SLCAP 3100

CIVIL AVIATION AUTHORITY OF SRI LANKA

PERPETUAL LICENCE PROCEDURE MANUAL

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Issued under the authority of the Director General of Civil Aviation & Chief Executive Officer

Perpetual Licence Procedure Manual

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CIVIL AVIATION AUTHORITY OF SRI LANKA

PERSONNEL LICENSING SECTION

LIST OF GUIDANCE MATERIAL ISSUED BY THE PERSONNEL LICENSING SECTION

		
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FOREWORD

As a signatory state to Chicago Convention on Civil Aviation, Sri Lanka is required to adopt the standards implemented by International Civil Aviation Organization (ICAO) through all the Annexes to Chicago Convention.

Annex 1 stipulates all pertinent standards applicable for the Issuance of Licenses to all personnel who requires certification for the performance of the respective job functions to achieve acceptable level of safety. Implementing Standard 48 & 49 stipulates the legal provision in Sri Lanka, applicable for the Issuance of Flight Operations Officer Licence(FOOL) and Aeronautical Station Operator Licence (ASOL) according to ICAO standard of Chapter 4 of Annex 1.

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Having promulgated the applicable legal provision as mentioned above, this Manual cited as "**Perpetual Licenses Procedure manual" SLCAP 3100** has two parts & Part 1 describes the procedures involved in issuance of **Flight dispatcher License** & Part 2 describes procedures for issuance of **Aeronautical Station Operator License** in which conducting various Training & evaluations including all knowledge Examinations, Practical Tests, & On the Job Training (OJT) & final practical assessment while working in the center.

Issuance of both above License are done based on training conducted here in Sri Lanka & as such certification of Training Organization which is Civil aviation Training Center (CATC) for ASO License & International Aviation academy (IAA) for Flight Dispatcher License are also conducted according to the procedures mentioned in this manual. This procedure is elaborated in chapter 4 of part 1 & 2 respectively in this manual.

Furthermore, adopted procedures on training & designation of all the professionals involved in evaluations, inter-alia, Ground Instructors OJT Instructors, Simulator Instructors & Examiners, Knowledge Test examiners, & Final Skills Test Examiners for grant of FOOL & ASOL are also included in this manual.

This guidance material is developed to provide adequate instructions & procedures for those who are involved in training & evaluation of both above Licenses & therefore shall be considered as a staff instruction & shall be guided by the applicable standards mentioned in this manual by the professionals who have received a mandate & authorization to conduct such evaluations.

This Authority may, without any prior notice, change the contents of this manual as appropriate, to suit the administrative requirements.

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ABBREVIATIONS

ADF	-	Automatic direction finder
AFTN	-	Aeronautical fixed telecommunication network
AID	-	Aeronautical Inspection Directorate
AIP	-	Aeronautical information publication
AIREP	-	Air-report
AIS	-	Aeronautical information service
ANR	-	Air Navigation Regulations of Sri Lanka
AOC	-	Air Operator Certificate
ASN	-	Aviation Safety Notice
ASOL	-	Aeronautical station Operator Licence
ATC	-	Air traffic control
ATIS	-	Automatic terminal information service
ATM	-	Air traffic management
ATS	-	Air traffic service
AVSEC	-	Aviation security
BOW	-	Basic operating weight (mass)
CAA	-	Civil Aviation Authority
CADC	-	Central air-data computer
CDU	-	Control and display unit
CG	-	Centre of gravity
C of A	-	Certificate of airworthiness
C of R	-	Certificate of Registration
CP	-	Critical point
CRM	-	Crew resource management
CSI	-	Cabin Safety Inspector
DCP	-	Designated Check Pilot
DGCA	-	Director General of Civil Aviation
DME	-	Distance measuring equipment
DOW	-	Dry operating weight (mass)
DRM	-	Dispatch resource management
EROPS	-	Extended Range of Operations
ETOPS	-	Extended range operations by aeroplanes with two turbine power units
FIR	-	Flight information region
FIS	-	Flight information service
FOI	-	Flight Operations Inspector
FOIH	-	Flight Operations Inspector Handbook
FOM	-	Flight Operations Manual
FOO	-	Flight operations officer
FOOL	-	Flight Operation Officer licence
GNSS	-	Global navigation satellite system
IATA	-	International Air Transport Association
IAVW	-	International airways volcano watch
ICAO	-	International Civil Aviation Organization
ILS	-	Instrument landing system
INS	-	Inertial navigation system
IS	-	Implementing Standards
ITCZ	-	Inter-tropical convergence zone
LMC	-	Last-minute change
LOFT	-	Line Oriented Flight Training

MAC	-	Mean aerodynamic chord
MAT	-	Mass/altitude/temperature
MEL	-	Minimum equipment list
METAR	-	Aviation routine weather report
MMEL	-	Master minimum equipment list
MNPS	-	Minimum navigation performance specifications
MPTOW	-	Maximum permissible take-off operating weight (mass)
MPZFW	-	Maximum permissible zero-fuel operating weight (mass)
MTT	-	Minimum time track
NDB	-	Non-directional radio beacon
NOTAC	-	Notification to the captain (pilot-in- command)
NOTAM	-	Notices to airmen
Ops Specs	-	Operations Specifications
PANS	-	Procedures for air navigation services
PEL	-	Personnel Licensing
PNR	-	Point of no return
Rev	-	Revision
RMI	-	Radio magnetic indicator
RNAV	-	Area navigation
RVR	-	Runway visual range
SARPs	-	Standards and Recommended Practises
SID	-	Standard instrument departure
SLCAP	-	Sri Lanka Civil Aviation Publication
SOPs	-	Standard Operating Procedures
SPECI	-	Aviation selected special weather report
STAR	-	Standard instrument arrival
TAS	-	True airspeed
TOW	-	Take-off weight (mass)
TRTO	-	Type Rating Training Organization
USOAP	-	Universal Safety Oversight Audit Programme
UTC	-	Coordinated universal time
VFR	-	Visual flight rules
VOR	-	VHF omnidirectional radio range
WAFC	-	World area forecast centre
WAFS	-	World area forecast system
WMO	-	World Meteorological Organization (United Nations Agency)
ZFW	-	Zero-fuelweight(mass)

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PART I

FLIGHT OPERATIONS OFFICER LICENCE PROCEDURE

CHAPTER 1- GENERAL RULES

A person shall not carry out duties of a Flight Operations Officer/ Flight Dispatcher as specified in paragraph 6 of Implementing Standard (IS) 013 unless he holds a valid Flight Operations Officer/ Flight Dispatcher Licence issued by DGCA, Sri Lanka and maintains competency and meets the requirements for recent experience as specified in IS 019.

Director General of Civil Aviation Sri Lanka(DGCA) shall issue continuing type of Flight Operations Officer/ Flight Dispatcher Licence (non-expiry type licence) to an applicant who meets the requirements in chapter 2 and employable for flight dispatching in an airline for commercial air transport operations with an approved method of control and supervision of flight operations.

The applicant for a Flight Operations Officer/ Flight Dispatcher (FOO/FD) Licence shall, before being issued with a licence

I) Meet such requirements in respect of age , knowledge , experience and skill specified at chapter 2 of this manual and Implementing Standard 049 (IS 049).

II) Demonstrate his/her ability in the following manner in respect of knowledge and skill as specified at paragraphs at 2.2 and 2.5 of chapter 2 of this manual.

a) Knowledge
Successful Completion of knowledge examination conducted by DGCA, Sri Lanka as per chapter 3 of this manual.

b) Skill
Satisfactorily demonstrate the skill in the manner described by DGCA in IS 049 and Chapter 4 of this manual.

III) A candidate shall produce a letter from an airline confirming that he is currently employed in the flight dispatch duties either on part time or full time basis if he/she has to be issued with a Flight Operations Officer Licence by this Directorate. No licence will be issued to anyone who is not engaged in Flight dispatch duties under any circumstance

Principal duties

The principal duties of the flight operations officer/flight dispatcher (FOO/FD) as specified in paragraph 6, SLCAIS 013 are:

a) assist the pilot-in-command in flight preparation and provide the relevant information required;

b) assist the pilot-in-command in preparing the operational and ATS flight plans, sign when applicable and file the ATS flight plan with the appropriate ATS unit;

c) furnish the pilot-in-command while in flight, by appropriate means, with information which may be necessary for the safe conduct of the flight; and

d) in the event of an emergency, initiate such procedures as may be outlined in the operations manual.

CHAPTER 2- REQUIRMENT FOR FLIGHT OPERATIONS OFFICER LICENCE

2.1 Requirements for the Issue of the Licence.

Requirement for issuance of Flight Operations Officer Licence have been published in the Implementing Standard 049.

