— State the function of wheel and brake wear indicators.

— State that the main power source for brakes in normal operation and for alternate operation for large transport aeroplanes is hydraulic or electric.

— State the operating principle of an anti-skid system.

— State the consequences of an inoperative anti-skid system on flight safety and performance.

— State the operating principle of an auto-brake system.

— State that the anti-skid system must be available when using auto-brakes.

— State the function of thermal/fusible plugs.

— State the implications of tread separation and tire burst.

— State that the ground speed of tires is limited immediately.

Primary flight controls

— Define a primary flight control.

— Name the following primary flight control surfaces:

- elevator;
- aileron, roll spoilers; and
- rudder.

— Name the various means of control surface actuation including:

- manual;
- fully powered; and
- partially powered.

— State the basic principle of a fully powered control system.

— State the need for a “feel system” in a fully powered control system.

— State the operating principle of a stabilizer trim system in a fully powered control system.

— State the operating principle of rudder and aileron trim in a fully powered control system.

— State how redundancy is obtained in primary flight control systems of large transport aeroplanes.

— State the function of a rudder deflection limitation (rudder limiter).

Secondary flight controls

— Define the term secondary flight control.

— Name the following secondary flight control surfaces:

- lift augmentation devices (flaps and slats);
- speed brakes;
- flight and ground spoilers; and
- trimming devices.

— State secondary flight control actuation methods and sources of actuating power.

— State the requirement of a mechanical lock/brake when using hydraulic motors driving a screw jack in stabilizer trim and flap/slat movement.

— State the requirement for limiting speeds for the various secondary flight control surfaces.

— State the requirement of load limiting (relief) protection devices for lift augmentation devices.

— State the requirement of a flap/slat asymmetry protection device.

— State the advantages and disadvantages of a digital Fly-by-wire (FBW) system in comparison with a conventional flight control system including:

- weight;
- pilot workload;
- flight envelope protection; and
- unauthorized interference.

Pneumatic

— State that the possible bleed air sources for gas turbine engine aircraft are the following:

- engine;
- APU; and
- ground supply.

— State that for an aeroplane a bleed air supply can be used for the following systems or components:

- wing and engine anti-icing;
- engine air starter;
- pressurization of a hydraulic and water reservoir;
- air driven hydraulic pumps; and
- pressurization and air conditioning.

— Distinguish the pneumatic system design from the all-electric system design.

— State the advantage and disadvantage of all-electric energy supply.

— Name the elements of the bleed air supply system:

- pneumatic ducts;
- isolation valve;

- cross feed valves;
- pressure regulating valve;
- engine bleed valve (HP/IP valves);
- fan air pre-cooler; and
- temperature and pressure sensors.

— Name the following air bleed malfunctions and indications:

- over temperature;
- over pressure;
- low pressure; and
- overheat/duct leak.

Air conditioning system

— State that a pressurization and an air conditioning system of an aeroplane controls:

- ventilation;
- temperature; and
- pressure.

— State that in general humidity is not controlled.

— Name the major components of a pressurization system:

- pneumatic system as the power source;
- outflow valve;
- pressure controller;
- excessive differential pressure relief valve; and
- negative differential pressure relief valve.

— Name the following components constitute an air conditioning system:

- air cycle machine;
- pack cooling fan;
- water separator;

- mixing valves;
- isolation valves;
- ram air valve;
- re-circulation fans; and
- cabin pressurization fan in electrical pneumatic systems.

— Define the following terms:

- cabin altitude;
- cabin vertical speed;
- differential pressure; and
- ground pressurization.

— State the requirement of a warning system when cabin altitude exceeds 10 000 ft.

— State the consequences and the actions required in case of a rapid and a slow decompression.

De-icing, anti-icing

— State the concepts of de-icing and anti-icing.

— Name the components of an aircraft protected from ice accretion.

— State the different types of anti-icing/de-icing systems (hot air, electrical, fluid).

— State the requirement of ice detectors and indicators.

— State that the use of engine and wing anti-ice on ground is time limited.

Fuel

— State the types of fuel used by gas turbine engine (JET-A, JET-A1, JET-B).

— State the main characteristics of these fuels and give typical flash points, freezing points and density.

— Name the main components of a fuel system, state their location and state their function:

- lines;
- tank fuel pump;
- pressure control valves;
- fuel shut-off valve;

- cross feed valves;
- filter, strainer;
- tanks (wing, tip, fuselage, tail);
- sump and drain;
- tank vent system;
- fuel quantity and temperature sensor;
- refuelling/defuelling system; and
- fuel dump/jettison system.

— State the possible mass limitations in the event of loss of tank boost pumps in the centre tank.

— Define the term “unusable fuel”.

— State the function of the cross-feed.

— State the use and purpose of drip sticks (manual magnetic indicators).

— State the objectives of a fuel jettison system.

— Name the following fuel system parameters:

- fuel quantity and density indication;
- warning of fuel low quantity, low pressure, low temperature; and
- filter clogging indication.

— Define the term fuel freeze.

— State the consequences in case of fuel freeze.

— State the effect of ram rise to the total air temperature and the relation to OAT/SAT in the context of fuel freeze.

Electrics

— Define static electricity and the reason for static discharger.

— State the reason for grounding plugs of aircraft for refuelling/defuelling.

— State the term alternating current (AC).

— Define frequency, voltage and ampere in qualitative terms and state the unit of measurement.

— Distinguish between the use of a particular frequency and wild frequency.

— State the requirement of circuit breaker.

— State the function of an aircraft battery.

— State the effect of temperature on battery capacity.

— State that battery power is time limited.

— State the methods of electricity generation:

  • DC generator; and

  • AC generator.

— State the operating principle of an engine generator and its purpose.

— State the function of revolutions per minute (RPM) controlled (constant speed) AC generator output.

— Name the following different power sources to drive an AC generator:

  • engine or APU gearbox;

  • ram air turbine (RAT); and

  • hydraulic driven.

— State that the integrated drive generator (IDG) is an integrated constant speed drives (CSD)/generator (GEN) system.

— State the reason and the consequences of a mechanical disconnect of a CSD/IDG during flight.

— State the function of non-RPM controlled (wild frequency) AC generator output.

— Compare RPM controlled and wild frequency generator systems and provide the advantage and/or disadvantage.

— State the requirement to convert AC into DC and vice versa.

— Name the transformer rectifier unit (TRU) to convert AC into DC.

— Name the static inverters used to convert DC into AC.

— State that an automated priority switching is used for different consumer of electrical power on ground and in flight.

— State the function of a bus (bus bar).

— State the primary function of the following buses:

  • main bus;

  • essential bus;

- emergency bus;
- ground bus; and
- battery bus.

— State that the aircraft structure can be used as a part of the electrical circuit (common ground).

— State the function of external power.

— State the reasons of an electrical load management system:

- distribution;
- monitoring; and
- protection (overloading, over/under voltage, frequency).

Engines

— State how thrust is produced by a basic gas turbine engine;

— Name the main components of a basic gas turbine engine:

- inlet;
- compressor;
- combustion chamber;
- turbine; and
- outlet.

— Name the different types of gas turbine engines:

- straight jet;
- turbo fan; and
- turbo prop.

— State that a gas turbine engine can have one or more spools (N1, N2, N3).

— State how thrust is produced in turbojet, turbofan and turboprop engines.

— State the advantage/disadvantage of propeller propulsion in relation to speed.

— Define the term bypass ratio.

— State the variations of propulsive efficiency for turbojet, turbofan and turboprop engines.

— Define the term “specific fuel consumption”.

— State that thrust can be considered to remain approximately constant over the whole subsonic speed range.

— Describe fan/propeller thrust and torque and their variation with TAS.

— State the functions of the engine air inlet/air intake.

— Evaluate advantages and disadvantages of fixed pitch and constant speed propellers.

— State the need of torque and RPM control for a constant speed propeller system.

— State the reasons and the risk of the following operational problems concerning the engine air inlet:

  • airflow separation;

  • inlet icing; and

  • inlet damage.

— State the purpose of the compressor.

— Name the following main components of a single stage and state their function for an axial compressor:

  • rotor vanes; and

  • stator vanes.

— State the gas parameter changes in a compressor stage.

— State the sensitivity for foreign object debris (FOD) and ice on fan and compressor blades.

— State the following terms:

  • compressor stall; and

  • engine surge.

— State the tasks of inlet guide vanes (IGVs).

— State the compressor pressure at low outside air temperatures (OAT) limits engine thrust.

— State the turbine inlet temperature at high OAT limits engine thrust.

— State the purpose and the basic working principle of the combustion chamber.

— State the gas parameter velocity, static pressure and temperature variation in an engine.

— Name the main components of a turbine stage and their function:

  • rotor vanes; and

- stator vanes.

— State the working principle of a turbine.

— State the function of active tip clearance control.

— Name the exhaust gas temperature (EGT) as an indicator of turbine performance and limitation.

— Define the term “flat rated engine”.

— State the working principle of the exhaust unit.

— Name the main components of the engine fuel system and state their function:

- high pressure pump;
- oil/fuel heat exchanger;
- fuel metering/control unit; and
- fuel filter.

— State parameter and indication of the engine control system:

- RPM N1, N2, N3;
- fuel flow (FF);
- fuel used;
- EGT;
- vibration; and
- engine pressure ratio (EPR).

— State the tasks of an engine lubrication system.

— Name the following main components of a lubrication system and state their function:

- oil tank;
- oil pumps (pressure and scavenge pumps);
- oil filters and by-pass;
- oil sumps and chip detectors; and
- oil/fuel heat exchanger.

— State oil filter clogging (blockage) as an operational risk.

— State the consequences of oil leakage into the bleed system.

— State the tasks and the function of the auxiliary gearbox.

— State the task of the ignition system.

— State the principle of a turbine engine start and types of starters:

  • electric; and

  • pneumatic.

— State the following aeroplane starting malfunctions:

  • dry start;

  • wet start;

  • hot start; and

  • hung start.

— State the principle of a reverse thrust system.

— Name the advantages and disadvantages of using reverse thrust.

— State the limitations on the use of the thrust reverser system at low ground speed.

— State the functions of thrust reverser elements:

  • reverser drive unit;

  • blocker doors;

  • reverser locking mechanism; and

  • reverser position indicator.

— State the following aeroplane engine limitations:

  • Take-off go-around (TOGA) power;

  • maximum continuous thrust; and

  • maximum climb thrust.

— State the reason of ground and flight idle RPM and the influence on go around and landing performance.

— State the parameters that can be used for setting and monitoring the thrust/power:

  • N1; and

  • EPR.

— State that engine limit exceedances must be reported.

— State the function of reduced (flexible) and de-rated thrust.

— State the advantages and disadvantages of flexible thrust.

— State the effects of the use of bleed air on RPM, EGT, specific fuel consumption and available thrust.

— State the advantage of an aircraft system without engine bleed air for air conditioning.

— State the operating principle of a built-in fire extinguishing system and state its components:

- fire detection;
- overheat detection; and
- fire extinguishing bottle and pipes.

— State that two discharges must be provided for each engine.

— State that an APU is an automatically operated and controlled gas turbine engine.

— State that an APU can provide electrical and pneumatic energy.

— State maximum operating altitude for the provision of electrical and pneumatic energy.

— State the mechanical stress and risk of an APU in-flight cold start.

— State the reason of APU's automatic shutdown function.

Equipment

— State the function of wipers and rain repellent.

— State the basic operating principle of a cockpit oxygen system.

— State the following different modes of operation:

- normal (diluter demand);
- 100 per cent; and
- emergency.

— State the operating principle and the purposes of the following two portable oxygen systems:

- smoke hood; and
- portable bottle.

— State the following two oxygen systems that can be used to supply oxygen to passengers:

  • fixed system (chemical oxygen generator or gaseous); and

  • portable.

— State the reason for automatic or manual actuation of the passenger oxygen mask.

— Compare chemical oxygen generators to gaseous systems with respect to:

  • capacity and supply time;

  • flow regulation; and

  • costs.

Air data parameters

— Define static, total and dynamic pressures and state the relationship between them.

— Describe the design and the operating principle of a:

  • static source;

  • pitot tube; and

  • combined pitot/static probe.

— State the air temperature measured in flight is the total air temperature (TAT).

— Distinguish between OAT, SAT and TAT.

— State the SAT must be calculated by the air data inertial reference unit (ADIRU) of the aircraft.

— State the relationship between the different temperatures to Mach number.

Angle of attack measurement

— Give examples of systems that use the angle of attack as an input, such as:

  • air data computer;

  • stall warning systems; and

  • flight envelope protection systems.

— Altimeter.

— Name the units used for altimeters:

  • feet; and

- metres.

— State the following errors and the means of correction:

- pitot/static system errors; and
- temperature error (air column not at ISA conditions).

— Extract examples of altimeter corrections from the operations manual.

Vertical speed indicator (VSI)

— Name the two units used for VSI and state the relationship between them:

- metres per second; and
- feet per minute.

Airspeed indicator

— Define IAS, EAS and TAS and state the relationship between these speeds.

— Name the function of IAS.

— Name the function of TAS.

— Describe the following errors and state when they must be considered:

- pitot/static system errors;
- compressibility error; and
- density error.

— Interpret tables from the operations manual and compare IAS, TAS, Mach number, TAT, SAT.

— Define the Mach number.

— State the existence of MMO and Max operating IAS (EAS).

Air data computer (as a module of the inertial reference system)

— Name the following possible input data:

- static air pressure;
- total air pressure;
- total air temperature;

- angle of attack; and
- flaps and landing gear position.

— Name the following output data:

- IAS;
- TAS;
- SAT;
- TAT;
- Mach number;
- angle of attack;
- altitude;
- vertical speed; and
- VMO/MMO.

Magnetism, direct reading compass and flux valve

— Describe the magnetic field of the Earth and the properties of a magnet.

— State the causes of the magnetic field of the aircraft and explain how it affects the accuracy of the compass indications.

Gyro

— State the function of gyros as a part of the inertial reference system (IRS).

— State the advantages and disadvantages of gyros.

— State the information obtained by gyro-functions:

- turn and slip;
- attitude;
- direction; and
- position.

— Define inertial reference system (IRS).

— State the basic principles of inertial navigation.

— Name the sample input of the IRS:

- Gyro;
- VOR DME;
- LLZ/GP;
- GNSS; and
- FMS data.

— Name the outputs provided by the IRS:

- latitude, longitude;
- attitude (pitch, roll and yaw);
- true and magnetic heading;
- wind speed and direction;
- ground speed;
- acceleration;
- angular rate data;
- altitude; and
- track deviation.

— State that an IRS can be a stand-alone system or integrated with an air data computer.

Automatic flight control system

— Name the following two functions of an automatic flight control system (AFCS):

- aircraft control;
- aircraft guidance; and
- aircraft protection.

— Name the system components of AFCS:

- auto pilot;
- flight director;
- thrust control computer;

- pilots interface (flight mode annunciator (FMA)); and
- flight management system (FMS).

— State the consequences in case of auto flight outage in view of landing minima and pilot workload.

— State the function of a flight director (FD) system.

— State the functions of the FMA:

- AFCS lateral and vertical modes;
- auto-throttle modes;
- FD selection, AP engagement and automatic landing capacity; and
- failure and alert messages.

— State the function of an autoland system.

— Define the following terms:

- fail passive;
- fail operational (fail active) systems; and
- alert height.

— Name the wind component as an operational limitation for autoland.

— State the function of the Yaw Damper system.

— State the consequences in case of inoperative Yaw Damper.

— State the function of the Flight Envelope Protection (FEP):

- stall protection; and
- overspeed protection.

— State the function of the auto-throttle (AT) system.

— State consequences in case of an AT-system outage.

Communication system

— State the function of a datalink transmission system.

— Compare voice communication versus datalink transmission systems.

— State that VHF, HF and SATCOM devices can be used for voice communication and datalink transmission.

— State the advantages and disadvantages of each transmission mode with regard to:

  • range;

  • line of sight limitations;

  • quality of the signal received;

  • interference due to ionosphere conditions; and

  • data transmission speed.

— Define downlink and uplink communications.

— State that a D-ATIS is an ATIS message received by datalink.

— Describe the ACARS network.

— Describe the two following systems using the VHF/HF/Satcom datalink transmission:

  • Aircraft Communication Addressing and Reporting System (ACARS); and

  • air traffic service unit (ATSU).

— Name the following on-board components of an ATSU:

  • communications management unit (VHF/HF/SATCOM);

  • datalink control and display unit (DCDU);

  • multifunction control display unit (MCDU) for AOC, ATC and messages from the crew (downlink communication);

  • ATC message and visual warning providing controller-pilot data link communications (CPDLC); and

  • printer.

— State that the system capability shall meet specific requirements for specific RNP/ATM routings.

— Name typical operational datalink messages:

  • Out of the gate, Off the runway, On the runway and Into the gate (OOOI);

  • load-sheet;

  • flight plan;

  • passenger information (connecting flights);

  • weather reports (aerodrome routine meteorological report (METAR), aerodrome forecast (TAF));

  • maintenance reports (engine exceedances); and

- free text messages.

— Give examples of CPDLC messages such as:

- departure clearance; and
- oceanic clearance.

— State the existence of the Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) concept.

— State that the future air navigation system - A (FANS-A) uses the ACARS network.

— Compare the ADS application with the secondary surveillance radar function and the CPDLC application with VHF communication systems.

— List the different types of ADS contracts:

- periodic;
- on demand;
- on event; and
- emergency mode.

Flight management system (FMS)

— State the function of an FMS:

- lateral/vertical navigation and guidance; and
- costs, fuel and time optimization.

— Name the possible inputs of an FMS:

- aircraft performance data;
- navigation data (AWY, standard routings, directs); and
- manual waypoint and route selection.

— State the function of the FMS in relation to the auto flight system.

— State the function of the navigation database and the aircraft’s database and state the update cycle and procedure.

— State the correction factor of tail sign specific performance.

— Define the cost index (CI) in relation to speed, route and altitude computation.

— Describe navigation accuracy computations in degraded modes of operation: back up navigation, use of raw data, RAIM function for RNAV procedures.

— State fuel computations on the basis of standard and non-standard configurations including one-engine out, landing gear down, flaps, spoilers, use of the anti-ice system, increase of consumption due to an MEL/CDL item, etc.

— State automatic radio navigation and tuning (Comm, Nav).