2.2 Licensing Procedure

Application for issuance of FOO licence – CAA/PL/I/10
Application for FOO Examination – CAA/PL/E/02
Refer Chapter 6 of PEL Office Procedure SLCAP 3030 for licence issuance procedure.
Refer Appendix D of PEL Office Procedure SLCAP 3030 for application forms.

CHAPTER 3- TRAINING

3.1 Training

Section 3.3 of SLCAIS 049 mentions various forms of past aviation experience that are adequate for the FOO/FD. It is necessary to train persons who do not have such previous experience and who must, therefore, be trained from the very beginning and allowed to obtain the
necessary experience either during their training or immediately after it.
It is obvious that the training requirements of these two groups of trainees will vary.

To cover the various backgrounds of trainees, it is recommended that training be divided into two phases as follows:

Phase one consists of basic knowledge; its completion ensures that a trainee has the necessary background to proceed with phase two of the training. The training syllabus covered in Appendix 1 needs to be covered during this phase.

Phase two consists of applied practical training and route experience. A training syllabus for this phase is detailed in Appendix 1 and guidance on training duration is provided in Table 2.

3.2 Training Programme

3.2.1 Initial training

Training required for candidates who do not have previous Flight Dispatch experience, for the issuance of a Flight Operations Officer / Flight Dispatcher licence. This training is sometimes known as Flight Operations Officer / Flight Dispatcher certification course. The initial training curriculum for Flight Operations Officer / Flight Dispatchers is shown in Appendix I of this Manual.

Table 1 & 2 in Appendix 1 presents the recommended duration (in hours) of the various subjects that need to be covered during phase one training (basic knowledge) for trainees with and without previous aviation experience, and Phase two (applied practical training).

3.2.1.1 Phase One training (basic knowledge)

Trainees who do not have previous aviation experience will have to undergo the complete training programme as recommended in phase one in Table 1 of Appendix 1.

Trainees who have had suitable aviation experience, however, may not need to undertake this complete programme; for example, a professional pilot, a flight navigator, an air traffic controller, or a flight radio operator can be assumed to have,

at least, partially completed phase one if they have been actively employed in these occupations within the past few years. In such cases, training institutes, with the approval of the DGCA, are encouraged to apply the necessary flexibility in arranging appropriate training courses, emphasizing subjects of particular concern to FOO/FDs. The same flexibility can also be applied during requalification or recurrent classroom training.

i. Training for trainees without previous aviation experience-

Table **1-A** provides an approximate duration for the training of the FOO/FD (phase one).

ii. Training for experienced personnel (with previous aviation experience)-

It also contains a shortened training duration in Table **1-B** to serve as a guideline for the training of experienced personnel and for the requalification of FOO/FDs.

3.2.1.2 Phase two training- Applied Practical Training

Phase two of the course takes the form of a series of supervised exercises in which trainees are given the opportunity to develop decision-making abilities by applying knowledge gained in earlier parts of the course. The exercises consist of operational flight planning based on weather analysis, fuel and load calculations, selection of navaids, and compliance with regulations, procedures and amendments thereto. If on-the-job training can be arranged,
then this part of the curriculum should be omitted at the training school and given in a convenient dispatch office where the trainee can receive the required practical training under the guidance and supervision of an FOO/FD
instructor. In the latter case, however, it will expedite the trainee's training if, in addition to "real" flights, hypothetical situations are set up as exercises when time allows.

The simulated or assumed operating conditions for each exercise must be clearly specified by the instructor. The exercises should be made as realistic as possible. Past flight records, meteorological forecasts, charts, weather
observations, etc., can be used to advantage, and answers arrived at by the trainees compared to what actually took place. A group discussion after each exercise will prove beneficial in eliminating possible misconceptions.

Table **2** in Appendix 1 provides an approximate duration for the practical training of the FOO/FD (phase two).

3.2.2 Recurrent Training.

Training required for a licensed Flight Operations Officer / Flight Dispatcher who has been trained and qualified and who must receive recurrent training and a competency

check within the appropriate eligibility period to maintain currency. The area of emphasis in recurrent training is on Flight Operations Officer / Flight Dispatcher duties. Flight Operations Officer / Flight Dispatchers shall undergo recurrent training every 12 calendar months. Recurrent training shall be conducted by IAA and shall ensure that each Flight Operations Officer / Flight Dispatcher is adequately trained and currently proficient with the type aircraft including differences training if applicable. The recurrent training for Flight Operations Officer / Flight Dispatchers shall include at least the following:

1 Question and answer or other review to determine the state of the Flight Operations Officer/ Flight Dispatcher 's knowledge with respect to the aircraft.

2 Instruction as necessary in the subjects required for initial ground training.

3 The recurrent ground training shall also consist of at least 10 programmed hours.

3.2.3 Re-qualification Training.

Training required for a licensed Flight Operations Officer / Flight Dispatcher who has been trained and qualified and who must receive Re-qualification training and a competency check within the appropriate eligibility period to maintain currency. The area of emphasis beyond that of recurrent training is on Flight Operations Officer / Flight Dispatcher duties and some initial training subjects. Re-qualification training should be a complete cycle covering all of the initial subjects over a period of three years.

3.2.4 Training reference guide

Table 1-A & 1-B presents the recommended duration (in hours) of the various subjects that need to be covered during phase one training (basic knowledge) for trainees with and without previous aviation experience, and Phase two (applied practical training). In appreciation of the fact that differences in requirements may necessitate changes in the suggested syllabus to allow completion of the course within the period allotted for training, the total hours required for the completion of a subject are given. Instructors should, however, ensure that all sections of the syllabus are adequately covered to the necessary degree in order to meet the desired level of accomplishment before the trainees are assigned to phase two training.

The training syllabus of phase 1 covered in Appendix 2 chapter 3 to 15 and phase 2 covered in Appendix 3.r

3.3 Degree of Expertise

The training course for basic knowledge (phase one) has been marked with a coding from 1 to 4 indicating an increasing degree of expertise to clarify understanding of the desired level of accomplishment.

1 – denotes a basic knowledge of a subject. Trainees should have a basic understanding of the subject but are not expected to apply that knowledge.

2 – denotes knowledge of the subject and the ability, where applicable, to apply in practice with the help of reference materials and instructions.

3 – denotes a thorough knowledge of the subject and the ability to apply it with speed and accuracy.

4 – denotes extensive knowledge of the subject and the ability to apply procedures derived from it with judgement appropriate to the circumstances.

3.4 Applied Practical Training

This module is based on the phase 2 of Appendix III of this manual:

3.4.1 Lesson Titles

Training organization shall conduct applied practical training in accordance with the procedure approved by DGCA & Training areas & lesson titles shall be in accordance with APPENDIX III-6.

3.5 Policy on training effectiveness

The policy on training effectiveness shall cover:

1 Individual trainee responsibilities;
2 Liaison procedures between training departments;
3 The procedures to correct unsatisfactory progress;
4 Change of Instructor;
5 Trainees' appeals;
6 Internal feedback system for detecting training deficiencies;
7 Suspension of trainees from training;
8 Requirements for reporting and documentation;
9 Completion standards at various stages of training to ensure standardization.
10 Fulfilment of Instructor's responsibility;
11 Trainee's performance at their module-end assessment;
12 Trainee's compulsory end-of-module feedback prior to test, on quality of training;
13 Complaints from Instructors either in terms of trainee behaviour or lack of training aids or facilities etc.;
14 Trainees voluntary complaints at anytime; and
15 Trainee's performance at the two Final Assessments held at the end of each of the phases, Phase 1 and Phase 2.

3.6 Process

Instructors shall strictly follow the planned Schedule and complete the module or subject assigned.

i. Instructors who wish to make any changes to the Schedule shall obtain prior written approval from the Head of Training & DGCA.

ii. Absence of instructors due to unforeseen circumstances shall necessitate arrangement of make-up classes with the consent of the trainees for which the Head of Training shall be informed to enable him to make the classroom and facilities available for the fresh fixtures.

iii. The total hours required for completion of a subject are given in each Module as specified in appendix I.

iv. Instructors should, ensure that all sections of the syllabus are adequately covered to the necessary degree in order to meet the desired level of accomplishment before trainees are assigned to Phase - 2 training.

v. Instructors shall promptly report to the Head of Training any difficulties or problems faced by them that hinder their performance, be it facilities, trainee behaviour or their personal problems, in order to consider remedial steps to maintain consistency in quality of training.

3.7 Assignment of Instructors

Instructors who fulfilled the minimum qualification requirement as specified in section 4.5.1.6 and are assigned as per availability of instructors in the relevant field of expertise and every effort shall be made not to effect changes of instructors within the period of the course.CAASL maintains consistency in always retaining the same two instructors, although trainees cannot always ensure on them doing so.