— State the basic functions of the pilot interface (i.e. MCDU).

Alerting and proximity system

— State the purpose of the flight warning system (FWS) in view of normal and abnormal situations.

— State the function of a stall warning and protection system.

— State the possible consequences for the operation in case of a warning system outage.

— State the purpose of an overspeed warning system (maximum operating speed (VMO)/maximum Mach operating speed (MMO)).

— State the possible consequences for the operation in case of a overspeed warning system outage.

— State the purpose of a take-off warning system and list typical abnormal situations generating a warning.

— State the function of an altitude alert system.

— State the possible consequences for the operation in case of an outage of the altitude alert system.

— State the function of a low altitude radio-altimeter.

— Name the systems using the radio-altimeter information.

— State the range and accuracy of a radio-altimeter.

— State the function of the ground proximity warning systems (GPWS).

— Distinguish between GPWS and enhanced GPWS (EGPWS).

— State the possible consequences for the operation in case of a GPWS/EGPES outage.

— State the function of the runway awareness and advisory system.

— State that ACAS II is an ICAO Standard for anti-collision purposes and does not guarantee any specific separation.

— Distinguish between resolution advisory (RA) and traffic advisory (TA).

— State that RAs are calculated in the vertical plane only.

— State the possible consequences for the operation in case of a system outage.

— State that a detected aircraft without altitude reporting can only generate a traffic advisory.

— State that standard detection range is approximately 30 NM.

Cockpit user interface and display

— Distinguish the different interface and display technologies (mechanical instruments, CRT and flat panel) in relation to multi-function, reliability and redundancy.

— State the redundancy and flexibility during the use of wide screen flat panels for the use as:

  • primary flight display (PFD);

  • navigation display (ND); and

  • Electronic Flight Instrument Systems (EFIS/EAM).

— State that the ND can be used in different modes for oversight or specific navigational task.

— Name aircraft system information and status items are displayed by the Electronic Flight Information System (EFIS) or Electronic Centralized Aircraft Monitor (ECAM).

— State that specific check lists are displayed automatically depending on the aircraft systems condition.

— State the purpose and typical data and functions of the Electronic Flight Bag (EFB).

— Distinguish between the standard EFB classes 1, 2 and 3 in view of cockpit system integration, operator data/information and data exchange between EFB and aircraft.

Maintenance, monitoring and recording system

— State the basic function of the maintenance, monitoring and recording system.

— State the function of automatic aircraft system status data processing as a prerequisite to an effective system and health monitoring.

— State the purpose of a cockpit voice recorder (CVR) and a flight data recorder (FDR).

— Name the voice communication recorded by the CVR: audio from the flight deck, radio telephony, public address, interphone.

— Name the main components of an FDR:

  • recording system; and

  • data interface.

— Name the main parameters recorded on the FDR:

  • time and relative time count;

- aircraft pitch and roll;
- airspeed and acceleration;
- pressure altitude;
- heading;
- thrust on each engine;
- cockpit lever/switch position (i.e. gear, flaps, thrust);
- aerodynamic configuration (i.e. spoiler, flaps, slats, gear);
- essential aircraft system data (i.e. fuel, electric, hydraulic, anti-ice, pneumatic);
- auto flight input and status; and
- navigation (i.e. position/time, NAVAID signal reception, waypoints, routing).

Prerequisite learning objectives: Meteorology

Atmosphere, composition, extent, vertical division

— Sketch the vertical division of the atmosphere, based on the temperature variations with height.

— Name troposphere and stratosphere as different layers and their main qualitative characteristics.

— State the main characteristics of the tropopause.

— State the variations of the flight level and temperature of the tropopause from the poles to the equator.

— Indicate the variations of the flight level of the tropopause with the seasons and the variations of atmospheric pressure.

Air temperature, definition and units

— Name the units of measurement of air temperature used in aviation meteorology (°C, °F, Kelvin).

— State the mean vertical distribution of temperature in the troposphere and stratosphere.

— Mention general causes of the cooling of the air in the troposphere with increasing altitude.

— Calculate the temperature and ISA deviations at specified levels.

— State how local cooling or warming processes result in transfer of heat.

— Distinguish between solar and terrestrial radiation.

— State the effect of absorption and radiation in connection with clouds.
— Name situations in which convection occurs.

— Name situations in which advection occurs.

— State qualitatively and quantitatively the dry and moist adiabatic lapse rates of the troposphere (3°C/1 000 ft and 2°C/1 000 ft).

Development of inversions, types of inversions

— State development and types of inversions.

— State the characteristics of inversions and of an isothermal layer.

— State the reasons for the formation of the following inversions:

  • ground inversion (nocturnal radiation/advection), subsidence inversion; and

  • frontal inversion, inversion above friction layer, valley inversion.

— State how the temperature near the Earth's surface is influenced by seasonal variations.

— State the cooling and warming of the air on the Earth or sea surfaces.

— State the influence of the clouds on the cooling and warming of the surface and the air near the surface.

— State the influence of inversions on the aircraft performance.

— Compare the flight hazards during take-off and approach associated to a strong inversion alone and to a strong inversion combined with marked wind shear.

Atmospheric pressure and density

— Define atmospheric pressure and atmospheric density.

— Name the units of measurement of the atmospheric pressure used in aviation (hPa, inches HG).

— State the relationship between pressure, temperature and density.

— State the vertical variation of the air density in the atmosphere.

— State isobars on the surface weather charts.

— Define high, low, trough and ridge.

— State the reason of exponential pressure gradient with increasing height.

— State qualitatively the variation of the barometric lapse rate, on SL 27 ft/hPa, at FL180 50 ft/hPa, average 30 ft/hPa.

— Define QNH, QFE.

— State the difference between QNH and sea level pressure under non-ISA conditions.

International standard atmosphere (ISA)

— State the use of standardized values for the atmosphere.

— Name the main values of ISA for pressure and temperature at mean sea level.

— Calculate the standard temperature in Celsius for a given flight level.

Altimetry

— Define the following terms and abbreviations and state how they are related to each other: height, altitude, pressure altitude, flight level, true altitude, true height, elevation and standard altimeter setting (QNH, standard).

— Define the terms transition altitude, transition level, transition layer, terrain clearance, minimum usable flight level.

— Name the altimeter settings associated with height, altitude, pressure altitude and flight level.

— State the reading of the altimeter of an aircraft on the ground during different settings.

— Calculate the true altitude/height the following rule of thumb (4 per cent rule): the altitude/height changes by 4 per cent for each 10°C temperature ISA-deviation.

Wind

— State the units of wind direction and speed.

— State how wind is measured in meteorology.

— Define the term horizontal pressure gradient.

— State the influence of the Coriolis force in relation to the wind.

— Define atmospheric convergence and divergence.

— Define the general global circulation (jet streams).

— State the defined minimum speed of a jet stream and typical figures for the dimensions of jet streams.

— Distinguish the intensity of vertical air mass movement in categories (clear air turbulence (CAT)).

— State where CAT is found in association with jet streams, in high level troughs and in other disturbed high level air flows.

— Sketch land breezes and sea breezes.

— State the origin and formation of mountain waves.
— State the origin and formation of the Foehn wind effect.

— Name the common types of turbulence (convective, mechanical, orographic, frontal, clear air turbulence).

— State where turbulence will normally be found (rough ground surfaces, relief, inversion layers, CB, TS zones, unstable layers).

— State the areas of worst wind shear and CAT (Annex 3 — *Meteorological Service for International Air Navigation*).

Humidity

— State the significance for meteorology of water vapour in the atmosphere.

— Indicate the sources of atmospheric humidity.

— Define dew point.

— State the spread (difference OAT/dew point) in relation to cloud base height.

— Define relative humidity.

— Name the units of relative humidity (%) and dew point temperature (°C, °F).

— State the relationship between temperature, dew point and condensation.

— State the effects of condensation on the weather.

— Define supercooled water.

Clouds and fog

— Sketch the cloud base and top in a simplified diagram (temperature, pressure, humidity).

— Name cumulus cloud types in unstable air conditions and their influence on aviation.

— Distinguish between ice clouds, mixed clouds and pure water clouds.

— Define FG fog, BR brume/mist and HZ haze with reference to WMO standards of visibility range.

— Name the factors contributing in general to the formation of fog and brume/mist.

— Name the factors contributing to the formation of haze.

— State the difference between freezing fog and ice fog.

— State the conditions for the development and dissipation of radiation fog, advection fog, frontal fog, orographic fog and steam fog.

Precipitation

— State the atmospheric conditions that favour process of precipitation.

— Name the types of precipitation given in the TAF and METAR codes (drizzle, rain, snow, snow grains, ice pellets, hail, small hail, snow, pellets, ice crystals, freezing drizzle, freezing rain).

— State the mechanism for the formation of freezing precipitation.

— State the weather conditions that give rise to freezing precipitation.

Air masses and fronts

— State the influence of maritime and continental conditions on air masses.

— State the effect of air mass passage over cold or warm surfaces.

— State the boundaries between air masses (fronts).

— Define front and frontal surface (frontal zone).

— Define warm front.

— State the cloud, weather, ground visibility and aviation hazards at a warm front.

— Define cold front.

— State the cloud, weather, ground visibility and aviation hazards at a cold front.

— Define the term occlusion.

— State the cloud, weather, ground visibility and aviation hazards in an occlusion.

— Define the term stationary or quasi-stationary front.

— State the cloud, weather, ground visibility and aviation hazards in a stationary or quasi-stationary front.

— State the movements of fronts and pressure systems and the life cycle of a mid-latitude depression.

— State the difference between the speed of movement of cold and warm fronts.

Pressure systems

— State the conditions necessary for the formation of tropical revolving storms.

— State how a tropical revolving storm moves during its life cycle.

— Name the stages of the development of tropical revolving storms (tropical disturbance, tropical depression, tropical storm, severe tropical storm, tropical revolving storm).

— State the meteorological conditions in and near a tropical revolving storm.

— State the approximate dimensions of a tropical revolving storm.

— Name the areas of origin and occurrence of tropical revolving storms, and their specified names (hurricane, typhoon, tropical cyclone).

— State the expected times of occurrence of tropical revolving storms in each of the source areas, and their approximate frequency.

Climatology

— State the formation of convective cloud structures caused by convergence at the boundary of the north-east (NE) and south-east (SE) trade winds at the intertropical convergence zone (ITCZ).

— Indicate on a map the ITCZ and state the associated weather.

— State the seasonal movement of the ITCZ.

— State the weather and winds at the ITCZ.

— State the flight hazards associated with the ITCZ.

— Define in general the term monsoon.

— State the major monsoon conditions.

— Indicate on a map the major monsoon areas.

Icing conditions

— Summarize the general conditions under which ice accretion occurs on aircraft in flight and on ground (temperatures of outside air; temperature of the airframe; presence of super cooled water in clouds, fog, rain and drizzle).

— Define clear ice.

— State the conditions for the formation of clear ice.

— Define rime ice.

— State the conditions for the formation of rime ice.

— Define mixed ice.

— State the conditions for the formation of mixed ice.

— Define frost.

— State the conditions for the formation of frost.

— State the ICAO qualifying terms for the intensity of icing (See the *Procedures for Air Navigation Services — Air Traffic Management* (Doc 4444)).

— State, in general, the hazards of icing and the dangers of the different types of ice accretion.

— State the possibilities of icing avoidance and mitigation:

- altitude variation;
- circumnavigate; and
- increase speed and TAT.

Turbulence and wind shear

— State the ICAO qualifying terms for the intensity of turbulence (See the *Procedures for Air Navigation Services — Air Traffic Management* (Doc 4444)).

— State the effects of turbulence on an aircraft in flight.

— State the effects on flight caused by CAT.

— State the possibilities of avoidance.

— Define wind shear (vertical and horizontal).

— State conditions where and how wind shear can form (e.g. thunderstorms, squall lines, fronts, inversions, land and sea breeze, friction layer, relief).

— State the effects on flight caused by wind shear.

— Indicate the possibilities of avoidance.

Thunderstorms and tornados

— Name the cloud types which indicate the development of thunderstorms.

— Name the stages of the life history of a thunderstorm: initial, mature and dissipating stages.

— Assess the average duration of thunderstorms.

— State the effects of lightning strike on aircraft and flight execution.

— Summarize the flight hazards of a fully developed thunderstorm.

— Name the stages of the life history of a super cell: initial, supercell, tornado and dissipating stages.

— Define the term tornado.

— Define the term downburst.

— Distinguish between macroburst and microburst.

— State the weather situations leading to the formation of downbursts.

— Give the typical duration of a downburst.

— State the effects of downbursts.

— State how thunderstorms can be anticipated: weather briefing, observation in flight, use of specific meteorological information, use of information given by weather radar and use of lightning detector.

— Indicate the possibilities of avoidance of thunderstorm hazards.

Flight hazards

— State the influence of a mountainous terrain on cloud and precipitation.

— State the vertical movements, wind shear and turbulence typical of mountain areas.

— State the reduction of visibility caused by precipitation: drizzle, rain, snow.

— State the reduction of visibility caused by obscurations: fog, mist, haze, smoke, volcanic ash, sand (SA) and dust (DU).

Meteorological information

— Indicate the means of observation of present weather (automation and human observation).

— List the contents of aerodrome weather reports and state units of measurement used for each item:

- wind direction and speed;
- variation of wind direction and speed;
- visibility;
- present weather;
- cloud amount and type including the meaning of CAVOK;
- air temperature and dew point;
- pressure values; and
- supplementary information.

— State the differences between ground visibility, flight visibility, slant visibility and vertical visibility when an aircraft is above or within a layer of haze or fog.

— State the meteorological measurement of surface wind.

— Define gusts, as given in the METARs.

— Distinguish wind direction as provided by METAR and ATIS/Control tower.

— State the meteorological measurement of visibility.

— Name the unit used for ground visibility (m, km, ft, SM).

— Define runway visual range.

— State the meteorological measurement of runway visual range.

— State the position of transmission meters on airports.

— Name the units used for runway visual range (m, ft).

— Indicate the means of observing clouds: type, amount, height of base (ceilometers) and top.

— Name the clouds considered in meteorological reports, and how they are indicated in METARs (TCU, CB).

— Define the terms octa, cloud base and ceiling.

— Name the unit and the reference level used for information about cloud base.

— Name the unit used for vertical visibility (ft).

— Indicate the means of observation of air temperature (thermometer).

— Indicate the means of observation of atmospheric pressure (mercury and aneroid barometer).

— State the basic outlines of satellite observations.

— Name the main uses of satellite pictures in aviation meteorology.

— State the different types of satellite imagery.

— Define the terms routine air-report and special air-report.

— State the obligation of a pilot to make air-reports.

— Name weather phenomena to be stated in a special air-report.

— State from a significant weather chart the flight conditions at designated locations and/or along a defined flight route at a given flight level.

— Extract wind direction/speed from surface weather charts.

— Extract wind direction/speed and OAT from upper air data charts.

— Extract for designated locations or routes from upper air data charts, if necessary by interpolation, the spot/average values for OAT and wind direction/speed.

— State the following aviation weather messages (given in written and/or graphical format): METAR, SPECI, TREND, TAF, SIGMET, AIRMET, GAMET, special air-report, volcanic ash advisory information.

— State the tropical cyclone advisory information in written and graphical form.

— State the general meaning of MET REPORT and SPECIAL.

— Decode by using a code table and interpret the Runway State Message as written in a METAR, GAFOR and SNOWTAM.

— Explain the meaning and application of ATIS and VOLMET.

— Name the main objectives of the world area forecast system:

  • world area forecast centres (upper air forecasts);

  • meteorological offices (aerodrome forecasts, briefing documents);

  • meteorological watch offices (SIGMET, AIRMET);

  • aeronautical meteorological stations (METAR, MET reports);

  • volcanic ash advisory centres; and

  • tropical cyclone advisory centres.

Prerequisite learning objectives: Mass and balance

Importance of structural limitations

— State that mass must be limited to ensure adequate margins of safety.

— State centre of gravity (CG) limitations, importance in regard to stability and controllability.

— Compare and name the effects on practice of the relationship between CG position and stability/controllability of aircraft, influence on the stall speed and drag.

— Name the effects if CG is in front of the forward limit: increases longitudinal stability, decreases controllability, stall speed increases.

— Name the effects if CG is behind the aft limit: decreases static longitudinal stability, increases controllability, stall speed decreases.

Mass terms

— Define the following mass terms:

  • basic empty mass;

  • dry operating mass;

  • operating mass;

  • take-off mass;

- landing mass;
- ramp/taxi mass;
- in-flight mass (gross mass); and
- zero fuel mass.

— Load terms (including fuel terms).

— Define and name the effects on practice of the following load terms:

- payload/traffic load;
- block fuel;
- taxi fuel;
- take-off fuel;
- trip fuel;
- reserve fuel (contingency, alternate, final reserve and additional fuel);
- extra fuel; and
- additional fuel.

— Calculate the mass of particular components on the basis of given components.

— Convert fuel mass, volume and density given in different units used in aviation.

Mass limits, structural limitations

— Define, compare and name the effects on practice of the following structural limitations:

- maximum zero fuel mass;
- maximum ramp/taxi mass;
- maximum take-off mass;
- maximum in-flight (gross) mass
- maximum in-flight (gross) mass with external load; and
- maximum landing mass.

Performance and regulatory limitations

— Define the following performance limitations:

- performance-limited take-off mass;
- performance-limited landing mass;
- regulated take-off mass; and
- regulated landing mass.

Cargo compartment limitations

— State, extract and name the effects on practice of the following cargo compartment limitations:

- maximum floor load (maximum load per unit of area); and
- maximum running load (maximum load per unit of fuselage length).

Mass calculations

— Calculate the allowed traffic load and allowed fuel load limited by maximum allowed mass for take-off.

— Calculate the allowed traffic load and allowed fuel load limited by maximum allowed mass for landing.

— Calculate the allowed traffic load limited by maximum zero fuel mass.

— Calculate the allowed fuel limited by maximum tank capacity.

— Calculate “under load/over load” as a difference of actual load and allowed traffic load.

— Calculate maximum extra fuel as a difference of minimum take-off fuel and maximum allowed fuel.

— Convert volumes and mass of fuel using density in mass per unit of volume.

— State the reason of standard masses for passengers, baggage and crew.

— Extract appropriate standard masses for passengers, baggage and crew from relevant documents.