The Department of Meteorology assigns several Instructors depending on their expertise on subjects within the relevant Module and retains them through the course as requested.

In case an unforeseen need arises to effect a change of an Instructor, it shall be done only with the prior written approval of the GDCA.

In such an event, any partly covered subject within a Module shall be re-done from its beginning, to facilitate understanding with a uniform approach to the subject.

3.8 Conduct of tests

Instructors shall conduct Tests at end of each Module and at mid-term covering all Modules taught up to date of exam, and submit trainees' performance to the Head of Training, through the Training Coordinator, together with a copy of each of the Question Papers.

3.9 Review of results

The Head of Training shall review results seeking opportunities for improvement and submit recommendations to the Training Management who will review such recommendations for implementation.

CHAPTER 4 – APPROVED TRAINING & ORGANIZATIONS

4.1 Approved Training and Approved Training Organizations

4.1.1 Approved Training

According to IS 049, 3.3.1 (c), the applicant shall have gained the experience having satisfactory completion of an approved training as an option. Hence all training programmes conducted by training organizations must be preapproved by this Authority and the approval will be processed in accordance with this procedure. Prior to start a FOO/FD training programme by a training organization shall obtain the approval from DGCA.

4.1.2 Approval of Training Programme

a. DGCA Sri Lanka shall approve a training programme for a Flight Operations Officer Licence that allows alternative means of compliance with the experience requirements established by IS 049 provided that the approved training organization demonstrates to the satisfaction of DGCA Sri Lanka that the training provides level of competency at least equivalent to that provided by the minimum experience requirements.

b. The approved training course includes Basic Knowledge (Phase 1) and Practical Training(Phase 2) as explained in chapter 3 of this manual acceptable to the DGCA. Before granting approval DGCA shall ensure the training complies chapter 3 of this manual. The approval of training programme should be done on a case by case basis and should not be granted for long term periods.

c. CAASL use checklist CAA/PL/CL/84 to approve the training programme after satisfying the below requirements.

   i. <u>Application</u>
   Applications for approval of training programme other than those to be conducted by a approved training school appropriately approved by DGCA, should be made on Application Form no. CAA / PL / I / 31 to the DGCA. The processing of an application, including auditing or inspecting of the course takes some time to complete and consequently organisations requiring approval of training programmes should make the application well in advance of the anticipated start-up date.

   Training organization providing the training shall describe the following aspects with the application when requesting the approval.
   1) The content and the duration of the Basic Knowledge (Phase 1) and Practical Training(Phase 2)
   2) The teaching methods and instructional equipment;
   3) The material and documentation provided to the student;
   4) The qualification of instructors, examiners and/or assessors, as applicable;
   5) The examination and/or assessment procedure,

6) The documentation and records to be provided to the student to justify the satisfactory completion of the training course and related examination/assessment. This should include not only a certificate of completion but enough documentation and records to justify that the content and duration approved has been met and that the examination/assessment has been successfully passed.

ii. <u>The requirements for approval of Training Programmes</u>;
The requirements described in SLCAP 3030 need to be satisfied by the Training organization for grant of approval to training programme.
Note.- Guidance on the approval of training programmes can be found in the Manual on the Approval of Training Organizations (Doc 9841).

1) Facilities
   i. The facilities and working environment shall be appropriate for the task to be performed and be acceptable to DGCA Sri Lanka.
   ii. The training organization shall have, or have access to, the necessary information, equipment, training devices and material to conduct the courses for which it is approved.
   iii. Adequate storage facilities should be available for examination papers and training records. The students should have access to a library containing all current technical material appropriate to the training course.
   iv. Adequate office accommodation should be provided for the instructor(s), examiner(s) and practical assessor(s).

2) Personnel
   i. The training organization shall nominate a person responsible for ensuring that it is in compliance with the requirements for an approved organization.
   ii. The organization shall employ the necessary personnel to plan, perform and supervise the training to be conducted.
   iii. The competence of instructional personnel shall be according to procedures and to a level acceptable to DGCA Sri Lanka.
   iv. The number, qualifications and experience of the course instructors, examiners and practical assessors, shall be appropriate to the intended course.
   v. The training organization shall ensure that all instructional personnel receive initial and continuation training appropriate to their assigned tasks and responsibilities. The training programme established by the training organization shall include training in knowledge and skills related to human performance.

3) Records
   i. The training organization shall maintain a system for recording the qualifications and training of instructional and examining staff where appropriate.
   ii. The training organization shall retain detailed student records to show that all requirements of the training course have been met as agreed by DGCA Sri Lanka.

iii. The records required by above i & ii above shall be kept for a minimum period of two years after completion of the training. The records required by 2.7 (ii) shall be retained for a minimum period of two years after the instructor or examiner ceases to perform a function for the training organization

4) Knowledge Examinations
Knowledge examinations must be conducted at the end of each distinct phase of training or at the end of the course.

5) Conduct Of Course
Lecture notes, diagrams and other instructional material shall be substantially accurate at the time they are handed out.

6) Practical Training
Practical training should be performed in accordance with Phase 2 of the FOO Training Programme in 3.4 of Chapter 3.
Note.- Guidance on the training programmes can be found in the ICAO Training Manual (Doc 7192 Part D-3).
Satisfactory completion of practical training may be demonstrated by a practical assessment.
An authorised instructor must conduct the training and an authorised practical assessor must conduct the practical assessment. Qualifications and experience standards for the instructors and practical assessors are established in Chapter 5 of this manual.

7) Oversight
DGCA Sri Lanka shall maintain an effective oversight programme of the approved training to ensure continuing compliance with the approval requirements.
An audit or inspection will be carried out by the CAASL to ensure that the training/examination is to the required standard.
Any findings that affect the standards of the training course must be rectified within the time duration specified in the Audit/Inspection report.

8) Course Certificates
Course Completion Certificates should be awarded to the successful students on completion of the course phase 1 & Phase 2.

9) Approval
The CAASL will approve the course by letter that will contain any specific conditions necessary

4.1.3 Approval of FOO Training Organizations

The certification process of the Training Organization requires the CAASL to ascertain through a systematic process whether or not, a prospective applicant has both the required aptitude and resources to comply with the applicable legislative requirements and to fulfil the applicant's actual and potential obligations in training Flight Operation Officers (FOO) to maintain the safe, secure and efficient conduct of civil aviation operations

The issuance of an approval for a training organization and the continued validity of the approval shall depend upon the training organization being in compliance with the requirements of this Appendix 2 of Annex 01 and Paragraph 1.2.8 of IS 050.

Prior to issuing approval of FOO Training Organization, the DGCA needs to be satisfied that the applicant comply to all the requirements of relevant legislation, subsidiary legislation and associated requirements published by the DGCA in terms of Aviation Safety Notice 054, section 8 prescribes the requirements for issue of approval to a FOO Training Organization to conduct approved training courses for issuance of Flight Operations Officer Licence/Flight Dispatcher Licence as specified in SLCAIS 049 - "Requirements and Standards Relating to Issue of Flight Operations Officer/Flight Dispatcher Licence .

The DGCA is empowered to specify and vary the conditions of training school approval and associated Operations Specifications (Ops Specs) which specifies the nature and scope of the operations authorized together with relevant conditions and limitations. Furthermore DGCA is authorized to revoke / reduplicate the training organization approval issued, if one or more of the conditions stipulated therein is breached or not maintained to the same level as demonstrated at the initial certification.

4.1.1 Document Evaluation.

The document evaluation phase is which the CAASL will undertake a detailed study of the applicant's manuals of Training & Procedure Manual and relevant course materials and other documents, which accompanied the application. The documentation shall be complete, accurate and current to satisfy the CAASL's requirements before the inspection phase can commence. Then based on the need arises at this phase there will be a series of discussions between the CAASL and the nominated post holders of the applicant in regard to establishing the validity/acceptability of the applicant's proposals.

Note: It should be understood that the documents shall reflect precisely the mode and manner in which the applicant intends conducting the proposed operations and once approved, they shall form a part of the understanding between the CAASL and the training organization in regard to future functioning of the training organization.

4.1.2 Inspection Prior to Certification.

This phase requires the applicant to demonstrate to the CAASL that the applicant is in a position to conduct the proposed operations in accordance with the procedures detailed in the Training & Procedure Manual and relevant course materials reviewed during the previous phase utilizing the personnel/facilities/equipment identified in the formal application. Furthermore at this phase the qualifications and experience of the nominees for Designated Post holders will be evaluated and interviewed, Training facilities, programmes and training personnel will be evaluated and Company's organizational structure, channels of communication, delegation of powers, financial strength and sources of funding will be subjected to detailed scrutiny to ensure that the company has sufficient resources, effective arrangement and control to satisfy its obligations. In order to proceed for the certification process the training organization shall satisfactorily complete the above mentioned elements.

4.1.3 Certification

When all the previous phases have been satisfactorily completed, the CAASL will take the necessary administrative action to approve formally the nominees for Designated Post holders, facilities and procedures specified in the Training and Procedure Manual and other related documents.

Note: It should be borne in mind that although the CAASL inspectors may indicate to the applicant regarding acceptability of the applicant's arrangements in respect of personnel, equipment, facilities, services, procedures or process in relation to the proposed operations as and when evaluations on such matters are completed, the final decision of the CAASL in regard to each such arrangement would be conveyed to the training organization formally during the certification process only.

4.1.4 Inspection / Surveillance

The CAASL Inspectors shall conduct inspection and surveillance activities during the certification phase to approve the training organization. Furthermore after the certification and approval of the training organization CAASL Inspectors shall also conduct the post certification inspections & annual planned safety oversight & surveillance inspections according to the surveillance plan of the CAASL, hence applicant is advised to be mindful of all these intricacies.

4.2 Organizational Requirements

4.2.1 Facility Requirements

The facilities and working environment shall be appropriate for the task to be performed and be acceptable to DGCA. The training organization shall have, or have access to, the necessary information, equipment, training devices and material to conduct the courses for which it is approved

(a). The size and structure of facilities shall ensure protection from the prevailing weather elements and proper operation of all planned training and examination on any particular day.

Opinions differ on the amount of classroom space required for each trainee. The range of "ideal" space for each adult in a classroom varies from a low of 1.4 m^2 to a high of 6.7 m^2. The reason for the wide range in "ideal" figures is that classroom designers either envision different classroom environments or account for certain spaces within the classroom, such as aisles and front setback, differently.

The sizes of classrooms are affected by:

— number of trainees in a class;

— trainee workstation size;

— class configuration;

— size of aisles; and

— use of media (in particular, projected media and hands-on projects).

DGCA recommends that the ratio of trainees per instructor be taken into account when planning the classroom size. In order to provide for sufficient supervision and control, a ratio of one instructor for every 15 trainees and 2 instructors for every 25 trainees is recommended.

(b). Fully enclosed appropriate accommodation separate from other facilities shall be provided for the instruction of theory and conduct of knowledge examinations.

i. The maximum number of students undergoing knowledge training during any training course shall not exceed 28.

ii. The size of accommodation for examination purposes shall be such that no student can read the paperwork or computer screen of any other student from his/her position during examinations.

(c) The paragraph (b) accommodation environment shall be maintained such that students are able to concentrate on their studies or examination as appropriate, without undue distraction or discomfort.

(d) The maximum number of students undergoing practical training during any training course shall not exceed 15 per supervisor or assessor.

(e). Office accommodation shall be provided for instructors, knowledge examiners and practical assessors of a standard to ensure that they can prepare for their duties without undue distraction or discomfort.

(f). Secure storage facilities shall be provided for examination papers and training records. The storage environment shall be such that documents area is in good condition for the retention period as specified in paragraph 4.2.3. The storage facilities and office accommodation may be combined, subject to adequate security.

(g). A library shall be provided containing all technical material appropriate to the scope and level of training undertaken.

(h). In planning for space requirements for the training of FOO/FDs, training managers must take into consideration the trainee workstations, area required for hands-on training, faculty workstations and storage area.

(i) Trainee workstation space includes the trainee's work surface, any additional equipment (terminal, audio/ visual, etc.), a chair, and the space for chair pushback and manoeuvrability. The concept of workstation space is important when sizing rooms for classes containing different numbers of trainees. The total area allowed in a classroom for each trainee varies with the size of the class. An adequate work surface within the work space is very important. The large amount of reference material used in the training of FOO/FDs requires considerably larger work surfaces than would be provided by the attached writing surface of an auditorium chair.

(j) Computers can also be considered as useful training aids for FOO/FDs. Used as instructional media, computers usually take the form of desktop micro computers with keyboard and monitor. They can communi- cate verbal and graphic information and can accept verbal as well as manual or tactile responses. Computers may be used for drills, computer-managed instruction, testing and simu- lations.

(k)The learning environment shall be as follows;

The key to a good learning environment is the elimination of discomforts and other undesirable character- istics. Ten primary factors have been identified:

— the climate must be comfortable;

— lighting must be of adequate level for work or viewing;

— distracting sound must be kept to a minimum;

— work areas must be aesthetically pleasing;

— workstations must be comfortable;

— work space must be adequate;

— work area must be reasonably clean;

— training equipment must be adequate;

— visual media must be visible; and

— audio media must be listenable.

If any of these factors are unsatisfactory, the result can be distraction from the task at hand, and fatigue can result from the effort required of the trainee to adapt to a poor environment. One of the most widely recognized factors listed is that of the comfort of workstations which includes the comfort of the chair

4.2.2 Instructional Equipment & use of media

Each classroom shall have appropriate presentation equipment of a standard that ensures students can easily read presentation text/ drawings/ diagrams and figures from any position in the classroom. Presentation equipment shall include representative synthetic training devices to assist students in their understanding of the particular subject matter where such devices are considered beneficial for such purposes.

The use of media and hands-on experiments is an important factor in determining the amount of common space required in a classroom. The most commonly used visual media are slides, chalk/marker boards, overhead projectors, video tape and easels. The use of projected media (slides, overheads, TV, etc.) has

considerable impact on room size and should be taken into consideration when assigning classrooms.

4.3 Performance evaluation (tests)

Performance evaluation (tests) is an integral part of the training process. Tests should always be prepared with the sole purpose of measuring whether or not the trainee has achieved the training objective. Trainees must always be informed on how they are going to be evaluated, so they can orient their efforts. The information must include the conditions that will exist during the test, the performance that is expected from the trainees, the standards of accomplishment that have to be met and the consequences of an inadequate performance. It is recommended that errors on knowledge exams and skill tests be reviewed with trainees to reflect corrections to achieve 100 per cent. Trainees must be informed of the result of their evaluation and instructors must offer correction of improper responses.

Time and resource constraints may limit the amount of testing that can be given to each objective. However, the criticality of the subject and the performance difficulties which can be encountered should give some indication as to when, how and what performance evaluation should be required. Generally speaking, performance measurement is undertaken to evaluate whether or not courses taught have been understood by the trainees at the desired level:

— *Skills* are best tested by performance tests (the trainee performs the task described in the objective under real or simulated conditions).

— *Knowledge* is best tested by oral or written tests.

— *Attitudes* are tested by observations of performance or by means of questionnaires.

4.4 Continued Compliance

Once certified, the operator is responsible for the continued compliance with the initial conditions of certifications, applicable legislative requirements and DGCA's requirements promulgated from time to time. The CAASL will maintain regular surveillance on the training organization's activities to ensure continued compliance, additionally to the formal and detailed audits where the training school's actual operations are checked against approved procedures as mentioned in the documents of training school. Therefore the failure on the part of the training school to comply with the applicable published requirements may result in either the imposing of administrative penalties or suspension / cancellation of the training organization approval.

4.5 Training Management

The training organization shall nominate a person responsible for ensuring that it is in compliance with the requirements for an approved organization who has cooperate authority for ensuring that all training commitments can be financed and carried out to

the standard required by the DGCA. The organization shall employ the necessary personnel to plan, perform and supervise the training to be conducted.

Training organization shall have accountable executive and key personnel. Depending on the size and scope of the organization and the requirements of the Licensing Authority, some of the key positions may be combined as illustrated in the organizational charts in its Training & procedure Manual. Typical key positions include:

- Accountable manager
- Head of training
- Chief instructor
- Training Manager/Coordinator
- Quality Manager
- Instructors- Classroom (Theory)
- Instructors- On-the Job Training

The training organization shall nominate a person responsible for ensuring that it is in compliance with the requirements for an approved organization.

The organization shall employ the necessary personnel to plan, perform and supervise the training to be conducted.

The competence of instructional personnel shall be in accordance with procedures and to a level acceptable to the Licensing Authority.

The competence of instructional personnel shall be in accordance with procedures and to a level acceptable to DGCA. The training organization shall ensure that all instructional personnel receive initial and continuation training appropriate to their assigned tasks and responsibilities. The training programme established by the training organization shall include training in knowledge and skills related to human performance.

Instructors and knowledge examiners shall undergo updating training at least every 24 months relevant to current technology, practical skills, human factors and the latest training techniques appropriate to the knowledge being trained or examined.

The training organization shall contract sufficient staff to plan/perform knowledge and practical training, conduct knowledge examinations and practical assessments in accordance with the approval of DGCA.