Definition of centre of gravity (CG)

— Define the meaning of “centre of”.

— Name the datum (reference point), moment arm and moment as basis information for CG evaluation.

— Name where the CG limits for an aircraft can be found.

— Extract CG limits from given aircraft documents.

— State the different forms in presenting CG position as distance from datum or other references.

— Extract the CG position as a percentage of mean aerodynamic chord (% MAC).

— State the reason of using % MAC for the description of the CG position.

— Extract the CG-range % MAC for dry operating mass (DOM), maximum zero fuel mass (MZFM), maximum landing mass (MLAM) and maximum take-off mass (MTOM).

— State the influence of CG position on performance and flight planning.

Details of passenger and cargo compartments

— Extract appropriate data seating schemes, compartment dimensions and limitations of passenger and cargo compartments from given sample documents.

— State the influence of centre tank fuel system-related MEL items on mass and balance considerations.

— Extract appropriate fuel tank capacities and fuel tank positions from given sample documents.

Weighing of aircraft (general aspects)

— State the operator's responsibility for correct aircraft masses.

— Name the basic empty mass from the weight/mass report as the basis for DOM.

— State examples for deviations from the standard configuration caused by variations of:

  • crew compliment;

  • emergency equipment;

  • catering material; and

  • additional fuel tanks.

— Determine CG position of aircraft by use of loading graphs given in sample documents.

— State the advantage of the index method.

Load and trim sheet, general considerations

— State the principle and the purpose of trim sheets:

  • evaluation of CG movements by different CG positions within limits (envelope) during all stages of flight;

  • masses within limits during all stages of flight; and

  • CG position and masses as variables for performance and trim evaluations.

— State the purpose and the operational aspects of a last minute change.

— State the purpose of load sheet sections and the methods for establishing allowed mass for take-off, allowed traffic load and under load.

— State the purpose of load sheet sections and the methods for assessing load distribution.

— State the reason of index movement during flight.

— State the different index limits in relation to flight condition (T/O, landing, zero fuel, dry operating).

— State the risk of re-positioning of CG by unintentional load shifting.

— Distinguish the CG movement caused by passenger located in the front and in the centre of the cabin.

— State that the maximum allowed mass of a container is limited by maximum mass per area.

— State the linear load distribution of a container to avoid exceeding maximum permissible running load.

Prerequisite learning objectives: Operational procedures

Operation of aircraft

— Define the reasons for alternate aerodromes: take-off alternate, en-route alternate, ETOPS en-route alternate and destination alternate.

— Define flight duty time and block time.

— State the compliance of the operations manual with laws, regulations and procedures based on national law and ICAO Standards and Recommended Practices (SARPs).

— State the reason of an accident prevention and flight safety program, safety management system (SMS) and flight safety document system.

— Define the prerequisites of an accident prevention and flight safety program, and flight safety document system.

— Describe how an SMS can influence the functions and tasks in operational control.

— Define the term system of operational control and the role of the human and technical resource in this system.

— State the general ICAO qualification standards of personnel exercising operational control tasks.

— State the health condition issues of aviation personnel in relation to drugs, alcohol and medicine.

Air operator certification and manuals

— State the applicability of OPS regulations.

— Define a commercial air transportation flight.

— State the requirements about language for crew communication and the operations manual.

— State the requirements to be satisfied for the issue of an air operator certificate (AOC).

— Define the terms shall and should in context with operational procedures.

— State the operator's responsibilities regarding the operations manual.

— State that all non-type-related operational policies, instructions and procedures needed for a safe operation are included in the general operations manual.

— State that all type-related instructions and procedures needed for a safe operation are included in the aircraft-related part of the operations manual.

— Distinguish between aircraft minimum equipment list (MEL) and aircraft configuration deviation list (CDL).

— Distinguish between master-MEL (MMEL) and MEL.

— Distinguish between master-CDL (MCDL) and CDL.

— State the ATA chapter from the MEL as a unique classification standard of aircraft systems, spare parts and procedures.

— Define the limits of MEL/CDL applicability in relation to pre-flight and in flight.

— State that the elements of aircraft systems not mentioned in the MEL or CDL need to be fully functional.

— Define the following terms: commencement of flight, inoperative, MEL and CDL rectification interval.

— State that generally, for items which are inoperative beyond the period specified in the MEL, this results in the aircraft being no longer airworthy.

— State the rules applicable to the AOC.

— State the conditions to be met for the issue or revalidation of an AOC.

— Explain the contents and conditions of the AOC.

Responsibility, program and policy

— State the operator's requirement for the nomination of persons responsible for essential functions and operational standards.

— Describe the operator's responsibility (nominated person) regarding an aircraft continued airworthiness program.

— Describe the operator's responsibility (nominated person) regarding the definition of aircraft, cargo and passenger ground handling standards.

— Describe the operator's responsibility (nominated person) regarding the transfer of manufacture data and SOPs into operator aircraft data and aircraft handling SOPs.

— Describe the operator's responsibility (nominated person) regarding the transfer of data and SOPs into the training process.

— Describe the function and responsibility of an accountable manager.

— State the operator's responsibility regarding the distinction between cockpit, cabin and additional crew members.

— State the regulations concerning endangering safety.

— State the operator's responsibility and list the documents to be carried on each flight.

— List the additional information and forms to be carried on board.

— List the items of information to be retained on the ground by the operator.

— Define the terms: pre-flight inspection, approved standard, approved by the authority.

— Describe the aircraft manufacture responsibility for initial airworthiness on the basis of given certification standards.

— Name the data and SOPs issued by the manufacturer for the operation of aircraft and the continuation of airworthiness:

  • Flight crew operating manual (FCOM);

  • Aeroplane flight manual (AFM);

  • master minimum equipment list and master configuration deviation list (MMEL and MCDL);

  • Maintenance manual;

  • illustrated parts catalogue;

  • aircraft repair manual;

  • Flight planning and performance manual (FPPM); and

  • data for flight-planning and performance applications.

— Describe the transfer of manufacture data and SOPs into the operations manual.

— State the operator's responsibility regarding inspections.

— State the responsibility of the operator regarding the production of and access to records and documents.

— State the operator's responsibility regarding the preservation of documentation and recordings; including recorders recordings.

— Define the terms used in leasing (wet/dry) and state the responsibility and requirements of each party in various cases.

— State the operator's responsibilities regarding competence of flight operations personnel.

— State the operator's responsibilities regarding establishment of procedures.

— State the operator's responsibilities regarding the use of air traffic services.

— State the operator's responsibilities regarding authorization of aerodromes/heliports and name the factors of influence.

— State the parameters to be considered in noise abatement procedures.

— State the maximum distance from an adequate aerodrome for two-engine aircrafts without an ETOPS approval.

— State the operational conditions under which the maximum diversion distance shall be evaluated.

— State the requirement for alternate airport accessibility check for EDTO/ETOPS operations.

— List the factors to consider when establishing minimum flight altitude.

— Name the components of the fuel policy and state their function.

— State the crew member responsibilities in the execution of their duties.

— Define the responsibility and authority to exercise operational control according to Annex 6 — *Operation of Aircraft*.

— State the authority, responsibility and the duties of the FOO/FD and PIC in relation to operational control.

— State the responsibilities in the execution of different role- and operator-specific tasks in operations control, flight dispatch, navigation/operations engineering and flight control/mission support.

— Explain the general rules for the structure and the content of the operations manual.

— Explain the structure and subject headings of the operations manual:

  • Flight Operations Manual (FOM, OM-A);

  • Aircraft Operation Manual (AOM, OM-B);

  • route documentation, NAV-data (OM-C);

  • training manual (OM-D); and

  • Ground Operation Manual (GOM).

— State the requirements for a journey and a technical log book.

— Describe the requirements regarding the operational flight plan.

— State the requirements for flight document storage periods.

Aircraft airworthiness

— State the reason of worldwide airworthiness standards (Annex 8— *Airworthiness of Aircraft*).

— State the reason of the harmonization of national/regional certification specifications (CS).

— State the reason of aircraft category in view of the standards of Annex 8.

— State the issuing authority for a certificate of airworthiness.

— State the necessity to have a valid certificate of airworthiness for the legal operation of aircraft.

— State essential elements and prerequisites for a certificate of airworthiness.

— State the responsibility regarding the continuity of an aircraft's airworthiness.

— Name the documents provided by the aircraft manufacture for the certification process and define their content:

  • Aeroplane flight manual (AFM);

  • Flight crew operating manual (FCOM);

  • master minimum equipment list (MMEL); and

  • master configuration deviation list (MMCDL).

— State the necessity of the operator to transfer certified manufacture raw data into the content of the operations manual.

— State manufacturer's responsibility for the issue and distribution of airworthiness directives and service bulletins where necessary.

— State the operator's responsibility for the continuation of aircraft airworthiness and equipment serviceability.

— State the operator's responsibility for the oversight over the contracted aircraft maintenance provider.

— Describe the requirements for ensuring that maintenance is carried out to an appropriate standard and quality.

— Describe the limiting factors for the planning of regular, planned and unplanned aircraft maintenance actions and the operational risks during the integration of a planning process.

— State the requirements for maintenance records.

— State the reason of a maintenance release before commencing a flight.

Aircraft maintenance planning and control basics

— Distinguish between the terms maintenance, repair and overhaul (MRO).

— Name the maintenance event planning and the factors of influence on the aircraft rotation planning (tail assignment):

  • planned and regular maintenance check (letter checks) interval;

  • planned modifications, overhaul and repair;

  • unplanned maintenance events and the risk of findings during regular maintenance;

  • the availability and productivity of resources (staff, material, infrastructure);

  • the certification, competence, quality, costs and location of maintenance provider;

  • limiting cycles/hours per aircraft, target utilization;

  • aircraft reserve capacity;

  • workload and resource management, allocation and harmonization of work packages to downtimes;

  • resource capacity and spare part availability at planned aircraft downtime location;

  • risk of unplanned downtime extensions or AOG;

  • availability of reserve aircraft capacity; and

  • operator’s flexibility for aircraft or equipment change.

— State the reliability program and engine conditions monitoring as a risk management element.

Ground operations

— State the structure and the subject headlines for aircraft handling procedures in a Ground Operation Manual (GOM).

— State the operator’s responsibility for the oversight of the performance of the contracted aircraft handling provider.

— Describe the requirements ensuring aircraft ground handling is carried out to an appropriate standard and quality.

— Describe the risk factors during ground handling in view of damage to the aircraft and flight delays.

— Describe the resources required for aircraft handling.

— State the documentation requirements during ground operation.

Passengers and cargo

— State the regulations concerning the carriage of persons on an aircraft.

— State the operator's and commander's responsibilities regarding admission to the flight deck and the carriage of unauthorized persons or cargo.

— State the operator's responsibility concerning portable electronic devices.

— State the operator's responsibilities regarding admission in an aircraft of a person under the influence of drug or alcohol.

— State the operator's responsibilities for the carriage of inadmissible passengers, deportees or persons in custody.

— State the requirements for the stowage of baggage and cargo in the passenger cabin.

— State the requirements regarding passenger seating and emergency evacuation.

— State the requirements for carrying persons with reduced mobility.

— State the risks and the resulting procedures for refuelling/defuelling with passenger on board and in relation to different fuel types.

— State crew members at station policy.

Transport of dangerous goods (DG) by air

— State the DG qualification requirements for FD/FOO.

— Decode the terminology relevant to dangerous goods: airway bill number (AWB-NR), cargo aircraft only (CAO), emergency response guide (ERG), Technical Instructions (TI), ULD, UN identification number (UN/IDNR).

— Name the risks and the possible consequences during the handling and transport of dangerous goods.

— State the requirements for acceptance of dangerous goods.

— State the requirements regarding inspection for damage, leakage or contamination during DG acceptance.

— State loading restrictions: incompatibility, temperature controlled, maximum quantity, CAO.

— State the requirement for provision of information to the crew, i.e. NOTOC.

— Name the content of the NOTOC and provide examples.

— State the description (i.e. ERG, drill codes) of operational risks by the transportation of dangerous goods regulations (DGR).

— Define dangerous goods accident, dangerous goods incident, exemption according to Annex 18 — *The Safe Transport of Dangerous Goods by Air*, Chapter 1).

— State the requirements for dangerous goods incident and accident reports.

— State that detailed provisions for dangerous goods transportation are contained in the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284), Annex 18, Chapter 2 and IATA DGR.

— State IATA DGR based on Doc 9284 and provide details in relation to DG handling.

— State that in case of an in-flight emergency, the pilot-in-command must inform the ATC of DG transportation (Annex 18, Chapter 9, 9.5).

— State the principle of compatibility and segregation (Doc 9284).

— State the special requirements for the loading of radioactive materials (Doc 9284).

— State the use of the DG list (Doc 9284).

— State that DG transportation is subject to the approval of the operator.

— State that some articles and substances may be forbidden for air transportation.

— State that packing must comply with the technical instructions as specified in Doc 9284.

— State that labelling and marking requirements are regulated (Doc 9284).

— State that DG transport document requirements are regulated.

— State the need of an inspection prior to loading on an aircraft.

— State that undeclared DG found in the baggage are to be reported.

— Name effect on practice and the influence of DGR on the flight planning process.

Operational limitations and minima

— Define the factors of influence on the specifications of aerodrome/heliport operating minima.

— State the operator’s responsibilities regarding departure and approach procedures.

— State the elements to be considered regarding routes and areas of operation.

— State the additional specific navigation performance requirements for:

  • reduced vertical separation minimum (RVSM); and

  • required navigation performance (RNP).

— State the flight preparation forms to be completed before flight.

— State the operator’s responsibility for flight preparation.

— State the operations limitations regarding discarding requirements.

— State the rules for aerodromes/heliports selection including ETOPS configuration.

— Explain the planning minima for IFR flights.

— State under which conditions a flight can commence or continue regarding meteorological conditions.

— State the operator's responsibility regarding ice and other contaminants.

— State the operator's responsibility regarding fuel to be carried and in-flight fuel management.

— State the requirements regarding the use of supplemental oxygen.

— Explain the requirements for the use or ACAS/TCAS.

— State the circumstances under which a flight safety report shall be submitted.

— State the operator's responsibility regarding aerodrome/heliport operating minima.

— List the parameters to be considered in establishing the aerodrome operating minima.

— Define the criteria to be taken into consideration for the classification of aircraft.

— Define the following terms: precision approach, non-precision approach, circling approach, low visibility procedures, low visibility take-off and visual approach.

— Define the following terms: flight control system, fail-passive flight control system, fail-operational flight control system and fail-operational hybrid landing system.

— Define the following terms: final approach area, take-off area, minimum descent altitude/height and decision altitude/height.

— State the general operating rules for low visibility operations.

— State the basic operating procedures for low visibility operations.

— State the operator's responsibilities regarding minimum equipment for low visibility operations.

— Aerodrome operating minima: state under which conditions take-off can be commenced.

— Aerodrome operating minima: state that take-off minima are expressed as visibility or RVR.

— Aerodrome operating minima: state the take-off RVR value depending on the facilities.

— Aerodrome operating minima: state the system minima for non-precision approach.

— Aerodrome operating minima: state under which conditions a pilot can continue the approach below MDA/H or DA/H.

— Aerodrome operating minima: state the lowest minima for precision approach category 1, 2 and 3.

— Aerodrome operating minima: state the lowest minima for circling and visual approach.

— Aerodrome operating minima: state the RVR value and cloud ceiling depending on the NPA facilities.

— Aerodrome operating minima: state under which conditions an airborne radar approach can be performed and state the relevant minima.

— State the requirements and the resulting minima regarding operating RWY lights and other navigation equipment and markings.

— State the consequences in case of an outage in RWY lights and other navigation equipment and markings in relation to the approach procedure (list of downgraded equipment).

Minimum aircraft installations and equipment

— State the requirements regarding windshield wipers.

— List the equipment for operations requiring a radio communication and/or radio navigation system.

— List the minimum equipment required for an IFR flight.

— State the requirements for an altitude alert system.

— State the requirements for radio altimeters.

— State the requirements for GPWS or EGPWS and name the advantage of EGPWS.

— State the requirements for ACAS (TCAS) and state the operating principles.

— State the conditions under which an aircraft must be fitted with a weather radar.

— State the requirement for operations in icing conditions.

— State the conditions under which a crew member’s interphone system and public address system are mandatory.

— State the circumstances under which a cockpit voice recorder is compulsory.

— State the rules regarding the location, construction, installation and operation of cockpit voice recorders.

— State the circumstances under which a flight data recorder is compulsory.

— State the rules regarding the location, construction, installation and operation of flight data recorders.

— State the requirements about seats, seat safety belts, harnesses and child restraint devices.

— State the requirements about the “fasten seat belt” and “no smoking” signs.

— State the requirements regarding internal doors and curtains.

— State the requirements regarding first-aid kits.

— State the requirements regarding emergency medical kits and first-aid oxygen.

— Detail the rules regarding the carriage and use of supplemental oxygen for passengers and crew.

— Detail the rules regarding crew protective breathing equipment.

— Describe the minimum number, type and location of hand fire extinguishers.

— Describe the minimum number and location of crash axes and crowbars.

— State the requirements for means of emergency evacuation.

— State the requirements for megaphones.

— State the requirements for emergency lighting.

— State the requirements for an emergency locator transmitter.

— State the requirements for life jackets, life-rafts and emergency locator transmitters (ELTs).

— State the requirements for survival equipment.

— State additional requirements for helicopters operating to or from helidecks located in a remote sea area.

— Explain the general requirements for communication and navigation equipment.

— State that radio communication equipment must be provided.

— List the requirements for communications and navigation equipment when operating under IFR or under VFR over routes not navigated by reference to visual landmarks.

Staff licensing, qualification, composition and checking

— State the relationship and differences between Annex 1 — *Personnel Licensing* and national/regional rules.

— Explain to what extent States will accept licences, certificates, etc., issued by other States.

— Distinguish between licence or certificate and a rating.

— Distinguish between conventional and competency-based training.

— State the evidence-based training concept.

— Define the following terms in relation to the basic flight operations officer (FOO) qualification:

  • competence and observable behaviour;

  • tasks;

  • learning objectives;

  • training syllabus;

  • licence or certificate (State); and

- rating or allowance (operator).

— State that the FOO basic qualification does not authorize for operator- and role-specific duties, e.g. flight dispatch.

— State that the operator has to define role-specific tasks and competency targets.

— Describe typical role- and operator-specific job titles as examples.

- flight dispatcher;
- operations controller;
- operations engineer;
- performance engineer; and
- flight data manager.

— Define the following terms in relation to pilot qualification:

- type rating inclusive multi-crew coordination;
- additional ratings, i.e. all-weather operation (AWO), ETOPS; and
- additional qualifications: oceanic airspace, PBN and special airport approaches.

— State the requirements for a pilot to carry a flight crew licence/rating and a medical certificate during duty.

— State the requirements for certified staff in maintenance repair and overhaul organizations.

— Describe the reason for competence requirements in operational control, describe examples and name their effects on practice.

- active operational data allocation;
- risk identification, forecasting and evaluation;
- identification of options/solutions for problem solving;
- decision making and execution;
- communication; and
- post operations analysis.

— Describe the ICAO competence requirements of operational control personnel according the *Procedures for Air Navigation Services — Training* (PANS-TRG, Doc 9868) or related national regulations and provide examples:

- definition of knowledge, skills and attitude;

- definition of competence;
- definition of tasks in context with competencies; and
- the use of observable behaviours during the training and assessment of competencies.

— Define the general national regulations, licence or certification requirements for the basic flight operations officer.

— Define the operator's responsibility for role-specific qualification programs, i.e. flight dispatcher.

— Distinguish between general qualification/ licence requirements and operator-specific and task-related qualification requirements.

— Describe typical operator specific tasks in operational control:

- flight performance analysis;
- weather analysis;
- airport installation condition analysis;
- handling provisions and status analysis;
- aircraft technical status analysis;
- crew status analysis;
- flight planning and flight monitoring; and
- risk management.

— State the operator's responsibility to name the job titles of operations control centre (OCC) staff and the allocation of tasks.

— State that there are no worldwide standard job titles and standard task allocation for operational control functions.

— Describe the structure and the elements of a FOO/FD training manual on the basis of the ICAO documents or related national regulations:

- function of prerequisite learning objectives (LOs);
- tasks as realistic operational control duties;
- transfer from LOs to tasks and from tasks to exercises;
- classroom training for the exercise and assessment of competencies during the exercise of LOs and tasks; and
- software application, interface, data, rule and policy handling training in the classroom or on the job.

— Name the relevant parts of the operations manual describing the operator and task specific training programs in operational control.

— Name typical competence requirements and tasks for cabin and cockpit personnel.

— Distinguish between licence, rating and recurrent qualification requirements for cabin and cockpit personnel.

— Describe typical qualification elements and training methods for cabin and cockpit personnel.

— State the requirement regarding crew composition and in-flight relief.

— State the requirement for FOO/FD, cockpit and cabin crew conversion training and checking.

— State the requirement for differences training and familiarization training for FOO/FD, cockpit and cabin crew.

— State the requirement for FOO/FD, cockpit and cabin crew recurrent training and checking.

— State the prerequisite for a pilot to operate in either pilot's seat.

— State that minimum recent experience for FOO, cabin and cockpit staff needs to be monitored.

— State the conditions of route and airport specific qualification requirements.

— State the additional qualification requirement to operate more than one type of aircraft.

— State the training and check documentation requirement.

Duty time limitations and rest requirements

— Explain the definitions used for flight time regulation.

— State the flight and duty limitations according to national law.

— State the requirements regarding the maximum daily flight duty period.

— State the requirements regarding the rest periods.

— State the possible extension of flight duty period due to in-flight rest.

— Name the PIC decision-making authority in case of unforeseen circumstances in actual flight operations.

— State the regulation regarding standby duty.

— State the requirements regarding the flight, duty and rest period records.

Flight planning basics

— Describe and demonstrate a fuel mass evaluation by an application of standard fuel flow, speed and distance.

— Describe and demonstrate the fuel mass evaluation by the application of simplified table/graphs.

— Extract final reserve fuel from the Aircraft Operation Manual.

— State the factors influencing the result of final reserve fuel.

— Extract alternate fuel from a simplified alternate fuel planning table graph or table.

— State the factors influencing the result of alternate fuel.

— Extract trip fuel from a simplified trip fuel graph or table.

— State the factors influencing the result of trip fuel.

— Calculate contingency fuel as appropriate according a standard fuel policy.

— Describe the fuel mass evaluation by the application of integrated range tables.

— Distinguish the advantages and disadvantages of the fuel mass evaluation methods.

— Provide a fuel and aircraft mass evaluation scheme and integrate all relevant mass portions.

— Provide a fuel and aircraft mass evaluation scheme limited by maximum masses for take-off, landing, zero fuel and by maximum tank capacity.

— Sketch a simplified graph as a function of mass and distance, and display a payload/range relation.

Flight management

— State the operator’s responsibilities concerning EDTO/ETOPS routes:

  • EDTO/ETOPS boundary time;

  • selection criteria of suitable EDTO/ETOPS-alternates according to the relevant regulation;

  • definition of EDTO/ETOPS entry/exit points;

  • definition of equal time point (ETP), point of safe return (PSR);

  • definition of the critical point (CP) and critical fuel scenario; and

  • definition of the remaining fuel in flight.

— Selection of a route:

  • describe the meaning of the term adequate aerodrome; and

  • describe the limitation imposed by OPS on extended range operations with two-engine aircrafts with and without ETOPS approval.

— Selection of cruising altitude on the basis of local procedures:

  • specify appropriate cruising levels for normal long range IFR flights and for those operating on any sample Atlantic Operational Track Structure.

— Selection of alternate aerodrome:

  • state the circumstances under which a take-off alternate must be selected;

  • state the maximum flight distance of a take-off alternate for two-engine aircraft, ETOPS approved aircraft, and three or four engine aircraft;

  • state the factors to be considered in the selection of a take-off alternate;

  • state when a destination alternate needs not be selected;

  • state when two destination alternates must be selected;

  • state the factors to be considered in the selection of a destination alternate aerodrome; and

  • state the factors to be considered in the selection of an en-route alternate aerodrome.

— Define the factors of influence on the evaluation of optimized routes:

  • distance;

  • time;

  • costs; and

  • fuel used.

— Interpret VOR, NDB, VOR/DME information to evaluate aircraft position and aircraft course.

— Describe the ICAO procedures for navigation and communication applicable in oceanic airspace.

— Describe the general ICAO procedures applicable in oceanic airspace if the aircraft is unable to continue the flight in accordance with its air traffic control clearance or in case of radio communication failure.

  • describe the recommended initial action if an aircraft is unable to obtain a revised air traffic control clearance; and

  • describe the subsequent action for aircraft able to maintain assigned flight level and aircraft unable to maintain assigned flight level.

— State the maximum flight time recommended between waypoints in oceanic airspace.

— Describe how the desired route must be specified in the air traffic control flight plan.

— Explain why magnetic compasses become unreliable or useless in polar zones and describe the general problems of polar navigation.

— Describe what precautions can be taken when operating in the area of compass unreliability as a contingency against INS failure.

— Describe how grid navigation can be used in conjunction with a directional gyro in polar areas and the use polar stereographic chart and grid coordinates to solve polar navigation problems.

— Apply polar stereographic chart and grid coordinates to extract and evaluate navigation data.

— Convert grid navigation data into true navigation data, into magnetic navigation data and into compass navigation data.

— State the lateral dimensions (in general terms) and vertical limits of relevant oceanic airspaces.

— Describe the meaning of following functions or procedures: high level airspace (HLA), minimum navigation performance specification airspace (MNPSA), oceanic control area (OCA), organized track system (OTS), reduced vertical separation minimum (RVSM), long range navigation sensors (LRNS), Minimum Aviation System Performance Specification (MASPS), strategic lateral offset procedures (SLOP), West Atlantic Route System (WATRS).

— State the navigation equipment requirements for unrestricted oceanic airspace operations.

— State alternative routes and procedures for use by aircraft not equipped with sufficient long range navigation systems.

— Extract information for the application of oceanic airspace structure, i.e. organized track system in relation to:

  • message identifier;

  • direction changeover periods;

  • allowed flight level per direction;

  • standard speed and speed control requirements;

  • separation procedures and requirements;

  • waypoint list;

  • prerequisite for random track and FL operation;

  • methods for clearance delivery, position report and clearance delivery;

  • alternative communication procedures;

  • escape route standards after navigation or communication system failure;

  • standard procedure if an aircraft encounters a critical in-flight performance failure (i.e. one engine out); and

  • strategic lateral offset procedures (SLOP).

— State the requirement to assure VHF coverage in case of an inoperative HF system.

Operational flight plan

— Extract given aircraft data, i.e. aircraft, engine, performance parameter.

— Extract and state all given time date.

— Extract and evaluate all given masses (minimum, estimated, planned, actual, re-cleared and maximum masses) and centre of gravity.

— Extract and evaluate meteorological information.

— Extract performance data and information with influence on the flight performance.

— Extract and evaluate given navigational data.

— Extract and state given fuel data.

— Extract and state given ETOPS data.

— Extract and evaluate all dates with a limiting factor to the operational flight plan (OFP).

Hazards and special operation

— Define the following terms: anti-icing, de-icing, one-step de-icing/anti-icing, two-step de- icing/anti-icing, holdover time and all icing related weather conditions according LOs MET (*Manual of Aircraft Ground De-icing/Anti-icing Operations* (Doc 9640), Glossary of terms and abbreviations).

— Describe the clean aircraft concept (CAC) (Doc 9640, Part I, Chapter 2).

— List the types of de-icing/anti-icing fluids available (Doc 9640, Part III, Chapter 3).

— State the procedure to be followed when an aircraft has exceeded the holdover time (Doc 9640, Part III, Chapter 4).

— Interpret the fluid holdover time tables and list the factors which can reduce the fluid protection time (Doc 9640, Part III, Chapter 4).

— State that the pre-take-off check, which is the responsibility of the pilot-in-command, ensures that the critical surfaces of the aircraft are free of ice, snow, slush or frost just prior to take-off. This check shall be accomplished as close to the time of take-off as possible and is normally made from within the aircraft by visually checking the wings (Doc 9640, Part III, Chapter 6).

— State that an aircraft has to be treated symmetrically (Doc 9640, Part III, Chapter 8).

— State that an operator shall establish procedures to be followed when ground de-icing and anti-icing and that related inspections of the aircraft are necessary.

— State that a commander shall not commence take-off unless the external surfaces are clear of any deposit which might adversely affect the performance and/or controllability of the aircraft except as permitted in the flight manual.

— State that the effects of icing are wide ranging, unpredictable and dependent upon individual aircraft design. The magnitude of these effects is dependent upon many variables, but the effects can be both significant and dangerous (Doc 9640, Part I, Chapter 1).

— State that in icing conditions, for a given speed and a given angle of attack, wing lift can be reduced by as much as 30 per cent and drag increased by up to 40 per cent. State that these changes in lift and drag will significantly increase stall speed, reduce controllability and alter flight characteristics (Doc 9640, Part I, Chapter 1).

— State that ice on critical surfaces and on the airframe may also break away during take-off and be ingested into engines, possibly damaging fan and compressor blades (Doc 9640, Part I, Chapter 1).

— State that ice forming on pitot tubes and static ports or on angle of attack vanes may give false altitude, airspeed, angle of attack and engine power information for air data systems (Doc 9640, Part I, Chapter 1).

— State that ice, frost and snow formed on the critical surfaces on the ground can have a totally different effect on aircraft flight characteristics than ice formed in flight (Doc 9640, Part I, Chapter 1).

— State that flight in known icing conditions is subject to limitations found in section B part of the operations manual.

— State where procedures and performances regarding flight in expected or actual icing conditions are located.

— State that the presence of birds constituting a potential hazard to aircraft operations is part of pre-flight information (PANS-AIM, Doc 10066).

— State that information concerning the presence of birds observed by aircrews is made available to the aeronautical information service for such distribution as the circumstances necessitate (PANS-AIM, Doc 10066).

— State the incompatible land use around airports as a factor of influence on the risk of bird strikes (*Airport Services Manual* (Doc 9137), Part 3, Chapter 4).

— Define the commander’s responsibilities regarding the reporting of bird hazards and bird strikes.

— Define the operator’s responsibilities regarding the establishment of noise abatement procedures.

— State that the operator has the authority to decide not to execute a noise abatement departure procedure if conditions preclude the safe execution of the procedure (*Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168), Volume III, Section 9).

— Name the main parameters for NADP 1 and NADP 2 (i.e. speeds, heights, etc.) (PANS-OPS, Volume III Section 9).

— State that a runway lead-in lighting system should be provided where it is desired to provide visual guidance along a specific approach path for purposes of noise abatement (PANS-OPS, Volume III Section 9).

— State that detailed information about noise abatement procedures is to be found in the PANS-AIM, Doc 10066.

— Name adverse operating conditions under which noise abatement procedures during approach and in the form of reduced power take-off should not be required (PANS-OPS, Volume III Section 9).

— State the rule regarding the use of reverse thrust on landing (PANS-OPS, Volume III Section 9).

— Name typical actions to be taken in the event of an engine fire during flight operation on ground and in flight.

— Identify the different types of extinguishant and the type of fire on which each one may be used.

— Describe the precautions to be considered in the application of fire extinguishant.

— Identify the appropriate hand held extinguishers to be used in the cockpit, the passenger cabin and toilets, and the cargo compartments.

— List the actions to be taken in the event of smoke in the cockpit or in the cabin.

— Describe the problems and safety precautions following overheated brakes after landing or rejected take-off.

— Describe the actions required following a rapid or explosive decompression.

— Describe the effects on aircraft occupants of a slow decompression and a rapid or explosive decompression.

— Define the meaning of the term low level wind shear (*Wind Shear* (Cir 186), Chapter 1).

— Define vertical wind shear, horizontal wind shear, updraft and downdraft wind shear (Cir 186, Chapter 2).

— Identify the meteorological phenomena associated with wind shear (Cir 186, Chapter 3).

— State the effects of and actions required when encountering wind shear at take-off and approach (Cir 186, Chapter 4).

— State the effect of a microburst (Cir 186, Chapter 4).

— Define the term “wake turbulence” (*Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) Chapter 4, 4.9).

— Describe vortex circulation on the ground with and without crosswind (*Air Traffic Services Planning Manual* (Doc 9426), Part II).

— List the three main factors which combine to give the strongest vortices (heavy, clean, slow) (Doc 9426, Part II).

— Describe the wind conditions which are worst for wake turbulence near the ground (Doc 9426, Part II).

— Describe the actions taken to avoid wake turbulence, specially separations (PANS-ATM, Chapter 5).

Security (unlawful events)

— Define the following terms: Aircraft security check, screening, security, security restricted area, unidentified baggage (Annex 17 — *Security*, Chapter 1).

— State the objectives of security (Annex 17, Chapter 2, 2.1).

— State the commander's responsibilities concerning notifying the appropriate ATS unit (Annex 17, Attachment).

— State the commander's responsibilities concerning operation of SSR (Annex 17, Attachment).

— State the commander's responsibilities concerning departing from assigned track and/or cruising level (Annex 17, Attachment).

— State the commander's responsibilities concerning action required or being requested by an ATS unit to confirm SSR code and ATS interpretation response (Annex 17, Attachment).

— State OPS requirement regarding training programs.

— State OPS requirement regarding reporting acts of unlawful interference.

Abnormal and emergency procedures

— Explain the commander's responsibilities concerning communicating with the FOO/FD in the event of an emergency. (Annex 6, Part 1, Chapter 4.6).

— State OPS requirement regarding aircraft search procedures.

— Define ditching, precautionary landing, safe forced landing, emergency landing.

— State reasons that may require a ditching, a precautionary landing or an emergency landing.

— State relevant elements of the passenger briefing to be given before making a precautionary/emergency landing or ditching (including evacuation).

— State that the aircraft must be stopped and the engine shutdown before launching an emergency evacuation.

— State that evacuation procedures are found in the operations manual.

— State the certification requirements regarding evacuation procedures (EASA CS 25.803 and Appendix J).

— State that an aircraft may need to dump fuel so as to reduce its landing mass in order to execute a safe landing (PANS-ATM, Doc 4444, Chapter 15, 15.5.3).

— State the required conditions when an aircraft operating within controlled airspace needs to dump fuel dumping (PANS-ATM, Doc 4444, Chapter 15, 15.5.3).

— State that a fuel jettisoning system must be installed on each aircraft unless it is shown that the aircraft meets certified climb requirements (EASA CS-25.1001).

— State that a fuel jettisoning system must be capable of jettisoning enough fuel within 15 minutes (EASA CS-25.1001).

Cold weather operation

— Define the following RWY conditions: contaminated, damp, wet and dry.

— List the different types of contamination: damp, wet or water patches, rime or frost covered, dry snow, wet snow, slush, ice, compacted or rolled snow, frozen ruts or ridges (Annex 15 — *Aeronautical Information Services*, Appendix 2).

— Give the definitions of the various types of snow (Annex 15, Appendix 2).

— Identify the difference between friction coefficient and estimated surface friction (Annex 15, Appendix 2).

— State that when friction coefficient is 0.40 or higher, the expected braking action is good (Annex 15, Appendix 2).

— Define the different types of hydroplaning (NASA TM-85652/tire friction performance).

— State that more restrictive wind limitations may apply in case of contaminated runways.

— State that the procedures and performances associated with contaminated runways are to be found in the operations manual.

— Extract and interpret from a SNOWTAM the contamination and braking action on a runway.

— Extract and interpret from a METAR/RWY report the contamination and braking action on a runway.

Direct operating costs (DOCs)

— State that elements of DOCs are factors of influence on the cost index operation.

— Define DOCs as variable and fixed costs in direct relation to a flight's:

  • fuel;

  • aircraft handling;

  • passenger handling and ticketing costs;

  • aircraft, crew, maintenance, and insurance (ACMI);

  • station administration costs; and

  • local/regional sales and distribution costs.

— Distinguish between variable and fixed costs and provide examples.

— Distinguish between direct and indirect costs and provide examples.

— Define the fixed costs allocation to ACMI per block/flight hour.

— State the purpose of the cost allocation ACMI/block hour and provide examples.

— State the cost elements under direct control of an Operations Control Centre.

— State the factor of influence on the passenger compensation fee according regional/national regulations (EC Regulation 261/2014).

— Describe the operational risks/consequences and the cost driver of unexpected ground handling delays and provide examples.