Any person may carry out any combination of the roles of instructor, examiner and assessor, subject to compliance with paragraph below.

The experience and qualifications of instructors, knowledge examiners and practical assessors shall be established as an officially recognized standards in the approved training organization training & Procedure Manual approved by DGCA.

The knowledge examiners and practical assessors shall be specified in the training & Procedure Manual for the acceptance of such staff.

The organization shall maintain a record of all instructors, knowledge examiners and practical assessors. These records shall reflect the experience and qualification, training history and any subsequent training undertaken.

Terms of reference shall be drawn up by DGCA for all instructors, knowledge examiners and practical assessors.

4.5.1 Qualification Requirements of the Training Management

The key personnel involved with the training activities shall have obtained the training requirements as specified in this section.

4.5.1.1 Chief instructor

a) Flight dispatch licence issued by DGCA Sri Lanka
b) Minimum of 8-10 years as a Duty Manager in a reputed Airline in Flight Operations & Network Control
c) International Airline First Officer (Wide body glass cockpit) with group two (11) rating (current/ expired) with 5 years' experience as an Instructor.

4.5.1.2 Quality Manager

a) B.Sc / Professional Qualifications in Airline related subjects or Management, Mathematics, Quality Assurance etc.

b) Minimum of 10-12 years overall experience as an Executive / Duty Manager in a reputed airline's Flight Operations including 05 years managerial experience.

Or

c) Professional qualification in Airline related subjects.
d) minimum of 17 years overall airline experience out of which 05 years in a managerial position.

Or

e) ICAO 201 Flight Dispatch Licence or equivalent professional airline licence.
f) Ability to handle work in a fully computerized environment.

4.5.1.3 Head of training

(a) Hold a Dispatcher/Flight Operations Officer Licence or ATPL or CPL
(b) A degree from a recognized university.
(c) 5 years' experience in managing training in an training organization organization
or
(d) An equivalent professional qualifications
and
(e) 5-7 yrs experience in a related field of which at least 3 years should be in an executive capacity.

4.5.1.4 Training Manager/Coordinator

(a) Degree from a recognized university

with

(b) 3 - 5 years experience in the relevant field

or

(c) Diploma from a recognized educational institution

or

(d) equivalent professional qualification

with

(e) 5 - 6 years experience in the relevant field out of which 4

4.5.1.5 Instructors- Classroom (Theory)

a) Flight Dispatch licence/CPL/ATPL issued by DGCA Sri Lanka.
Or
b) above and having 5 years' experience as an instructor in an airline/flight operations/ technical training on specific subject areas.
c) Having completed the training in Train the trainer programme
d) Knowledge of Air Navigation Regulations and its annexes and other relevant regulations under which Airline operates.
e) Knowledge on technical crew training preferable, but not essential.
f) Knowledge on safety training preferably, but not essential
g) Other than the qualifications mentioned from a) – d) the instructors shall have the module based qualifications specified below to be appointed as a instructor for the specific module. prior approval shall be obtained from DGCA in respect of every instructors.

Module	Qualification (s)
Civil Air Law and Regulations	Holder of a valid FOO/CPL/ATPL Licence or Experience as a Captain/ First Officer capacity in an airline for 5 years and 2 years' experience as designated as an Instructor. WITH OVERALL FLIGHT DESPATCHING EXPERIENCE IN
Aviation Indoctrination	Holder of a valid FOO/CPL/ATPL/AML Licence or Experience as an engineering instructor capacity for minimum 3 years.
Meteorology	Holder of a valid FOO/CPL/ATPL Licence or Be an designated Meteorology Instructor
Navigation	Holder of a valid FOO/CPL/ATPL Licence or Experience as a Captain/ First Officer capacity in an airline for 5 years Or

	Designated as a Naviagtion Instructor and have at least 03 yrs experience.
Mass and Balance Control	Holder of a valid FOO/CPL/ATPL Licence or 3-5 years experience as a load control instructor at International air line Or a hodler of a valid FOO Licence issued by DGCA, Sri Lanka and have a 5 yrs working experience.
Aircraft Mass and Performance	Holder of a valid FOO/CPL/ATPL Licence or 03 yrs working experience as a Mass and Performance Instructor
Air Traffic Management	Holder of a valid ATC Licence with all ratings issued by DGCA, Sri Lanka and 03 yrs experience as an ATC Instructor.
Air Traffic Management (AIS)	Holder of a valid ATC Licence with all ratings issued by DGCA, Sri Lanka and 03 yrs experience as an ATC Instructor.
Flight Planning	Holder of a valid FOO/CPL/ATPL Licence and Experience as a Captain/ First Officer capacity in an airline for 03 years or 03 years' experience as designated as a Instructor.
Flight Monitoring	Holder of a valid FOO/CPL/ATPL Licence and 3-5 years experience as a Performance Supervisor Or a holder of a valid ATPL Or 03 yrs experience as a Instructor for FM
Dangerous Goods by Air	Holder of a valid FOO/CPL/ATPL Licence and Designated as a Dangerous Good Inspector and have 3-5 yrs experience in the capacity
Communication	Holder of a valid FOO/CPL/ATPL Licence or 3-5 years experience as a Aero Com Manager Grade 3 and experience as a Instructor Or a holder of a valid ASO licence issued by DGCA.
Security	3-5 years experience as a Security Manager and having 3 years' experience as an instructor
Human Factors	Holder of a valid ATPL/CPL/FOO Licence and 03 yrs experience as a Human Factor Instructor in an airline and .

4.5.1.6 Chief- Instructors- On-the Job Training

a) FOO/Flight Dispatch licence issued by DGCA Sri Lanka
b) Have minimum 10 years' experience as senior flight dispatcher

c) Have 5 years' experience as OJT Instructor.
d) Successfully completed train the trainer programme and having recurrent training once in 2 years.
e) Knowledge of Air Navigation Regulations and its annexes and other relevant regulations under which Airline operates.

4.5.1.7 Instructors- On-the Job Training

f) FOO/Flight Dispatch licence issued by DGCA Sri Lanka
g) Have minimum 5 years' experience as senior flight dispatcher
h) Successfully completed train the trainer programme and having recurrent training once in 2 years.
i) Knowledge of Air Navigation Regulations and its annexes and other relevant regulations under which Airline operates.

4.5.2 Duties & Responsibilities of the Training Management

4.5.2.1 Accountable manager

Handling all affairs necessary to deliver Training Courses. This includes consultation with the training Manager and Head of training for the delivery of relevant course programs.

Selection and appointment of Technical Instructors, Examiners,

Responsibilities & Duties-

i. The responsibilities of the CAASL nominated person at Training Organization.
ii. The Accountable Manager is kept informed as to the state of compliance of the Training Organization with Training Organization requirements.
iii. The operation of Training Organization is efficiently managed and confirms to the requirements of Training Organization as stipulated by CAASL.
iv. Sufficient staff with appropriate qualifications are selected, trained and developed, to plan perform, supervise examine and assess trainees as required.
v . All necessary Air Navigation & Personnel Licensing data published by CAASL and ICAO as appropriate, is made available.
vi. Examiners, instructors, and practical assessors are fully trained and assessed regularly for competence and that all records pertaining to these personnel are kept up to date.
vii. Sub contract staff including any part time staff conforms to the requirements of Training Organization and the training procedures.
viii. Office accommodation and facilities are available appropriate to the management of the planned training and for the use of training staff.
ix. Staff development and update training is undertaken and recorded

x All approved courses and examinations are delivered to the standard and content at the required level of knowledge, as specified in Training Organization.

xi. A working environment is provided appropriate to the tasks being undertaken.

xii. Ensure sufficient storage facilities, tools, equipment, materials and publications available to perform the training tasks.

xiii. Ensure secure facilities are available for the storage of examination papers prior to the examination and for the storage of completed students answer papers.

xiv. Ensure student and staff records are produced and stored in secure conditions.

xv. Ensure any person to whom any of these responsibilities may be delegated is aware of current regulations.

xvi. Ensure corrective actions carried out for the findings of quality audits.

xvii. Ensure follow up and rectification of findings required to re-establish the required standards of training, examination or ATC standards.

4.5.2.2 Head of training

i. Ensure that the Flight Operations Officer Training Course is implemented in accordance with the DGCA's guidelines, as described in the Flight Operations Officer Training and Procedures Manual (FOO-TPM).

ii. Establish and document key parameters of responsibilities for all staff reporting directly (indirectly) that will support departmental objectives.

iii. Carry out effective management to ensure that desired targets/objectives are achieved.

iv. Execute planned training programmes to enhance the standards/ skills/ knowledge of all ground staff thus ensuring a highly competent work force is available at Flight Operations for day to day work and for future appointments for higher grades.

v. Identify and monitor indicators such as profitability, productivity, service quality levels and attrition rate which contribute to organizational effectiveness.

vi. Ensure all training data is computerised and back up copy records / files are maintained to ensure 100% accuracy.

vii. Develop training management information reports that are easily accessible to functional, line management

viii. Make available a mini library / resource centre to provide reference facilities.

ix. Develop Course calendar & implementation as per Appraisal Training Needs & the Training Matrix.