— Describe the operational risks/consequences and the cost driver of unexpected maintenance/repair events and provide examples.

Network planning basics

— Name the factors influencing a regional/local market of air transportation:

  • population and average income;

  • regional/local business structure and expected development;

  • market segmentation in leisure, business, etc.;

  • potential pairings of origin and destination;

  • attractive frequencies and departure/arrival schedules;

  • acceptable product, service level and price relation; and

  • seat capacity demand.

— Name the factors influencing the resource requirements:

  • seat and cargo capacity to be offered;

  • required aircraft category in relation to demand capacity per flight;

  • hub integration or origin and destination;

  • crew resource requirements (duty limits, crew change, layover);

  • acceptable handling facilities and service provider; and

  • airport slots.

— State a simplified route profitability evaluation:

  • assumed revenue;

  • contribution margin on the basis of variable costs (part of direct operating costs); and

  • contribution margin on the basis of fixed costs (ACMI as a part of direct operating costs).

Flight scheduling basics

— Describe the factors influencing optimized and realistic flight scheduling:

- sector length on the basis of average wind components;
- average wind components on the basis of routing and season;
- minimum turnaround time and handling slots;
- departure daytime and resulting maximum crew duty time;
- hub integration or O/D (origin and destination);
- direct operating costs per block hour and/or flight hour;
- aircraft maintenance downtime requirements;
- aircraft reserve;
- specific aircraft and ground equipment per sector (city pair);
- intended frequency and capacity per sector;
- airport (hub) capacity and departure/arrival slots; and
- sector pairings and aircraft rotation.

Crew planning basics

— State the results of a fatigue risk management as a safety-related factor of influence on the crew planning process.

— Describe the crew pairing process and the optimization factors:

- crew composition according to operational minimum or product service level;
- relation of aircraft block hours and crew duty days/hours as a productivity indicator;
- relation of number of flights to the number of crew changes as a risk factor;
- relation of the number of active to reserve crew member a cost and risk factor;
- number of training days per crew function as a cost factor;
- crew duty and rest time requirements, delta between plan and limit; and
- deadhead versus layover, cost and risk aspects.

— Describe the individual crew rostering process and the optimization factors:

- off days and routing requests;

- training requirements: resources, location and capacity;
- overtime allocation and flexibility; and
- reserve and standby allocation, location and daytime.

Crew control basics

— Describe the factors that influence short-term decision making and control:

- risks of crew change versus aircraft change;
- stand by and reserve adjustments, allocation to flights;
- adjustment of crew composition; and
- equipment changes on the basis of different qualifications.

Communication systems and procedures

— Name the two parts of the call sign of an aeronautical station and ICAO location indicator.

— Identify the call sign suffixes for aeronautical stations (Heavy).

Prerequisite learning objectives: Principles of flight

Units and basic definitions

— Name the international system of units (SI) for mass, acceleration, weight, velocity, density, temperature, pressure, force and power.

— Define mass, force, acceleration and weight.

— Define static, dynamic and total pressure.

— State the factors influencing the formula for dynamic pressure.

— Describe the Bernoulli equation.

— Explain air density and static air pressure and name their effects on practice.

— Name the atmospheric properties that affect air density and static air pressure.

— State how temperature and pressure changes affect air density.

— State that total air temperature (TAT), static pressure and total pressure are measured during flight.

— State that total pressure is the sum of static pressure and dynamic pressure.

— Name OAT and ram rise (RR) as components of TAT.

— Name compressibility as a factor of influence on speed measurement.

— Define IAS, CAS, EAS, TAS, Mach, OAT, SAT, TAT, RR.

— Name input parameter for air data computing:

  • Total air pressure;

  • Static air pressure; and

  • Total air temperature.

— Name output parameter from air data computing:

  • Mach number;

  • indicated air speed;

  • true air speed; and

  • static air temperature.

Air flow and wing design

— Distinguish steady and unsteady airflow.

— Describe the streamline pattern around an airfoil.

— Describe the stagnation point.

— Describe the force resulting from the pressure distribution around an airfoil.

— Describe the following parameters of an airfoil section: leading edge, trailing edge and chord line.

— State the following parameters of a wing: span, wing area, wing planform, mean aerodynamic chord MAC, dihedral angle, sweep angle, angle of incidence, geometric and aerodynamic wing twist.

Drag and lift

— Name the parasite drag components friction, form (pressure) and interference.

— Describe friction, form and interference drag.

— Describe the relationship between parasite drag and speed.

— Describe induced drag consequently out of the generation of lift.

— Define angle of attack.

— Describe the influence of the angle of attack on lift and induced drag.

— State the basic components of the lift or drag formula: air density, speed, wing area/dimensions, lift or drag effectivity (coefficient of lift (CL) or coefficient of drag (CD)).

— State that CL and CD integrates multiple aerodynamic factor of influence on the results of lift and drag.

— Extract the speed of minimum drag and maximum lift on a graph.

— Extract the best CL/CD ratio on a graph.

— Describe the flow separation at high angles of attack and the significant points on a related graph.

— Distinguish between the angle of attack and the attitude of an aircraft.

— Describe the general streamline pattern around the wing, tail section and fuselage.

— State the aircraft mass and the angle of attack as primary factors of influence on wake turbulence.

— Describe the causes, distribution and duration of wake turbulence behind an aircraft.

— Distinguish the result of induced drag and parasite drag in high speed and low speed flight conditions.

— State that total drag consists of parasite drag and induced drag.

— State examples from the configuration deviation list of an aircraft affecting the drag in relation to speed and flight altitude and name the effect on practice.

— Define buffet.

— Describe drag behaviour in the non-stable speed region if speed suddenly decreases further.

— State flow separation at increasing angles of attack.

— Define the critical stall angle of attack.

— Describe and explain the normal post stall behaviour of an aircraft.

— Describe the dangers of using the controls close to the stall.

— Distinguish between VS and VS1g.

— Define the load factor “n”.

— State the reason of increased load factor in a turn.

— Describe and explain the influence of the load factor on stall speed.

— Explain why stall warning is important.

— Explain why the certification specifications require a margin to stall speed.

— Explain why artificial stall warning is necessary for the certification of large transport aircraft.

— State the angle of attack, IAS and load factor as important input parameters for the stall warning system.

— State aural, visual and stick shaker as an output of the stall warning system.

— Name the effects of ice, frost or snow on the stagnation point.

— Describe the risk of the absence of stall warning in case of wing icing.

— State countermeasures to in-flight icing conditions.

— Describe the aerodynamic effects of remaining anti-ice fluid on the wing after lift-off.

Lift control devices

— State the increased wing area and changed chord line caused by extended leading and trailing edge lift devices.

— State that extended leading and trailing edge devices are increasing lift and drag and reducing the stall speed.

— State the effects of leading edge devices on the stall speed and compare with trailing edge flaps.

— Describe the effect of trailing edge flaps on the location of centre of lift, and aircraft trim and flight stability.

— Describe the consequences in case of slat or flap asymmetry.

— Describe the positive and negative effects of slats and flaps on take-off and landing performance.

— Distinguish between the differing types of leading edge high lift devices: Krueger flaps, variable camber flaps and slats.

— Describe the function of the slot in leading edge devices.

— State the advantages and disadvantages of vortex generators.

— Describe the aerodynamic functions of flight spoilers, speed brakes and ground spoilers.

High speed aerodynamics

— Define the variation of the speed of sound with altitude and temperature.

— Define Mach number as a relation of TAS to the speed of sound.

— State the relationship between Mach number, TAS and IAS during climb and descent.

— State the reasons of specific standard speed schedules for climb and descent in view of limitations.

— State that compressibility means that air density can change along a streamline.

— Distinguish between IAS and EAS.

— Define the subdivision of aerodynamic flow: subsonic, transonic and supersonic.

— State that transport aircraft normally cruise at Mach numbers above critical Mach (M_{crit}).

— Describe a shock wave.

— State the effects and the consequences of exceeding M_{crit} in relation to shock wave, drag and lift.

— Define the concept of buffet margin.

— Describe the effect of exceeding the speed to buffet onset.

— Define aerodynamic ceiling and coffin corner, and name their effects on practice.

— State that precise speed and altitude control is important during high-speed cruise close to MMO and VS.

— State that an auto flight system provides altitude, heading and speed control.

— State realistic consequences of auto flight outage during high-speed cruise conditions.

Static and dynamic stability

— Define static stability.

— State a static stable, neutral and unstable condition (positive, neutral and negative static stability).

— Explain why static stability is the opposite of manoeuvrability.

— Define dynamic stability.

— State a dynamically stable, neutral and unstable motion (positive, neutral and negative dynamic stability).

— State the functions of the stabilizer and the fin for aerodynamic stability.

— State the longitudinal distance of the centre of gravity to the centre of lift as a factor of influence on the pitching moment.

— State that for aerodynamic stability of large transport aircraft, the centre of gravity must be located in front of the centre of lift.

— State that the negative pitching moment compensation of large transport aircraft by an additional tail-downforce or an additional lift at the nose (canard) is mandatory.

— State the adjustable stabilizer angle of attack for the generation of the balancing tail-downforce as a design standard for large transport aircraft.

— State the effect of the CG location on pitch manoeuvrability and pitch stability.

Control

— Define lateral, longitudinal and yaw axis in context with pitch, bank and yaw.

— Name the control devices for pitch, bank and yaw control.

— Describe the working principle of the rudder, aileron/flight spoiler and elevator.

— Distinguish roll rate and turning rate.

— Describe the effects of engine location and engine thrust on pitching and yaw moments.

— State the reason of rudder deflection limitation during cruise flight by transport aircraft.

— State the reason of speed depending artificial rudder feel system on transport aircraft.

— State the use of inboard and outboard ailerons.

— State the additional yawing force generated by flight spoiler during high speed cruise.

Trim

— Explain the factors influencing stabilizer setting.

— Explain the influence of take-off stabilizer trim setting on rotation characteristics and take-off performance.

— State the effects of jammed and runaway stabilizer.

Operating limitations

— Define VFE and VLE.

— Name the effects on practice and the risk of flying at speeds close to VMO and MMO.

— State the relationship between mass and load factor limits and maximum speeds.

— State the function and the effect of VMC speeds on flight performance.

— Define minimum control on ground speed (VMCG), minimum control speed in the air (VMCA), and minimum control speed during approach and landing (VMCL).

— State the influence of aircraft gross weight, CG location and thrust setting on VMCG, VMCA, and VMCL.

Flight mechanics

— Define flight path angle.

— State the relationship between angle of attack and the best lift/drag ratio.

— State the effect of wind component on glide angle, duration and distance.

— State the effect of mass change on glide angle, duration and distance.

— State the effect of configuration change on glide angle, duration and distance.

— Distinguish between a coordinated and uncoordinated turn.

— Define angular velocity.

— Describe the effects on the aircraft during flight with asymmetric thrust.

— State the critical engine in view of crosswind during take-off.

Appendix B

FLIGHT OPERATIONS OFFICER (FOO) TASKS

Training Phase 2

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
1	Risk assessment	Analyse weather data	METARs and TAFs (origin, en-route, destination and alternate airports)	Demonstrate the application of OM-rules in relation to BECMG, TEMPO, PROB30 TEMPO and PROB (alone) and decide about the lowest ceiling and visibility/RVR, the expected OAT, wind speed/direction/gusts and precipitation during the applicable time window of suitability	SELA
2	Risk assessment	Analyse weather data	METARs and TAFs (origin, en-route, destination and alternate airports)	Evaluate the expected RWY in use and the resulting crosswind and tailwind components	SELA
3	Risk assessment	Analyse weather data	METARs and TAFs (origin, en-route, destination and alternate airports)	Extract and decode the actual RWY report and evaluate the influence of expected precipitation on the RWY braking action	SELA
4	Risk assessment	Analyse weather data	METARs and TAFs (origin, en-route, destination and alternate airports)	Evaluate the consequence of icing conditions during ground and flight operations	SELA
5	Risk assessment	Analyse weather data	Upper air data	For designated locations and/or routes, determine from forecast upper wind and temperature chart, if necessary by interpolation, the spot/average values for outside air temperature deviation from ISA, wind direction and wind speed	FPL&FM

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
6	Risk assessment	Analyse weather data	SIG WX Data and PIREPs (Convective activity, jet streams, turbulence, volcanic ash, icing, ITCZ)	Summarize the flight hazards of a fully developed thunderstorm	FPL&FM
7	Risk assessment	Analyse weather data	SIG WX Data and PIREPs (Convective activity, jet streams, turbulence, volcanic ash, icing, ITCZ)	Identify or indicate on a map the positions of the ITCZ and evaluate the expected influence of the ITCZ on the planned flight track	FPL&FM
8	Risk assessment	Analyse weather data	SIG WX Data and PIREPs (Convective activity, jet streams, turbulence, volcanic ash, icing, ITCZ)	State the weather and winds at the ITCZ and evaluate the flight hazards associated with the ITCZ	FPL&FM
9	Risk assessment	Analyse weather data	SIG WX Data and PIREPs (Convective activity, jet streams, turbulence, volcanic ash, icing, ITCZ)	Evaluate the operational influence of icing conditions, freeze rain, snow and other precipitation in relation to aircraft systems, equipment and MEL-restrictions	FPL&FM
10	Risk assessment	Analyse weather data	SIG WX Data and PIREPs (Convective activity, jet streams, turbulence, volcanic ash, icing, ITCZ)	Identify the route segments affected by jet streams and areas of clear air turbulence (CAT)	FPL&FM
11	Risk assessment	Analyse weather data	SIG WX Data and PIREPs (Convective activity, jet streams, turbulence, volcanic ash, icing, ITCZ)	Evaluate the time interval and duration	FPL&FM
12	Risk assessment	Analyse weather data	Major weather event (typhoon, snow, freezing rain)	Summarize the operational risk by intercepting a wide area frontal system, typhoon/hurricane and snow front	FPL&FM

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
13	Risk assessment	Analyse weather data	Major weather event (typhoon, snow, freezing rain)	Extract information about the direction of movement and speed of frontal systems, typhoon and/or hurricane	FPL&FM
14	Risk assessment	Analyse weather data	Major weather event (typhoon, snow, freezing rain)	Evaluate the consequences for aircraft operation inside and in the vicinity of typhoon/hurricane	FPL&FM
15	Risk assessment	Analyse weather data	Local outstanding weather phenomena (tornado, thunderstorms, heavy rain/hail/snow, flooding)	Evaluate the potential risk of local outstanding weather phenomena	FPL&FM
16	Risk assessment	Analyse weather data	Local outstanding weather phenomena (tornado, thunderstorms, heavy rain/hail/snow, flooding)	Evaluate the expected consequences in relation to the planned operation	FPL&FM
17	Risk assessment	Analyse AIP/NOTAM data	ATC/service strike action	Extract and decode the NOTAM about ATC service strike action	FPL&FM
18	Risk assessment	Analyse AIP/NOTAM data	ATC/service strike action	Describe different situations about ATC service strike action that influence operation control	FPL&FM
19	Risk assessment	Analyse AIP/NOTAM data	ATC/service strike action	Understand the importance of the ATC service strike and how to deal with this situation	FPL&FM
20	Risk assessment	Analyse AIP/NOTAM data	Long term airspace and airport closures	Find the airspace and airport description and regulations in AIP	FPL&FM
21	Risk assessment	Analyse AIP/NOTAM data	Long term airspace and airport closures	Notice the change of airspace and airport closures before releasing a flight and monitoring a flight	FPL&FM

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
22	Risk assessment	Analyse AIP/NOTAM data	Long term airspace and airport closures	Understand the influence of airspace and airport closures and how to deal with these situations	FPL&FM
23	Risk assessment	Analyse AIP/NOTAM data	Long term airspace and airport closures	Extract and decode the NOTAM about the change of airspace and airport closures before amending in AIP	SELA
24	Risk assessment	Analyse AIP/NOTAM data	SUA airspace	Demonstrate different categories of SUA airspace and the entrance regulations of each SUA airspace	FPL&FM
25	Risk assessment	Analyse AIP/NOTAM data	SUA airspace	Find the regulations for entering different SUA airspace in AIP	FPL&FM
26	Risk assessment	Analyse AIP/NOTAM data	SUA airspace	Extract and decode the NOTAM about the limitations or closure of a specific SUA airspace	FPL&FM
27	Risk assessment	Analyse AIP/NOTAM data	SUA airspace	Notice the limit time and flight level of a SUA airspace and the influence of flight operations	FPL&FM
28	Risk assessment	Analyse AIP/NOTAM data	SUA airspace	Analyse the solution to adjust flight route	FPL&FM
29	Risk assessment	Analyse AIP/NOTAM data	Long term ATC route closures	Identify long term ATC route closure in AIP/AIP amendments/AIP supplements	FPL&FM
30	Risk assessment	Analyse AIP/NOTAM data	Long term ATC route closures	Analyse the influence of ATC route closures on company routes	FPL&FM
31	Risk assessment	Analyse AIP/NOTAM data	Long term ATC route closures	Demonstrate the adjustment of company route when the ATC route is closed for a long period of time	FPL&FM

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
32	Risk assessment	Analyse AIP/NOTAM data	Fuel availability	Extract and decode the NOTAM about fuel supply availability or find the fuel supply of an airport in AIP-Aerodromes (AD)	FPL&FM
33	Risk assessment	Analyse AIP/NOTAM data	Fuel availability	Describe the solution when fuel is not available at an airport	FPL&FM
34	Risk assessment	Analyse AIP/NOTAM data	Fuel availability	Calculate the fuel required when fuel is not available at the destination airport	FPL&FM
35	Risk assessment	OPS engineering	Payload/range alterations	Describe the influence of seasonal average wind components on the payload/range evaluation	FPL&FM
36	Risk assessment	OPS engineering	Payload/range alterations	Describe the seasonal OAT, PA and wet/contaminated RWY conditions with influence on take-off and landing performance including approach climb limitations	PEFLS
37	Risk assessment	OPS engineering	Payload/range alterations	Evaluate the advantage and disadvantage of fuel stops and name the operational and commercial factors of influence	COMCL
38	Risk assessment	OPS engineering	En-route performance	Describe the effect of EDTO/ETOPS scenario planning on the expected payload	FPL&FM
39	Risk assessment	OPS engineering	En-route performance	Describe the influence of one engine inoperative drift down scenarios and the minimum altitude requirements on the route selection	PEFHS
40	Risk assessment	OPS engineering	En-route performance	Describe the influence of decompression scenarios on the minimum altitude and oxygen requirements	FPL&FM

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
41	Risk assessment	OPS engineering	Navigation procedures and permits	Describe the influence of required and approved navigation performance on the intended approach, landing and en-route operation	FPL&FM
42	Risk assessment	OPS engineering	Navigation procedures and permits	Describe the influence of en-route navigational requirements on the technical standards, procedures and operator certification	FPL&FM
43	Risk assessment	OPS engineering	Navigation procedures and permits	Evaluate the overflight permits required and name the information and data required for the application in specific countries/regions	OPSSTD
44	Risk assessment	Political unrest and security threats	Terrorist acts	Identify the different terrorist acts, e.g. hi-jack, threat or bomb on the aircraft, terrorist disturbing the order of the cabin.	OPSSTD
45	Risk assessment	Political unrest and security threats	Terrorist acts	Notice the emergency level of a terrorist act	OPSSTD
46	Risk assessment	Political unrest and security threats	Terrorist acts	Extract information from the company security report	OPSSTD
47	Risk assessment	Political unrest and security threats	Terrorist acts	Identify flight monitoring procedure and the use of communicating methods when terrorist acts happen	OPSSTD
48	Risk assessment	Political unrest and security threats	Terrorist acts	Describe the report procedure when terrorist acts happen. Point out which departments need to be reported to and the content of the reports.	OPSSTD
49	Risk assessment	Political unrest and security threats	Terrorist acts	Be familiar with emergency disposal procedures and coordinate their mechanism	OPSSTD

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
50	Risk assessment	Political unrest and security threats	Natural disasters, i.e. earthquakes, tsunami	Extract natural disasters information from company resources	OPSSTD
51	Risk assessment	Political unrest and security threats	Natural disasters, i.e. earthquakes, tsunami	Describe monitoring procedure and methods of communicating when natural disasters occur	OPSSTD
52	Risk assessment	Political unrest and security threats	Natural disasters, i.e. earthquakes, tsunami	Identify the hazard level of the natural disaster	OPSSTD
53	Risk assessment	Political unrest and security threats	Natural disasters, i.e. earthquakes, tsunami	Describe the report procedure and the departments to report to	OPSSTD
54	Risk assessment	Political unrest and security threats	Natural disasters, i.e. earthquakes, tsunami	Make a decision with PIC and find an appropriate airport to land	OPSSTD
55	Risk assessment	Political unrest and security threats	Natural disasters, i.e. earthquakes, tsunami	Describe emergency disposal procedures for natural disasters	OPSSTD
56	Risk assessment	Political unrest and security threats	Widespread industrial action	Extract information from the security report of the company	OPSSTD
57	Risk assessment	Political unrest and security threats	Widespread industrial action	Describe different situations of widespread industrial action	OPSSTD
58	Risk assessment	Political unrest and security threats	Widespread industrial action	Be aware of latest political unrest	OPSSTD
59	Risk assessment	Political unrest and security threats	Widespread industrial action	Describe emergency disposal procedures and the coordinate mechanism for widespread industrial action	OPSSTD
60	Risk assessment	Political unrest and security threats	Widespread industrial action	Enhanced cabin and cockpit security methods	OPSSTD

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
61	Risk assessment	Political unrest and security threats	Unauthorized interference in flight operations	Describe the risks of unmanned air vehicles and adequate countermeasures	OPSSTD
62	Risk assessment	Political unrest and security threats	Unauthorized interference in flight operations	Describe the risk of laser pointer for pilots in flight	OPSSTD
63	Risk assessment	Political unrest and security threats	Unauthorized interference in flight operations	Describe the risks of ground movement near active runways	OPSSTD
64	Risk assessment	Company resources	OCC responsibility, set up and capacity	Describe the areas of responsibility for specific OCC functions on the basis of a sample problem solving and decision-making process	OPSSTD
65	Risk assessment	Company resources	OCC responsibility, set up and capacity	Identify the essential competence criteria for the staff involved in problem solving and decision-making processes	OPSSTD
66	Risk assessment	Company resources	OCC responsibility, set up and capacity	State adequate recurrent training methods and check criteria for OCC staff involved in operational control	OPSSTD
67	Risk assessment	Company resources	Equipment availability	Describe the content and use of certified aircraft airworthiness documents, e.g. AFM, QRH, MMEL/MCDL	OPSSTD
68	Risk assessment	Company resources	Equipment availability	Identify the minimum equipment requirements for releasing an aircraft	OPSSTD
69	Risk assessment	Company resources	Equipment availability	Demonstrate the release procedures for deferred items	OPSSTD
70	Risk assessment	Company resources	Equipment availability	Extract and decode MEL/CDL and evaluate the operation and maintenance procedures	OPSSTD

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
71	Risk assessment	Company resources	Equipment availability	State the regulatory and organizational prerequisites for wet lease-in and wet lease-out	OPSSTD
72	Risk assessment	Company resources	Equipment availability	Describe the operational and commercial risks and benefits of wet lease-in operation	COMCL
73	Risk assessment	Company resources	Equipment availability	Describe the operational and commercial risks and benefits of dry lease-in operation, distinguish between wet- and dry-lease operation and state their advantages and disadvantages	COMCL
74	Risk assessment	Company resources	Crew availability	Identify the crew composition, certificate and rating requirements, training requirements, i.e.: licence, ratings, airport/area introduction, DGR, etc.	OPSSTD
75	Risk assessment	Company resources	Crew availability	Describe the definition of high minima PIC and evaluate the resulting landing minima	FPL&FM
76	Risk assessment	Company resources	Crew availability	Name the crew and operator requirements for special operation, i.e. technical ferries for decompression, gear down, certification/check flights	OPSSTD
77	Risk assessment	Company resources	Crew availability	Demonstrate the limitations of crew duty time, flight time and rest time of cockpit, cabin and air marshal	OPSSTD
78	Risk assessment	Company resources	Crew availability	Identify the medical requirements and regulations in view of drugs, e.g. alcohol	OPSSTD
79	Risk assessment	Company resources	Traffic rights (landing and overflight permits)	Identify the different requirements of landing and overflight permit of each authority	OPSSTD

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
80	Risk assessment	Company resources	Traffic rights (landing and overflight permits)	Describe the different application procedures	OPSSTD
81	Risk assessment	Company resources	Traffic rights (landing and overflight permits)	Describe the consequences in case of incomplete overflight permits	OPSSTD
82	Risk assessment	Company resources	Ground handling provisions	Describe the responsibility of the nominated operator for aircraft and passenger/cargo handling	OPSSTD
83	Risk assessment	Company resources	Ground handling provisions	State the risk factors for the customer flow and aircraft handling and the consequences for on time performance and customer experience	COMCL
84	Risk assessment	Company resources	Ground handling provisions	Describe typical elements of a service level agreement between the operator and the handling service provider	OPSSTD
85	Risk assessment	Company resources	Ground handling provisions	Describe the basic elements of a quality management system	OPSSTD
86	Risk assessment	Company resources	Ground handling provisions	Describe the standard provisions for cold weather operation, i.e. fluids type I, II, IV in relation to the holdover time, expected taxi time, costs and environmental and operational conditions	OPSSTD
87	Risk assessment	Company resources	Ground handling provisions	Describe consequences of special handling criteria, i.e. aircraft night stops, security measures, remote position, bomb search procedure, disinfection of aircraft	OPSSTD

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
88	Risk assessment	Company resources	MRO service provisions	Describe the responsibility of the person nominated by the operator for continuing aircraft airworthiness management organization	OPSSTD
89	Risk assessment	Company resources	MRO service provisions	State the risk factors of an inadequate maintenance management and planning process	OPSSTD
90	Risk assessment	Company resources	MRO service provisions	Describe typical elements of a service level agreement between the operator and the MRO service provider	OPSSTD
91	Risk assessment	Company resources	MRO service provisions	Describe the prerequisites for maintenance stations and the consequences of operations on non-maintenance stations (no SLA with certified MRO provider available)	OPSSTD
92	Risk assessment	Company resources	MRO service provisions	Describe the basic elements of a typical quality management system initiated by the operator (Continuing Airworthiness Management Organization (CAMO))	OPSSTD
93	Flight planning and flight monitoring	Route selection	Optimized time/burn/cost	Analyse and select appropriate route options	FPL&FM
94	Flight planning and flight monitoring	Route selection	Flight level	Evaluate upper air weather products and decide appropriate flight levels for ride and economy considerations	FPL&FM
95	Flight planning and flight monitoring	Route selection	NAV equipment and procedural requirements	Evaluate the minimum required navigation performance (RNP) en-route and compare it with the aircraft and operator certification	FPL&FM

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
96	Flight planning and flight monitoring	Route selection	SIG WX (turbulence, convective activity/passenger comfort)	Extract relevant information from weather products (upper air charts) and apply information during route and flight level selection process	FPL&FM
97	Flight planning and flight monitoring	Route selection	Fuel freeze assessment	Identify if flight is subject to fuel freeze based on stage length and SAT/TAT	FPL&FM
98	Flight planning and flight monitoring	Route selection	ATC preferred routing	Extract ATC preferred routing data from flight planning system and analyse ATC preferred routing requirements from AIP/ATC publications	FPL&FM
99	Flight planning and flight monitoring	Route selection	ATC preferred routing	Describe the factors of influence on air traffic flow management capacity and the standard communication procedures	FPL&FM
100	Flight planning and flight monitoring	Route selection	ATC required routing	Extract required ATC routing information from ATC advisories	FPL&FM
101	Flight planning and flight monitoring	Route selection	Minimum off-route altitude (MORA) Grid (high terrain OPS)	Extract MORA grid information from navigation charts	FPL&FM
102	Flight planning and flight monitoring	Route selection	MORA Grid (high terrain OPS)	Identify potential drift down (engine out) and critical terrain (depressurization) areas for a chosen flight route	FPL&FM
103	Flight planning and flight monitoring	Route selection	Variable costs of a specific flight	Evaluate per country or region the costs for navigation and ATC services, approach and landing	COMCL

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
104	Flight planning and flight monitoring	Route selection	Variable costs of a specific flight	Evaluate the costs of fuel and the relation of fuel costs at departure and destination	COMCL
105	Flight planning and flight monitoring	Route selection	Variable costs of a specific flight	Evaluate the advantages and disadvantages of fuel tankering	COMCL
106	Flight planning and flight monitoring	Route selection	Variable costs of a specific flight	Evaluate the potential costs of delay	COMCL
107	Flight planning and flight monitoring	Route selection	Variable costs of a specific flight	Evaluate the variable crew costs	COMCL
108	Flight planning and flight monitoring	Airport suitability	Take-off alternate selection	Assess the need for a take-off alternate based on meteorological data (METAR) for the airport of departure	SELA
109	Flight planning and flight monitoring	Airport suitability	Take-off alternate selection	Define the requirement for a take-off alternate based on regulatory and company guidance	SELA
110	Flight planning and flight monitoring	Airport suitability	Take-off alternate selection	Assess available take-off alternate airports based on distance (two engines vs. three or more engines)	SELA
111	Flight planning and flight monitoring	Airport suitability	Take-off alternate selection	Assess available take-off alternate airports based on weather (alternate minima), NOTAMs, crew qualification	SELA
112	Flight planning and flight monitoring	Airport suitability	Take-off alternate selection	Select appropriate take-off alternate based on regulatory and company guidance	SELA

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
113	Flight planning and flight monitoring	Airport suitability	En-route alternate selection (EDTO/ETOPS, driftdown, critical terrain)	Evaluate available alternates based on route to be flown	SELA
114	Flight planning and flight monitoring	Airport suitability	En-route alternate selection (EDTO/ETOPS, driftdown, critical terrain)	Describe the technical infrastructure and operational minimum prerequisites for alternate aerodrome selection	SELA
115	Flight planning and flight monitoring	Airport suitability	En-route alternate selection (EDTO/ETOPS, driftdown, critical terrain)	Extract available alternates from authorized airport lists (OPS specs)	SELA
116	Flight planning and flight monitoring	Airport suitability	En-route alternate selection (EDTO/ETOPS, driftdown, critical terrain)	Derive appropriate (OPS spec approved) alternate minima based on type of operation (EDTO/ETOPS, drift down or critical terrain)	SELA
117	Flight planning and flight monitoring	Airport suitability	En-route alternate selection (EDTO/ETOPS, driftdown, critical terrain)	Extract appropriate NOTAMs for selected alternate and assess the effects on the operations	SELA
118	Flight planning and flight monitoring	Airport suitability	En-route alternate selection (EDTO/ETOPS, driftdown, critical terrain)	Extract and evaluate weather data (TAF/METAR/CHARTS) and evaluate in relation to required minima	SELA
119	Flight planning and flight monitoring	Airport suitability	Destination alternate selection	Assess the need for a destination alternate based on regulations and OPS specs.	SELA
120	Flight planning and flight monitoring	Airport suitability	Destination alternate selection	Evaluate available alternates based on route (arrival flow) to be flown	SELA
121	Flight planning and flight monitoring	Airport suitability	Destination alternate selection	Extract available alternates from authorized airport lists (OPS specs)	SELA

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
122	Flight planning and flight monitoring	Airport suitability	Destination alternate selection	Derive appropriate (OPS spec approved) alternate minima based on type of operation	SELA
123	Flight planning and flight monitoring	Airport suitability	Destination alternate selection	Extract appropriate NOTAMs for selected alternate and assess the effect on the operation.	SELA
124	Flight planning and flight monitoring	Airport suitability	Destination alternate selection	Extract and evaluate weather data (TAF/METAR/CHARTS) and evaluate in relation to required minima	SELA
125	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Take-off minima	SELA
126	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Select appropriate runway of intended departure based on available meteorological conditions (wind/temperature/pressure)	SELA
127	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Extract approved take-off minima (standard or published) for the selected departure runway using available navigation charts	SELA
128	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Compare required take-off minima to available meteorological data (TAFs/METARs) and assess their applicability	SELA
129	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Extract appropriate NOTAMs that may affect take-off minima (TODA, runway lighting)	SELA
130	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Extract MEL items and assess the potential impact on take-off minima	SELA

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
131	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Extract the landing minima	SELA
132	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Select appropriate runway of intended landing based on available meteorological conditions (wind/temperature/pressure)	SELA
133	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Select appropriate NAV procedures on the basis of operator approval, crew qualifications and aircraft capability	SELA
134	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Extract approved landing minima for the intended approach category, i.e. precision approach CAT I/II/III, GNSS, RNAV, RNP, non-precision for the selected landing runway using instrument approach procedure (IAP) charts	SELA
135	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Compare required landing minima to available meteorological data (TAFs/METARs) and assess suitability on the basis of the ETA and the period of validity	SELA
136	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Extract appropriate NOTAMs that may affect landing minima (LDA, runway lighting, NAVAIDS, runway closure)	SELA
137	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Extract aircraft MEL items and assess the potential impact on landing minima	SELA
138	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Describe the consequences if the landing minima at destination are not fulfilled	SELA

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
139	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Additional alternate minima for destination/ en-route/take-off/EDTO/ETOPS	SELA
140	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Evaluate all available approaches that can be used to derive alternate minima, i.e. use of the 1 NAVAID or 2 NAVAID rule	SELA
141	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Apply approved procedures and derive alternate planning minima from the selected available approaches	SELA
142	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Compare required alternate planning minima to available forecast information at the intended alternate, and check for suitability at ETA and the required period of validity	SELA
143	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Describe the prerequisites of an operation without destination alternate	SELA
144	Flight planning and flight monitoring	Airport suitability	Take-off/landing/alternate minima	Describe the specific minimum requirements for adequate EDTO/ETOPS airports, i.e. minimum RFFS category, AD opening hours, NAVAIDS and procedures, ATIS or landing information	SELA
145	Flight planning and flight monitoring	Airport suitability	NOTAMs (NAVAIDS, airport facilities)	Extract NOTAMs for all airports relevant to the operation (departure, destination, all alternates)	SELA
146	Flight planning and flight monitoring	Airport suitability	NOTAMs (NAVAIDS, airport facilities)	Evaluate NOTAMs for all aspects of the operation (NAVAIDS, airport facilities, AD closure, RWY closure) and assess the potential impact for suitability	SELA

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
147	Flight planning and flight monitoring	Airport suitability	NOTAMs (NAVAIDS, airport facilities)	Apply a list of downgraded RWY equipment for the evaluation of consequences arising from NOTAMs	SELA
148	Flight planning and flight monitoring	Airport suitability	Approach procedures	Extract approved approach procedures from OPS Spec documents (OM-C, OPS spec, Part C)	SELA
149	Flight planning and flight monitoring	Airport suitability	Approach procedures	Evaluate available approaches for all airports relevant to the operation (departure, destination, all alternates) and assess suitability	SELA
150	Flight planning and flight monitoring	Airport suitability	Crew qualification (CAT II/III, RNP)	Extract information regarding any “low time pilot” and assess the impact on the operation (limits to CAT II and III approaches)	SELA
151	Flight planning and flight monitoring	Airport suitability	Pavement loading limitations	Extract information from airport pages and identify any potential pavement loading restrictions for departure, destination and alternate airports	SELA
152	Flight planning and flight monitoring	Airport suitability	Pavement loading limitations	Apply pavement load limitations during flight planning/gross weight calculation process based on ACN/PCN and LCN calculations	SELA
153	Flight planning and flight monitoring	Fuel load	Regulatory fuel requirements	Quote locally defined regulatory fuel requirements	FPL&FM
154	Flight planning and flight monitoring	Fuel load	Regulatory fuel requirements	Identify regulatory fuel requirements and apply these to the fuel load that is reflected on the flight plan/release	FPL&FM

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
155	Flight planning and flight monitoring	Fuel load	Holding/contingency	Extract information regarding factors that may affect the landing of the aircraft	FPL&FM
156	Flight planning and flight monitoring	Fuel load	Holding/contingency	Potential for ATC holding	FPL&FM
157	Flight planning and flight monitoring	Fuel load	Holding/contingency	Airport arrival capacity vs. demand	FPL&FM
158	Flight planning and flight monitoring	Fuel load	Holding/contingency	Potential for vectoring/re-routes during arrival sequence	FPL&FM
159	Flight planning and flight monitoring	Fuel load	Holding/contingency	Airport configuration and potential for runway changes at the last minute	FPL&FM
160	Flight planning and flight monitoring	Fuel load	Holding/contingency	Weather in and around destination that may cause holding	FPL&FM
161	Flight planning and flight monitoring	Fuel load	Holding/contingency	En-route weather that may require re-route (convection, turbulence)	FPL&FM
162	Flight planning and flight monitoring	Fuel load	Standard vs. non-standard distribution	Extract information from operations manuals that define standard fuel distribution requirements	FPL&FM
163	Flight planning and flight monitoring	Fuel load	Standard vs. non-standard distribution	Identify on any given flight if a non-standard fuel distribution exists	FPL&FM