4.5.2.3 Chief instructor

i. Ensure that the Flight Operations Officer Training Course is implemented in accordance with the DGCA's guidelines, as described in the Flight Operations Officer Training and Procedures Manual (FOO-TPM).

ii. Implement existing policies and develop new ideas and thinking for flight monitoring and flight dispatching, thereby reducing the work load and increasing the quality of the work and the performance of staff to achieve a high level of accuracy which directly contributes to flight safety.

iii. Ensure that the Flight Operations Officer Training Course is implemented in accordance with the DGCA's guidelines, as described in the Flight Operations Officer Training and Procedures Manual (FOO-TPM).

iv. Conduct lectures on flight dispatch,load control and route planning to Tech Crew and Ground Staff.

v. Identify and monitor indicators such as profitability, productivity, service quality levels and attrition rate which contribute to organizational effectiveness.

vi. Ensure all training data is computerised and back up copy records / files are maintained to ensure 100% accuracy.

vii. Develop training management information reports that are easily accessible to functional, line management

viii. Make available a mini library / resource centre to provide reference facilities.

ix. Develop Course calendar & implementation as per Appraisal Training Needs & the Training Matrix.

4.5.2.4 Training Manager/Coordinator

i. Handling all affairs necessary to deliver Maintenance Training Courses. This includes consultation with the Head of Training for the delivery of relevant course programs.

ii. Selection and appointment of Instructors, Examiners, and Practical Assessors/Examiners.

Responsibilities & Duties-

i. Ensure that the Flight Operations Officer Training Course is implemented in accordance with the DGCA's guidelines, as described in the Flight Operations Officer Training and Procedures Manual (FOO-TPM).

ii. The responsibilities of the CAASL nominated person at Training organization.

iii. The delegated duties and responsibilities of the Accountable Manager during prolonged absence.

iv. The Accountable Manager is kept informed as to the state of compliance of the organization with Training Organization requirements.

v. The operation of Training organization is efficiently managed and confirms to the requirements of Maintenance Training Organization as stipulated by CAASL.

vi. Sufficient staff with appropriate qualifications are selected, trained and developed, to plan perform, supervise examine and assess trainees as required.

vii. All necessary data published by CAASL and ICAO as appropriate, is made available.

viii. Examiners, instructors, and practical assessors are fully trained and assessed regularly for competence and that all records pertaining to these personnel are kept up to date.

ix. Sub contract staff including any part time staff conforms to the requirements of Maintenance Training Organization and the training procedures.

x. Office accommodation and facilities are available appropriate to the management of the planned training and for the use of training staff.

xi. Staff development and update training is undertaken and recorded.

xii. All approved courses and examinations are delivered to the standard and content at the required level of knowledge, as specified in Maintenance Training Organization.

xiii. A working environment is provided appropriate to the tasks being undertaken.

xiv. Ensure sufficient storage facilities, tools, equipment, materials and publications available to perform the planned practical tasks.

xv. Ensure secure facilities are available for the storage of examination papers prior to the examination and for the storage of completed students answer papers.

xvi. Interviewing of trainees prior to, during and on completion of the course is effective and un-biased.

xvii. Ensure student and staff records are produced and stored in secure conditions.

xviii. Ensure any person to whom any of these responsibilities may be delegated is aware of current regulations.

xix. Ensure corrective actions carried out for the findings of quality audits.

xx. Ensure follow up and rectification of findings required to re-establish the required standards of training, examination or standards.

xxi. Provide appropriate training support services to all instructors and facilitators to perform effectively.

xxii. Supervise proper maintenance of facilities, equipment, property etc, to enable the provision of satisfactory training of projects you handle.

xxiii. Ensure proper planning and productive utilisation of all available resources.

xxiv. Maintain statistics and a training data base for management information on projects you handle.

xxv. Support the implementation on a comprehensive annual training plan that is in alignment with the organization's objectives in order to ensure that all staff are well trained as per their job requirements in a timely manner.

xxvi. Maintain the effectiveness of training products, delivery, and follow-up processes and objectives and ensure the quality of training services provided meet corporate and departmental objectives and industry standard.

4.5.2.5 Quality Manager

i. Ensure that the requirements of the Quality Assurance System pertaining to the implementation of the Flight Operations Officer Training Course.

ii. Research, Plan and ensure adequate resources are available when preparing the Quality Audit Schedule for the year in consultation with the Accountable Manager thus ensuring all audit areas under the scope is covered once a year with trained auditors.

iii. Ensure, in consultation with the Accountable Manager quality assurance and control activities defined in chapter 4.10 of this manual are carried out to achieve the stated quality objectives.

Iv. Conduct audits as per the planned audit schedule in the respective operational areas to ensure procedures for regulatory conformity are well documented and training standards well defined with documented policies and procedures in order to satisfy the Civil Aviation Authority of Sri Lanka.

V. Plan and review corrective actions, based on audits conducted, with regard to the structure of the operational areas, in consultation with the Accountable Manager in order that these corrective actions could be

evaluated at the Management review meetings for enhanced quality output with the least lost.

vi. Ensure all Line Managers in operational areas/ sections have responsibilities for quality objectives within their remit in order that all their activities are both planned and documented, where documented procedures result from such plans are in adherence to regulatory and company procedures for a safe operation of flights.

vii. The primary role of the Quality Manager is to verify, by monitoring activities in the field of training, that the standards as established by the flying school and any additional requirements of DGCA are being carried out properly.

viii. The quality manager should be responsible for ensuring that the quality assurance system is properly implemented, maintained and continuously reviewed and improved.

ix. The quality manager should:

(i) have direct access to the accountable manager; and

(ii) have access to all areas of the training organization.

The quality manager should be responsible for ensuring that personnel training relating to the quality assurance system is conducted.

4.5.2.6 Instructors- Classroom (Theory)

i. Instructors shall ensure that the Flight Operations Officer Training Course is implemented in accordance with the DGCA's guidelines, as described in this manual and the Flight Operations Officer Training and Procedures Manual (FOO-TPM) in respect of the ICAO Doc 7192 Module/s assigned to him/her to teach.

ii. Instructors must, however, ensure that all items in the training manual syllabus are adequately covered and any requirements relevant to individual authorities should be treated as additional subjects and not as substitutions for the syllabus recommended in this manual. Instructors must also ensure that all items required in final examination conducted by DGCA.

iii. Instructors should, however, ensure that all sections of the syllabus are adequately covered to the necessary degree in order to meet the desired level of accomplishment before the trainees are assigned to phase two training.

iv. In addition to the above, main responsibilities of Instructors are,

a. Preparation and delivery of assigned FOO Training Courses.

b. Supervision of trainees, providing encouragement to develop safe and neat working routines, a sense of responsibility, technical honesty and integrity

c. To provide guidance and counseling to trainees as and when required.

d. Preparation of lesson material, including training manuals, lesson plans, practical work schedules and practical exercises where appropriate

e. Carryout instructional duties for which he / she is qualified

f. Practical demonstrations of work and safety practices

g. Accurate and timely completion of all course documentation

h. Assessment of student performance and implementation of any necessary corrective actions

i. Maintenance of correct work attitudes and discipline, initiating the company disciplinary system when appropriate

j. Initiation of all necessary actions in the event of an emergency

k. If appointed by Chief Instructor undertake duties of invigilator where he /she is not involved in the instruction of that particular phase examination / module

l. Compile questions for examination banks for which he /she is qualified

4.5.2.7 Chief OJT Instructor (COI)

i. COI shall ensure that OJT is conducted in accordance with the approved OJT guide lines.

ii. At the end of the training the Chief OJT Instructor in consultation with the line OJT instructors will conduct the final evaluation/OJT Assessment for each trainee to assess the knowledge gained.

iii. Instructors shall ensure that the Flight Operations Officer Training Course is implemented in accordance with the DGCA's guidelines, as described in this manual and the Flight Operations Officer Training and Procedures Manual (FOO-TPM) in respect of the ICAO Doc 7192 Module/s assigned to him/her to teach.

iv. Chief OJT Instructor to ensure the line Instructors have completed the training for the students as per the guidelines in this document and the trainees have gained the required practical knowledge, when and how the subject matters which were learnt in the classroom are applied and practised for problem solving and any other knowledge required is gained to work as a professional Flight Dispatcher.