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
164	Flight planning and flight monitoring	Fuel load	Standard vs. non-standard distribution	Evaluate the impact to the aircraft and/or intended operation of a non-standard distribution	FPL&FM
165	Flight planning and flight monitoring	Fuel load	Standard vs. non-standard distribution	Determine the implications of non-standard distribution to the weight and balance of the aircraft	FPL&FM
166	Flight planning and flight monitoring	Fuel load	Standard vs. non-standard distribution	Implement appropriate procedures to rectify non-standard fuel distributions before flight departure	FPL&FM
167	Flight planning and flight monitoring	Fuel load	Fuel policy	Describe the minimum components of the operator specific fuel for take-off	FPL&FM
168	Flight planning and flight monitoring	Fuel load	Fuel policy	Describe the impact in terms of time and fuel costs on the different cruise speed schedules – MRC, LRC, CI or fixed speed	FPL&FM
169	Flight planning and flight monitoring	Fuel load	Fuel policy	Specify the function of contingency fuel and name the conditions, i.e. 3%, 5%, 3% en-route alternate, 20 minutes and minimum 5 minutes	FPL&FM
170	Flight planning and flight monitoring	Fuel load	Fuel policy	Describe the calculation for the alternate fuel, i.e. routing from the go around at MAP via the missed approach procedure, cruise segment and approach/landing	FPL&FM
171	Flight planning and flight monitoring	Fuel load	Fuel policy	Describe the reduced contingency fuel procedure or re-clearance procedure	FPL&FM

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
172	Flight planning and flight monitoring	Fuel load	Fuel policy	Evaluate the advantages and disadvantage of reduced contingency fuel operation	FPL&FM
173	Flight planning and flight monitoring	Fuel load	Fuel policy	Describe the concept of isolated aerodrome operation and pre-determined point procedure	FPL&FM
174	Flight planning and flight monitoring	Fuel load	Fuel policy	Describe the function of the point of safe return and the point of equal times (PET)	FPL&FM
175	Flight planning and flight monitoring	Fuel load	EDTO/ETOPS fuel requirements	Identify the critical point, i.e. ETP, EDTO/ETOPS entry/exit point	FPL&FM
176	Flight planning and flight monitoring	Fuel load	EDTO/ETOPS fuel requirements	State the factors of influence on the selection of the critical point, i.e. diversion time/distance, icing conditions, diversion scenario decompression/one engine inoperative, expected remaining fuel	FPL&FM
177	Flight planning and flight monitoring	Fuel load	EDTO/ETOPS fuel requirements	Estimate the expected remaining fuel at the critical point	FPL&FM
178	Flight planning and flight monitoring	Fuel load	EDTO/ETOPS fuel requirements	Evaluate if the expected remaining fuel covers the critical fuel	FPL&FM
179	Flight planning and flight monitoring	Fuel load	EDTO/ETOPS fuel requirements	Evaluate the additional fuel requirements	FPL&FM

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
180	Flight planning and flight monitoring	Aircraft suitability	MEL items	Evaluate inoperative systems to determine the feasibility for the aircraft to perform the desired mission, i.e. auto flight, EDTO, ETOPS	OPSSTD
181	Flight planning and flight monitoring	Aircraft suitability	MEL items	Evaluate the operational- and performance-related consequences for the intended operation, i.e. gear down operation, flight without cabin pressurization	PEFHS
182	Flight planning and flight monitoring	Aircraft suitability	MEL items	Review fuel requirements for items that restrict or affect the fuel range of the aircraft	FPL&FM
183	Flight planning and flight monitoring	Aircraft suitability	MEL items	Verify MEL applicability including the validity of any expiration date for the intended operation	FPL&FM
184	Flight planning and flight monitoring	Aircraft suitability	CDL items	Evaluate missing parts to determine feasibility for the aircraft to perform the desired mission	PEFHS
185	Flight planning and flight monitoring	Aircraft suitability	CDL items	Evaluate the operational- and performance-related consequences for the intended operation	PEFHS
186	Flight planning and flight monitoring	Aircraft suitability	CDL items	Review fuel requirements for items that restrict or affect the fuel range of the aircraft	PEFHS
187	Flight planning and flight monitoring	Aircraft suitability	CDL items	Verify CDL applicability including the validity of any expiration date for the intended operation	FPL&FM

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
188	Flight planning and flight monitoring	Aircraft suitability	CAT II/III capability	Evaluate aircraft capability based on certification and any inoperative components to determine CAT II/III capabilities	SELA
189	Flight planning and flight monitoring	Aircraft suitability	CAT II/III capability	If CAT II/III capabilities are required for the intended operation, determine crew suitability and operator authorizations for CAT II/III operations	SELA
190	Flight planning and flight monitoring	Aircraft suitability	MEL in view of RVSM, RNP, altitude restrictions	Evaluate inoperative equipment that affects airspace requirements to determine the suitability for the intended operation	FPL&FM
191	Flight planning and flight monitoring	Aircraft suitability	MEL in view of RVSM, RNP, altitude restrictions	Consult OM-C, AIP/NOTAMs/regulations for intended areas of operation to comply with published restrictions	FPL&FM
192	Flight planning and flight monitoring	Aircraft suitability	MEL in view of RVSM, RNP, altitude restrictions	Ensure that the aircraft is capable of the intended operation based on restrictions outlined in the MEL and airspace	FPL&FM
193	Flight planning and flight monitoring	Aircraft suitability	Overwater capability (life vests/rafts)	Ensure aircraft is equipped with adequate emergency equipment for overwater operations based on the operator's requirements	OPSSTD
194	Flight planning and flight monitoring	Payload	Planned payload (passengers, cargo, bags)	Analyse expected payload to determine expected zero fuel weight (ZFW), weight of the aircraft and the loading restrictions, floor load, CG limits, seat capacity	FPL&FM
195	Flight planning and flight monitoring	Payload	Planned payload (passengers, cargo, bags)	Evaluate payload limitations in case of fuel tankering requirements based on the minimum remaining fuel at destination	FPL&FM

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
196	Flight planning and flight monitoring	Payload	Planned payload (passengers, cargo, bags)	Evaluate the influence of performance on planned payload: field length, brake energy, tire speed, climb, obstacle, approach climb	PEFLS
197	Flight planning and flight monitoring	Payload	Planned payload (passengers, cargo, bags)	Determine if expected payload can be accommodated for the operation, in view of the limitations of aircraft: MZFM, MTOM, MLAM, TCAP	PEFLS
198	Flight planning and flight monitoring	Payload	Dangerous goods/hazmat/special load	Ensure compliance with company procedures and applicable regulations for transport	OPSSTD
199	Flight planning and flight monitoring	Payload	Dangerous goods/hazmat/special load	Identify the procedure to reach subject matter experts in the event of questions or concerns regarding materials contained in the cargo or proper handling	OPSSTD
200	Flight planning and flight monitoring	Payload	Dangerous goods/hazmat/special load	Ensure that appropriate paperwork is provided to the flight crew in a timely manner	OPSSTD
201	Flight planning and flight monitoring	Payload	Human remains	Extract procedural information from operations manuals to assure appropriate loading protocols are observed	OPSSTD
202	Flight planning and flight monitoring	Payload	Human remains	Ensure compliance with company procedures and local customs	OPSSTD
203	Flight planning and flight monitoring	Payload	Human remains	Ensure appropriate notifications are made to the flight crew prior to flight departure	OPSSTD

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
204	Flight planning and flight monitoring	Payload	Organs for transplant	Follow company guidelines regarding organ transportation and advise appropriate ATC facilities as applicable	OPSSTD
205	Flight planning and flight monitoring	Payload	Load planning	Describe the influence of the load position on the complexity and speed of the ground handling process	OPSSTD
206	Flight planning and flight monitoring	Payload	Load planning	Evaluate the influence of passenger class-related booking figures on the CG	OPSSTD
207	Flight planning and flight monitoring	Payload	Load planning	Evaluate the influence of the CG position on the trip fuel in general	OPSSTD
208	Flight planning and flight monitoring	Payload	Total flight revenue and route profitability	Provide a simple revenue summary from commercial payload components: passenger, cargo, mail	COMCL
209	Flight planning and flight monitoring	Payload	Total flight revenue and route profitability	Evaluate the variable flight costs from ATC/overflight costs and fuel costs	COMCL
210	Flight planning and flight monitoring	Payload	Total flight revenue and route profitability	Evaluate the direct time-related fixed-cost elements: aircraft, crew, maintenance, and insurance (ACMI) costs	COMCL
211	Flight planning and flight monitoring	Payload	Total flight revenue and route profitability	Evaluate a simple profit contribution: revenue minus variable costs and minus ACMI costs	COMCL
212	Flight planning and flight monitoring	Payload	Total flight revenue and route profitability	Evaluate the influence of a single route profitability on the network profitability	COMCL

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
213	Flight planning and flight monitoring	Payload	Total flight revenue and route profitability	Evaluate the influence of a flight cancellation in view of costs of delay	COMCL
214	Flight planning and flight monitoring	Payload	Total flight revenue and route profitability	Compare the different value factors of passengers/customers and their influence on the operational/commercial decision making	COMCL
215	Flight planning and flight monitoring	Weather analysis	METARs and TAFs (origin, en-route, destination and alternate airports)	Evaluate METARs/TAFs for all areas to obtain a familiarization of the weather conditions for the intended operation	FPL&FM
216	Flight planning and flight monitoring	Weather analysis	METARs and TAFs (origin, en-route, destination and alternate airports)	Identify potential concerns and/potential limitations to the operation and prepare accordingly	FPL&FM
217	Flight planning and flight monitoring	Weather analysis	METARs and TAFs (origin, en-route, destination and alternate airports)	Evaluate weather charts (upper air and surface) to ensure flight is not conducted into hazardous conditions and is in compliance with operational limitations	FPL&FM
218	Flight planning and flight monitoring	Weather analysis	METARs and TAFs (origin, en-route, destination and alternate airports)	Evaluate surface weather products (TAF, METAR, surface charts) to identify potential for runway contamination such as standing water, ice slush or snow.	FPL&FM
219	Flight planning and flight monitoring	Weather analysis	SIG WX data (convective activity, jet streams, turbulence, volcanic ash, icing, ITCZ)	Extract information from upper air products to evaluate risks associated with SIG WX (convective activity, turbulence, volcanic ash and icing conditions)	FPL&FM
220	Flight planning and flight monitoring	Weather analysis	SIG WX data (convective activity, jet streams, turbulence, volcanic ash, icing, ITCZ)	Evaluate known areas of severe weather potential if flying in the region (i.e. ITCZ, volcano regions)	FPL&FM

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
221	Flight planning and flight monitoring	Weather analysis	SIG WX data (convective activity, jet streams, turbulence, volcanic ash, icing, ITCZ)	Evaluate and monitor data regarding significant weather and ensure pertinent information is given to the crew in an expeditious manner both before and during the flight	FPL&FM
222	Flight planning and flight monitoring	Weather analysis	PIREPs	Extract PIREP information and use data in the route planning process	FPL&FM
223	Flight planning and flight monitoring	Weather analysis	PIREPs	Advise flight crew prior to departure of any know or forest SIG WX conditions (turbulence, icing, convective activity)	FPL&FM
224	Flight planning and flight monitoring	Weather analysis	PIREPs	Monitor PIREPs in the vicinity of intended operation and advise crew of any pertinent information	FPL&FM
225	Flight planning and flight monitoring	Weather analysis	Upper air	Evaluate upper air forecast to identify areas of significant weather and turbulence	FPL&FM
226	Flight planning and flight monitoring	Weather analysis	Major weather event (typhoon, snow, freezing rain)	Evaluate major weather events to determine impact to facilities and/or airspace and determine if operation in the expected conditions is possible/prudent	FPL&FM
227	Flight planning and flight monitoring	Analyse AIP/NOTAM data	ATC/service strike action	Evaluate source documents for known job action and subsequent planning requirements	FPL&FM
228	Flight planning and flight monitoring	Analyse AIP/NOTAM data	Long term airspace and airport closures	Evaluate NOTAM/AIP information to ensure compliance	FPL&FM

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
229	Flight planning and flight monitoring	Analyse AIP/NOTAM data	Long term airspace and airport closures	Establish alternative procedures to avoid airspace/airport during the closure period	FPL&FM
230	Flight planning and flight monitoring	Analyse AIP/NOTAM data	SUA airspace	Monitor NOTAMs and/or other sources of information regarding restrictions for the airspace	FPL&FM
231	Flight planning and flight monitoring	Analyse AIP/NOTAM data	SUA airspace	Ensure flights are not planned to operate within the area without appropriate permission	FPL&FM
232	Flight planning and flight monitoring	Analyse AIP/NOTAM data	Long term ATC route closures	Evaluate NOTAM/AIP information to ensure compliance	FPL&FM
233	Flight planning and flight monitoring	Analyse AIP/NOTAM data	Long term ATC route closures	Coordinate alternate route with ATC and/or other entities responsible for the airspace	FPL&FM
234	Flight planning and flight monitoring	Analyse AIP/NOTAM data	Fuel availability	Monitor sources for notification of reduction of availability	FPL&FM
235	Flight planning and flight monitoring	Analyse AIP/NOTAM data	Fuel availability	Communicate with supplier as applicable	FPL&FM
236	Flight planning and flight monitoring	Performance analysis	Runway selection	Identify desired runway(s) based on availability (NOTAM, noise abatement, ATC configuration)	PEFLS
237	Flight planning and flight monitoring	Performance analysis	Runway selection	Extract TAF and METAR data and determine desired runway based on wind direction	PEFLS

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
238	Flight planning and flight monitoring	Performance analysis	Runway selection	Evaluate local ATC information to determine active runway configuration	PEFLS
239	Flight planning and flight monitoring	Performance analysis	Identify performance limitation (RATOW, CLW, STRUCT)	Evaluate limitations of the aircraft based on the runway of intended use based on TORA, ASDA, TODA available. Evaluate possible consequences of TWY closure in view of allowed intersection take-offs	PEFLS
240	Flight planning and flight monitoring	Performance analysis	Identify performance limitation (RATOW, CLW, STRUCT)	Evaluate limitations of the aircraft based on the runway of intended use, conditions of the runway (dry, wet, contaminated), weight of the aircraft and weather conditions at time of departure	PEFLS
241	Flight planning and flight monitoring	Performance analysis	Mitigation strategy for weight-limited flights	Establish limiting factors and determine feasibility for performance improvement (runway change, wait for temperature reduction, repair performance limiting MEL items)	PEFLS
242	Flight planning and flight monitoring	Performance analysis	Mitigation strategy for weight-limited flights	Apply rules for payload/fuel prioritization	OPSSTD
243	Flight planning and flight monitoring	Performance analysis	En-route performance (drift down, critical terrain)	Identify potential drift down (engine out) and critical terrain (depressurization) areas for a chosen flight route	PEFHS
244	Flight planning and flight monitoring	Performance analysis	En-route performance (drift down, critical terrain)	Establish a mitigation strategy for each of the identified areas	PEFHS

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
245	Flight planning and flight monitoring	Performance analysis	OCC in-flight support	Describe the functions of flight tracking, flight watch, flight following, flight monitoring	FPL&FM
246	Flight planning and flight monitoring	Performance analysis	OCC in-flight support	Evaluate the basic functions in view of data allocation, risk management and active operational control and decision making	OPSSTD
247	Flight planning and flight monitoring	Performance analysis	OCC in-flight support	Evaluate the factors of influence on problem solving and decision making in view of in-flight re-routing or diversions, i.e. weather avoidance, diversion planning for medical or technical reasons	OPSSTD
248	Post-flight assessment	Assessment of fuel consumption deviation	Influence of flight altitude deviations from planned altitude	Evaluate the average additional fuel consumption per 1 000 ft deviation	FPL&FM
249	Post-flight assessment	Assessment of fuel consumption deviation	Influence of flight altitude deviations from planned altitude	Evaluate the specific range in kg/NAM and NAM/tonne per 1 000 ft deviation	FPL&FM
250	Post-flight assessment	Assessment of fuel consumption deviation	Influence of flight track (NAM) deviations from planned routing	Investigate the reason of changed flight track, i.e. ATC, traffic capacity, weather	FPL&FM
251	Post-flight assessment	Assessment of fuel consumption deviation	Influence of flight track (NAM) deviations from planned routing	Evaluate realistic countermeasures to reduce in-flight deviations from optimum flight track	FPL&FM
252	Post-flight assessment	Assessment of fuel consumption deviation	Influence of flight speed deviations from planned speed regime	Evaluate the influence of OAT variations on the resulting TAS	PEFHS
253	Post-flight assessment	Assessment of fuel consumption deviation	Influence of flight speed deviations from planned speed regime	Evaluate the influence of GW variations on the resulting TAS	PEFHS

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
254	Post-flight assessment	Assessment of fuel consumption deviation	Influence of flight speed deviations from planned speed regime	Evaluate the influence of the selected cruise procedure on the resulting TAS	PEFHS
255	Post-flight assessment	Assessment of fuel consumption deviation	Influence of flight speed deviations from planned speed regime	Evaluate the influence of actual time costs on the planned cost index	PEFHS
256	Post-flight assessment	Assessment of fuel consumption deviation	Influence of gross weight deviations from planned gross weight	Evaluate the delta ZFW due to last minute changes	PEFHS
257	Post-flight assessment	Assessment of fuel consumption deviation	Influence of gross weight deviations from planned gross weight	Evaluate the amount of unplanned additional/extra fuel on board at take-off	PEFHS
258	Post-flight assessment	Assessment of fuel consumption deviation	Influence of gross weight deviations from planned gross weight	Evaluate the average additional fuel consumption per 1 000 kg GW deviation	PEFHS
259	Post-flight assessment	Assessment of fuel consumption deviation	Influence of gross weight deviations from planned gross weight	Evaluate the specific range in kg/NAM and NAM/tonne per 1 000 kg GW deviation	PEFHS
260	Post-flight assessment	Assessment of fuel consumption deviation	Influence of wind deviations from forecasted wind speed and direction	Evaluate the average actual vs. planned main wind direction per route segment	PEFHS
261	Post-flight assessment	Assessment of fuel consumption deviation	Influence of wind deviations from forecasted wind speed and direction	Evaluate the average actual vs. planned main wind speed per route segment	PEFHS
262	Post-flight assessment	Assessment of fuel consumption deviation	Influence of wind deviations from forecasted wind speed and direction	Evaluate the influence of the actual average headwind/tailwind component per route segment and the resulting GS	PEFHS

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
263	Post-flight assessment	Assessment of fuel consumption deviation	Influence of wind deviations from forecasted wind speed and direction	Evaluate the influence of the actual average cross wind component per route segment and the resulting effective TAS	PEFHS
264	Post-flight assessment	Assessment of fuel consumption deviation	Evaluation of the planned and actual remaining fuel	Compare the planned with the actual remaining fuel on board, evaluate the deviation and analyse the influence on the statistical analysed extra/contingency fuel	PEFHS
265	Post-flight assessment	Assessment of cost deviation	Direct operating planned vs. actual costs	Evaluate the influence of GW, speed, track, ALT and wind deviations on the direct operating costs	COMCL
266	Post-flight assessment	Assessment of cost deviation	Direct operating planned vs. actual costs	Distinguish between variable and fixed costs (ACMI)	COMCL
267	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Analyse root cause of the given irregularity	Distinguish between primary and secondary causes	OPSSTD
268	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Analyse root cause of the given irregularity	Identify the information used during decision making	OPSSTD
269	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Potential risks of given irregularities in relation to the actual risks and consequences	Identify possible situations leading to additional risks	OPSSTD
270	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Potential risks of given irregularities in relation to the actual risks and consequences	Describe the probability and the possible impact	OPSSTD

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
271	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Potential risks of given irregularities in relation to the actual risks and consequences	Develop a possible alternative scenario	OPSSTD
272	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Potential risks of given irregularities in relation to the actual risks and consequences	Evaluate the risks and costs of the alternative scenario	COMCL
273	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Total additional costs of the irregularity	Apply the calculation methods for DOC and the costs of delay	COMCL
274	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Remaining fuel in flight at a given position and evaluate the maximum holding time	Evaluate the components of the minimum remaining fuel	FPL&FM
275	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Remaining fuel in flight at a given position and evaluate the maximum holding time	Evaluate the factors of influence on the remaining fuel, i.e. wind, minima, procedures, technical	FPL&FM
276	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Remaining fuel in flight at a given position and evaluate the maximum holding time	Evaluate the expected remaining fuel and compare with the minimum fuel	FPL&FM
277	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Remaining fuel in flight at a given position and evaluate the maximum holding time	Evaluate the flight/holding time equivalent under different conditions	FPL&FM

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
278	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Planned or expected RWY in use vs. actual RWY in use	Evaluate the advantage/disadvantage of specific RWYs in use, i.e. obstacle, weather minima, RWY length, RWY slope, taxi time	PEFLS
279	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Planned or expected RWY in use vs. actual RWY in use	Describe the reasons for specific preferential RWYs	PEFLS
280	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Planned or expected RWY in use vs. actual RWY in use	Evaluate the probability of using the preferential RWY, depending on season, daytime, capacity and technical status	PEFLS
281	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Availability of landing procedures (RNP/precision/non-precision) during actual time of landing	Evaluate operational limitations and options on the basis of the route documentation (OM-C)	FPL&FM
282	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Availability of landing procedures (RNP/precision/non-precision) during actual time of landing	Evaluate historical status reports, i.e. NOTAMs	FPL&FM
283	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Availability of landing procedures (RNP/precision/non-precision) during actual time of landing	Describe the probability, times and intervals of downgraded equipment and procedures	SELA
284	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Availability and quality of information during operation from MET, ATC, airports and internal sources	Summarize results from incident/accident reports in view of data availability and quality	OPSSTD

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
285	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Availability and quality of information during operation from MET, ATC, airports and internal sources	Identify gaps in the information flow	OPSSTD
286	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Availability and quality of information during operation from MET, ATC, airports and internal sources	Identify the influence of missed and wrong data on the decision-making process	OPSSTD
287	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Technical status of the aircraft during operation and the aircraft system availability	Evaluate operational limitations and options on the basis of the aircraft operations manual, i.e. OM-B/AOM	FPL&FM
288	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Technical status of the aircraft during operation and the aircraft system availability	Evaluate historical status reports, the list of MEL-items and the list of deferred/open items	FPL&FM
289	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Technical status of the aircraft during operation and the aircraft system availability	Describe the probability, times and intervals of downgraded aircraft capabilities	FPL&FM
290	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Handling options in relation to the published rules and SOPs from the Flight Operations Manual (FOM,OM-A, OM-B, OM-C)	Evaluate operating procedures in view of applicability in a specific operational situation, i.e. incident/accident	FPL&FM

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
291	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Handling options in relation to the published rules and SOPs from the Flight Operations Manual (FOM,OM-A, OM-B, OM-C)	Evaluate the level of harmonization or conflicts of standard procedures in different operations manuals	OPSSTD
292	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Handling options in relation to the published rules and SOPs from the Flight Operations Manual (FOM, OM-A, OM-B, OM-C)	Evaluate operational limitations and options on the basis of the route documentation (OM-C)	OPSSTD
293	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Handling options in relation to the published rules and SOPs from the Flight Operations Manual (FOM,OM-A, OM-B, OM-C)	Identify possible SOP adjustments to reduce the operational risk	OPSSTD
294	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Handling options in relation to the published rules and SOPs from the Flight Operations Manual (FOM, OM-A, OM-B, OM-C)	Evaluate the operational risks and factors of influence on passenger flow, i.e. customs (Schengen Agreement), immigration, security	OPSSTD
295	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Potential risks of given delays in relation to the actual risks and consequences based on operator standards, policies, data and SOPs	Total costs of delay, the average cost per delayed minute, the average costs per delayed passenger	COMCL
296	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Potential risks of given delays in relation to the actual risks and consequences based on operator standards, policies, data and SOPs	Scope of company rules and SOPs published in the Flight Operations Manual and Ground Operations Manual	OPSSTD

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
297	Post-flight assessment	Assessment of irregular operations (return to ramp, diversions, air turn-back, incidents, accidents)	Potential risks of given delays in relation to the actual risks and consequences based on operator standards, policies, data and SOPs	Options of adequate process, tool and staff qualification improvements	OPSSTD
298	Post-flight assessment	Assessment of the aeronautical data management, i.e. weather, AIP/NOTAM, ATM	Potential risks of given delays in relation to the actual risks and consequences based on MET, ATM and AIP standards, policies, data and SOPs	Compare the information from routine weather forecasts with the actual ceiling, visibility and wind direction/speed	FPL&FM
299	Post-flight assessment	Assessment of the aeronautical data management, i.e. weather, AIP/NOTAM, ATM	Potential risks of given delays in relation to the actual risks and consequences based on MET, ATM and AIP standards, policies, data and SOPs	Compare the forecasted against the actual time interval of weather conditions and state possible reasons for major deviations	FPL&FM
300	Post-flight assessment	Assessment of the aeronautical data management, i.e. weather, AIP/NOTAM, ATM	Potential risks of given delays in relation to the actual risks and consequences based on MET, ATM and AIP standards, policies, data and SOPs	Compare forecasted special weather phenomena with the actual condition	FPL&FM
301	Post-flight assessment	Assessment of the aeronautical data management, i.e. weather, AIP/NOTAM, ATM	Potential risks of given delays in relation to the actual risks and consequences based on MET, ATM and AIP standards, policies, data and SOPs	Given conditions of airport infrastructure (RWY, TWY, apron) against the published status from AIP and NOTAMs	SELA
302	Post-flight assessment	Assessment of the aeronautical data management, i.e. weather, AIP/NOTAM, ATM	Potential risks of given delays in relation to the actual risks and consequences based on MET, ATM and AIP standards, policies, data and SOPs	Availability of approach and/or en-route navigation procedure (incl. RAIM) against the published status from AIP and NOTAMs	FPL&FM

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
303	Post-flight assessment	Assessment of the aeronautical data management, i.e. weather, AIP/NOTAM, ATM	Potential risks of given delays in relation to the actual risks and consequences based on MET, ATM and AIP standards, policies, data and SOPs	Reliable information/data sources required to initiate the analytical process	OPSSTD
304	Post-flight assessment	Assessment of the aeronautical data management, i.e. weather, AIP/NOTAM, ATM	Potential risks of given delays in relation to the actual risks and consequences based on MET, ATM and AIP standards, policies, data and SOPs	Define an appropriate method of data collection and analysis	OPSSTD
305	Post-flight assessment	Assessment of the aeronautical data management, i.e. weather, AIP/NOTAM, ATM	Potential risks of given delays in relation to the actual risks and consequences based on MET, ATM and AIP standards, policies, data and SOPs	Compare the forecasted traffic volume at specific airports or ATC sectors with the actual situation	OPSSTD
306	Post-flight assessment	Assessment of airline market and product definitions, success and risk factors for customer experience	Potential consequences in view of passenger experience	Description of product properties in different airline market segments, i.e. flight frequency, capacity, connectivity, service level, pricing, passenger status, on time performance, booking platform	COMCL
307	Post-flight assessment	Assessment of airline market and product definitions, success and risk factors for customer experience	Potential consequences in view of passenger experience	Key performance indicator to measure customer experience and describe the influence of the OCC	COMCL
308	Post-flight assessment	Assessment of airline market and product definitions, success and risk factors for customer experience	Potential consequences in view of passenger experience	Product cost driver and the influence of the OCC on cost control	COMCL

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
309	Post-flight assessment	Assessment of airline market and product definitions, success and risk factors for customer experience	Potential consequences in view of passenger experience	Influence of the product service level on the complexity of processes	COMCL
310	Post-flight assessment	Assessment of airline market and product definitions, success and risk factors for customer experience	Potential consequences in view of passenger experience	Implications on market and product definitions for on-time performance	COMCL
311	Post-flight assessment	Assessment of airline market and product definitions, success and risk factors for customer experience	Potential consequences in view of passenger experience	Network planning process and its influence on network scheduling	COMCL
312	Post-flight assessment	Assessment of airline market and product definitions, success and risk factors for customer experience	Potential consequences in view of passenger experience	Network scheduling process and its influence on the decision making in operational control	COMCL
313	Post-flight assessment	Assessment of areas of responsibility in the operational control environment: CAMO, MRO	Potential risks of given delays in relation to the actual risks and consequences based on CAMO, MRO and aircraft manufacture standards, policies, data and SOPs	Responsibility of the continuing aircraft airworthiness management organization (CAMO) by the operator	OPSSTD
314	Post-flight assessment	Assessment of areas of responsibility in the operational control environment: CAMO, MRO	Potential risks of given delays in relation to the actual risks and consequences based on CAMO, MRO and aircraft manufacture standards, policies, data and SOPs	Responsibility of the aircraft's maintenance repair and overhaul (MRO) service provider	OPSSTD

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
315	Post-flight assessment	Assessment of areas of responsibility in the operational control environment: CAMO, MRO	Potential risks of given delays in relation to the actual risks and consequences based on CAMO, MRO and aircraft manufacture standards, policies, data and SOPs	Meaning and risks of airworthiness directives, manufacture service bulletins, regular maintenance interval and unplanned maintenance downtime extensions	COMCL
316	Post-flight assessment	Assessment of areas of responsibility in the operational control environment: CAMO, MRO	Potential risks of given delays in relation to the actual risks and consequences based on CAMO, MRO and aircraft manufacture standards, policies, data and SOPs	Key elements of the aircraft maintenance downtime planning and its influence on the tail assignment process, on time performance, aircraft reliability and maintenance costs	COMCL
317	Post-flight assessment	Assessment of areas of responsibility in the operational control environment: CAMO, MRO	Potential risks of given delays in relation to the actual risks and consequences based on CAMO, MRO and aircraft manufacture standards, policies, data and SOPs	Tasks of the function maintenance control in relation to the CAMO and MRO and to other functions in the OCC	OPSSTD
318	Post-flight assessment	Assessment of areas of responsibility in the operational control environment: crew planning and crew scheduling	Potential risks of given delays in relation to the actual risks and consequences based on crew planning and scheduling standards, policies, data and SOPs	Factors of influence on crew capacity planning and application of relevant KPI	COMCL
319	Post-flight assessment	Assessment of areas of responsibility in the operational control environment: crew planning and crew scheduling	Potential risks of given delays in relation to the actual risks and consequences based on crew planning and scheduling standards, policies, data and SOP's	Process of crew hiring and training in relation to the available crew capacity and the operational risk	OPSSTD

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
320	Post-flight assessment	Assessment of areas of responsibility in the operational control environment: crew planning and scheduling	Potential risks of given delays in relation to the actual risks and consequences based on crew planning and scheduling standards, policies, data and SOPs	Costs of an adequate crew factor in relation to the advantage of crew reserves and to time performance	COMCL
321	Post-flight assessment	Assessment of areas of responsibility in the operational control environment: crew planning and scheduling	Potential risks of given delays in relation to the actual risks and consequences based on crew planning and scheduling standards, policies, data and SOPs	Process of pairing and rostering	OPSSTD
322	Post-flight assessment	Assessment of areas of responsibility in the operational control environment: crew planning and scheduling	Potential risks of given delays in relation to the actual risks and consequences based on crew planning and scheduling standards, policies, data and SOPs	Costs and benefits of an individual crew request system	OPSSTD
323	Post-flight assessment	Assessment of areas of responsibility in the operational control environment: crew planning and scheduling	Potential risks of given delays in relation to the actual risks and consequences based on crew planning and scheduling standards, policies, data and SOPs	Costs and risks of short term changes of individual crew schedules	OPSSTD
324	Post-flight assessment	Assessment of the data flow and data quality in the OCC	Potential risks of given delays in relation to the actual risks and consequences based on OCC standards, policies, data and SOPs	Risks of undefined data formats, different data sources and different information status	OPSSTD

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
325	Post-flight assessment	Assessment of the data flow and data quality in the OCC	Potential risks of given delays in relation to the actual risks and consequences based on OCC standards, policies, data and SOPs	Basic properties of an adequate IT architecture (GUI, interfaces, data base)	OPSSTD
326	Post-flight assessment	Assessment of the data flow and data quality in the OCC	Potential risks of given delays in relation to the actual risks and consequences based on OCC standards, policies, data and SOPs	Data processing and stakeholder in the data management process	OPSSTD
327	Post-flight assessment	Assessment of the data flow and data quality in the OCC	Potential risks of given delays in relation to the actual risks and consequences based on OCC standards, policies, data and SOPs	Influence of irrelevant data on the speed of decision making in the OCC	OPSSTD
328	Post-flight assessment	Assessment of the route profitability and the factor of influence on the operational risk and commercial result	Potential consequences for the passenger experience and the commercial result	Evaluate the impact of misconnections of passenger/cargo in view of costs of delay	COMCL
329	Post-flight assessment	Assessment of the route profitability and the factor of influence on the operational risk and commercial result	Potential consequences for the passenger experience and the commercial result	Evaluate the operational and commercial risks resulting from disruptions in aircraft flow, crew misconnection and aircraft maintenance re-planning	COMCL
330	Post-flight assessment	Assessment of communication standards and risk factors	Potential consequences caused by communication standards, policies, tools and data	Risks caused by inadequate communication during decision-making processes	OPSSTD
331	Post-flight assessment	Assessment of communication standards and risk factors	Potential consequences caused by communication standards, policies, tools and data	Human factor-related influence on the information exchange	OPSSTD

Ref. No.	Task family	Task category	Task: analyse, explain, evaluate, decide	Sub-tasks	Training modules
332	Post-flight assessment	Assessment of communication standards and risk factors	Potential consequences caused by communication standards, policies, tools and data	Adequate concept of written shift reports	OPSSTD
333	Post-flight assessment	Assessment of communication standards and risk factors	Potential consequences caused by communication standards, policies, tools and data	Adequate concept for the information flow during shift handover	OPSSTD
334	Post-flight assessment	Assessment of the decision-making process in the OCC	Factor of influence on the quality of the decision-making process in the OCC	Human factor-related influence on the result of the decision made by the OCC team	OPSSTD
335	Post-flight assessment	Assessment of the decision-making process in the OCC	Factor of influence on the quality of the decision-making process in the OCC	Prerequisites for an adequate decision-making process	OPSSTD
336	Post-flight assessment	Assessment of safety management aspects in the OCC	Factor of influence on the effect of the SMS	Methods of operational risk analysis in the OCC context	OPSSTD
337	Post-flight assessment	Assessment of safety management aspects in the OCC	Factor of influence on the effect of the SMS	Operational risks and their effect on flight safety	OPSSTD
338	Post-flight assessment	Assessment of safety management aspects in the OCC	Factor of influence on the effect of the SMS	Concept of evidence-based training in the context of a safety management system	OPSSTD
339	Post-flight assessment	Assessment of air operator certificates, standards and approvals	Potential consequences caused by incomplete or missing certificates, standards and approvals	Operator legal capabilities and the area of operation on the basis of given certificates and approvals	OPSSTD

Ref. No.	*Task family*	*Task category*	*Task: analyse, explain, evaluate, decide*	*Sub-tasks*	*Training modules*
340	Post-flight assessment	Assessment of air operator certificates, standards and approvals	Potential consequences caused by incomplete or missing certificates, standards and approvals	Standards and procedures described in the operations manual in relation to the certification status	OPSSTD
341	Post-flight assessment	Assessment of air operator certificates, standards and approvals	Potential consequences caused by incomplete or missing certificates, standards and approvals	Operator roles and responsibilities during dry and wet lease operations and the related prerequisites, risks and benefits	COMCL
342	Post-flight assessment	Assessment of air operator certificates, standards and approvals	Potential consequences caused by incomplete or missing certificates, standards and approvals	Additional air operator prerequisites for EDTO/ETOPS approval, i.e. maintenance management exposition (MME), spare parts control program, engine trend monitoring and system reliability program and training	OPSSTD

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