v. Chief OJT Instructor to ensure that the students get the opportunity to work in the Flight Dispatch Centre (FDC), Airlines Operations Control Centre (AOCC) and Flight Dispatch Back Office to learn the job functions carried out by each unit related to flight dispatch and flight supervision processors

4.5.2.8 Instructors- On-the Job Training

i. OJT Instructor who is a qualified licence Flight Dispatcher will be assigned for each trainee to guide as per this manual to gain practical knowledge and experience.
ii. If the instructors deemed necessary to provide additional training for the student(s) the OJT will be extended on an agreed time line and will be reassessed.
iii. assess students in an ad-hoc basis from time to time
iv. He shall always be a 'Practical Controller' who is most often a Supervisor.

v. His Role is basically threefold viz. Figure-head Role, Supervisor/Motivator role and Liasion Role

vi. Instructors must, however, ensure that all items in the training manual syllabus are adequately covered and any requirements relevant to individual authorities should be treated as additional subjects and not as substitutions for the syllabus recommended in this manual. Instructors must also ensure that all items required in final examination conducted by DGCA and .

vii. Instructors should, however, ensure that all sections of the syllabus are adequately covered to the necessary degree in order to meet the desired level of accomplishment before the trainees are assigned to phase two training.

viii. It is the responsibility of the OJT instructor to ensure that all trainees are given adequate instructions, advice, demonstrations and help to achieve objectives of OJT topics for the trainees to gain confidence to perform the tasks of Flight Operations Officer

In addition to the above, main responsibilities of Instructors are,

ix. Ensure that the Flight Operations Officer Training Course is implemented in
x. accordance with the DGCA's guidelines, as described in the Flight Operations Officer
xi. Training and Procedures Manual (FOO-TPM) in respect of Phase Two of the Course.

4.5.3 Staff Training

4.5.3.1 Responsibility for standards and competency of instructional personnel

The Training Management Committee (TMC) shall be responsible to address all matters relating to staff training, standards and competency of instructional personnel.

Training Organization shall ensure that all instructional personnel receive initial and continuation training appropriate to their assigned tasks and responsibilities.

Training shall be done according to the Organization Training Policy according to the Training & Procedure Manual approved by DGCA which describes in detail the range of training programmes conducted for SriLankan staff as well as for other personnel.

The Training Manager shall prepare an Annual Training Schedule for this purpose, which shall be tabled at the meetings of the Training Management Committee (TMC) for review of progress and taking decisions in regard to its implementation. The review shall include initiating and follow-up of corrective action in case non-conformance, if any, is detected.

4.5.3.2 Competency of instructional personnel

This Policy and Procedure applies to Instructors of all the modules of the Flight Operations Officer Training Course (as defined in this Manual), assigned to conduct the following training/evaluation:

Initial training for instructors acceptable to the Director General of the Civil Aviation Authority of Sri Lanka;

Recurrent training for instructors acceptable to the Director General of the Civil Aviation Authority of Sri Lanka;

Competency checks for instructors acceptable to the Director General of the Civil Aviation Authority of Sri Lanka;

4.5.3.3 Eligibility, training and qualification requirements:

Instructors contracted to conduct training in the Flight Operations Officer Training Course shall meet the eligibility, training, and qualifications requirements of IAA and CMSL as applicable.

4.5.3.4 Training programmes for instructional personnel

All instructors assigned to Instructional duties in the Flight Operations Officer Training Course, must complete an instructor-training programme acceptable to CMSL. Before an instructor is initially assigned to conduct training, each instructor must provide evidence of having completed training in the following subjects:

1 The learning process;
2 Elements of effective teaching;
3 Trainee evaluation and testing;
4 Course development;
5 Lesson planning;
6 Classroom training techniques;
7 Assessment of trainee performance in those subjects in which ground instruction is given;
8 Analysis and correction of trainee errors;
9 Policies and procedures;
10 Instructor duties, privileges, responsibilities, and limitations

The training requirement in the subjects in subparagraphs 1 to 9 above shall not apply to:

1 An Instructor who holds a Trained Teacher's Certificate issued by the Department of Educatior that authorizes that person to teach at secondary level or higher;

2 An Instructor who provides evidence of an equivalent level of experience acceptable to CAASL.; or

The holder of a relevant and specific instructor authorization issued by CAASL.

4.5.3.5 Constraints / Conditions

Instructors assigned to instruct a particular module must remain current in the subject concerned. This can be achieved either by the instructor instructing all syllabus subjects relevant to the course for which he has been assigned, or by completing satisfactorily, a relevant approved course within the previous two years.

4.5.3.6 Procedures for proficiency checks and upgrade training

Evaluation by Inspector or a panel of relevant Inspectors;

An instructor candidate must satisfactorily demonstrate to an Inspector (either organization's internal Inspector or an external Inspector approved by CAASL), adequate knowledge of, and proficiency in, instructing in a representative module of each course of training for which that instructor is authorized to instruct in the course.

An Instructor will be evaluated on the following:

i. Knowledge in the specific area of instruction;

ii. Adherence to the applicable lesson plans, guides and other training aids to ensure that the material is properly presented as designed.

iii. Awareness of the minimum equipment for each element of training and conformation to the limitations imposed on the training element by inoperative components of equipment;

iv. Exhibition of effective instructional methods and techniques;

v. Presentation of material in a clear, logical, and organized manner;

vi. Knowledge of organization's training policies and procedures;

vii. Knowledge of the applicable training documentation forms used for the course and how to complete them

The assessment shall be done as follows:

Using the checklist: - The checklist may be used as a part of a routine instructor evaluation, or when an instructor problem has been reported.

Care shall be taken to observe the following:

- Instructors shall be advised, of the training standards on which

they will be evaluated.

- All instructors shall be provided with a copy of the evaluation checklist used.

As soon as possible after the session, the Accountable Manager, the Evaluator and the Instructor shall meet to discuss the evaluation and corrective actions that might be appropriate.

The evaluation shall be repeated subsequently, if appropriate, to see if the instructor has corrected any deficiencies.

Whenever possible, the evaluator shall be the Head of Training.

A summary of Instructor Training Evaluations shall be submitted to the Accountable Manager, with recommendation for action. (e.g. return to work assigned prior to training; assign to work as Instructor; etc.).

4.6 Manuals & Manual Standards

All the Manual /Document prepared by Training organization for the approval of the CAASL or to satisfy its regulatory requirements shall contain the following in order to ensure effective production, amendment, distribution and/or uniform use of, or compliance with information relating to the company requirements.

Reference Number used to identify the Document: This number shall be printed on top of the right hand corner of the front / cover page and on each page of the Manual/Document.

Trade Mark / logo of the applicant: This shall be printed on front / cover page and top of the left-hand corner on each page of the Manual/Document.

Title of the Manual / Document: This shall be printed on front / cover page.

Edition Number & Year of edition: This shall be printed on front / cover page.

Title of the person under whose authority the document is printed: the title of the person who authorized the production of the Manual / document should be written at the bottom of the cover / front page;

Control Number: In addition to whatever information the applicant may wish to print on the inner page immediately after the cover page, shall contain the control number which indicates the serial number;

Record of Revision: This shall contain three running columns to indicate the Revision Number, date entered and name of the person making the revision;

History of Revision: A brief description in regard to each amendment introduced subsequent to the initial issue.

List of effective pages: This shall contain two running columns to indicate the Page Number and last date of revision or effective date;

Preamble/Forward: This shall at least contain information relating to the purpose of the Manual in brief, the level of compliance expected from the user, mode and manner used to update the document, the person responsible for update/amendment. The preamble of a Manual /document shall be signed by the Accountable Manager and approved by DGCA;

Table of Contents: The table of contents shall be expanded to cover at least two sublevels with page numbers placed on section basis.

Abbreviations: All abbreviation and acronyms used in the Manual or documents should be clearly explained in full;

Definitions: All words, which has or requires a specific meaning in relation to the matter being explained, shall be defined clearly in order to avoid ambiguities. In the absence of a definition for a word or phrase, the CAASL will have the right to interpret such word or phrase with due regard to its obligations for safety and security;

Separation of sections/chapters: Manuals should be divided into chapters or sections based on topics being dealt with in view of the necessity of future updating requirements. Each new chapter or section shall start with a new page and such sections/chapters shall be identified with distinctive separators;

Header: There shall be a header for each page of a Manual or document and it shall contain at least the applicant's logo / trade mark, document name, document identification number, chapter number, page number, subject of the chapter and any other information the applicant may wish to display ;

Footer: There shall be a footer for each page which shall contain the revision number, date of revision, name of the organization and any other information which the applicant may wish to display ; and,

Index: It is advised that the applicant may include an index to a Manual /document for ease of reference.

4.6.1 Use of language in Manuals / Documents

The applicant shall ensure that all Manuals/ Documents are written in the English language and the following words are used to give the meaning as indicated against such words.

"shall" or "must" – compliance is mandatory

"will" – the action referred to will not take place at the present moment but there is a commitment to comply with the requirement.

should" – compliance is recommended but not compulsory.

"may" – there is discretion for the applicant/operator to apply alternate means of compliance or to ignore the requirement.

Any specific instruction issued by the applicant to the operational staff shall be given using the words "shall" or "must".

(This Manual, SLCAP 5030 itself may be used as guidance for the development of applicant's Manual(s) in keeping with the aforesaid requirements)

The applicant shall also maintain a Master Distribution Record in relation to the production and distribution of the Manual/document and its subsequent amendments.

All Manuals / documents submitted by the applicant to the CAASL shall be in duplicate so that one copy will be returned with the appropriate attestation, on approval. The relevant page or pages of the original document which carries the CAASL attestation shall be submitted, whenever an amendment is forwarded to the CAASL for approval.

All Manuals / documents which contain information/instructions which are subject to change shall be compiled in a loose binder (ring binders) and any manual /document to be used in the flight deck shall be printed on papers of A5 size.

4.7 Training and Procedure Manual

The Training and Procedures Manual shall contain information/instructions relating to the topics listed in the paragraph 1.2.8 of IS 50. The applicant may divide the manual to a single or more volumes depending on the size and/or nature of information/instructions which are required to be presented. It is essential that the manual meets the requirements of Annex 1 "Personnel Licensing" to the Convention on International Civil Aviation and applicable ANRs and ISs. The DGCA may require the applicant to include any additional or particular information in the Training and Procedure Manual, as deemed necessary.

There are two ways of presenting information in the Training and Procedure Manual. One way is to place the information directly in to the text of the Training and Procedures Manual or alternatively to incorporate by reference. This means that the portion so "incorporated by reference" could be issued in a separate volume with an appropriate subtitle with a "reference" to the Training and Procedures Manual identifying its relation or contribution to the main Training and Procedure Manual. Then in the table of contents of the Training and Procedures Manual there would be an entry in the appropriate place (between volume 7 and 9 in this example) for the listing of what volume 8 consisted of.

a. The organization shall provide manual for use by the organization describing the organization and its procedures and containing the following information.

4.7.1 Contains of the Training and Procedures Manual (T & PM)

The Training and Procedures Manual shall contain and follow the below specified format.

1.0. GENERAL

1.1. Preamble relating to use and authority of the manual.
1.2. Table of contents.
1.3. Amendment, revision and distribution of the manual:

a) procedures for amendment;
b) amendment record page;

c) distribution list; and
d) list of effective pages.

1.4. Glossary of significant terms and definitions.
1.5. Description of the structure and layout of the manual, including:

a) various parts, sections, their contents and use; and
b) the paragraph numbering system.

1.6. Description of the scope of training authorized under the organization's terms of approval.
1.7. Organization (chart of the management organization)
1.8. Qualifications, responsibilities and succession of command of management and key operational personnel, including but not limited to:

a) Accountable manager;
b) Head of training;
c) Chief instructor;
d) Training Manager
e) Quality manager; and
f) Instructors — Theoretical & OJT

1.9. Policies
1.10. Description of the facilities available, including:
a) the number and size of classrooms;
b) training aids provided;
c) facilities during OJT period
d) facilities for Instructors

2.0. STAFF TRAINING

2.1. Persons responsible for standards and competency of instructional personnel.
2.2. Details of the procedures to determine competency of instructional personnel
2.3. Details of the training programme for instructional personnel
2.4. Procedures for proficiency checks and upgrade training.

3.0. TRAINING PLAN

3.1. Aim of the course in the form of a statement of what the student is expected to do as a result of the training, the level of performance, and the training constraints observed.
3.2. Pre-entry requirements, including:

a) minimum age;
b) education requirements;
c) medical requirements; and
d) Linguistic requirements.

3.3. Credits for previous experience, which should be obtained from the Licensing Authority before the training commences.

3.4. Training curricula,

a) Theoretical knowledge curriculum (Phase 1as per Appendix 1 to this manual)

and

b) OJT knowledge curriculum (Phase 2 as per Appendix 2)

3.5. The general arrangements of daily and weekly programmes for Phase 1 and Phase 2

3.6. Training Policies and Policy for the conduct of student evaluation, including:

a) procedures for knowledge progress tests and knowledge tests;
b) procedures for authorization for tests;
c) procedures for refresher training before retest;
d) test reports and records;
e) procedures for knowledge test preparation, type of questions and assessments, standards required for a pass;
f) procedures for question analysis and review and issuing replacement exams; and knowledge test re-write procedures.

3.7. Policy regarding training effectiveness, including

a) individual student responsibilities;
b) liaison procedures between training departments;
c) procedures to correct unsatisfactory progress;
d) procedures for changing instructors;
e) procedure for students appeal;
f) internal feedback system for detecting training deficiencies;
g) procedures for suspending a student from training;
h) requirements for reporting and documentation; and
i) Completion standards at various stages of training to ensure standardization

4.0. TRAINING SYLLABUS - THEORETICAL KNOWLEDG SYLLABUS/ OJT SYLLABUS

4.1. Detailed statement of the content specifications of all air exercises to be taught, arranged in the sequence to be flown with main and sub-titles.

4.2. Statement of how the course will be divided into phases, indicating how the phases will be arranged to ensure completion in the most suitable learning sequence and that essential at the proper frequency.

4.3. Syllabus hours for each phase and for groups of lessons within each phase
and when progress tests are to be conducted.

4.4. The syllabus for theoretical knowledge instruction should be structured generally but with a training specification and objective for each subject.

5.0. RECORDS

5.1. Policy and procedures regarding:

a) attendance records;
b) student training records;
c) staff training and qualification records;
d) person responsible for checking records
e) standardization of record entries;
f) security of records and documents

6.0. ORGANIZING THE MANUAL

6.1. A Training and Procedures Manual should be organized according to criteria relating to information, importance and use.
6.2. The information should be structured and sequenced so that operational personnel can access it easily.
6.3. These principles will help determine whether to issue the manual as a single document or in separate parts.
6.4. When the Training and Procedures Manual is organized in separate parts, it should include a master index to help locate information included in more than one part.
6.5. The master index should be placed in the front of each document.
6.6. The manual should be internally consistent with the training organization's philosophies, policies, procedures and processes.

7.0. DESIGN

7.1. The structure of the manual should be easy to understand, appropriate for the information documented and clearly identified through headings and other formatting devices.
7.2. The document structure should be identified at its beginning by explaining organizing elements such as headings, the numbering scheme, main parts of the document and other sources of coding or grouping.
7.3. Precise language should be used wherever possible. Consistent terms for common items and actions should be maintained throughout the manual. Terms must be clear and easily understood.
7.4. Writing style, terminology, formatting, and use of graphics and symbols should be consistent throughout the document. This includes the location of specific types of information and consistent use of units of measurement and codes.
7.5. The manual should include a glossary of terms, acronyms, abbreviations and associated definitions. The glossary should be updated on a regular basis to ensure access to the most recent terminology.
7.6. For ease of amendment and distribution, the revision process should be kept in mind when designing the manual.
7.7. The Training and Procedures Manual should comply with the requirements of the training organization's quality assurance system.

8.0. Amendments

8.1. The Training and Procedures Manual should be reviewed in association with other operational documents that form the organization's flight safety documents system:

a) on a regular basis (at least once a year);
b) after changes in course material, panel of instructors
c) after technology changes,
d) after changes in safety regulations.

8.2. Permanent changes to the Training and Procedures Manual should be communicated through a formal amendment process. The manual should be amended or revised as necessary to ensure that the information contained is kept up-to-date.

8.3. Distribution of amendments and revisions should include a tracking system. The tracking system should include some form of log combined with a procedure to ensure that all amendments are furnished promptly to all organizations or persons to whom the manual has been issued.

8.4. The training organization shall ensure that the training and procedures manual is amended as necessary to keep the information contained therein up to date and no changes to the approved training programme/ training manual/course materials should be affected without prior approval of this authority.

8.5. Copies of all amendments to the training and procedures manual shall be furnished promptly to all organizations or persons to whom the manual has been issued.

4.8 Assignment of Instructors

Instructors are assigned as per availability of instructors in the relevant field of expertise and every effort shall be made not to effect changes of instructors within the period of the course.

CAASL maintains consistency in always retaining the same two instructors, although trainees cannot always ensure on them doing so.

The Department of Meteorology assigns several Instructors depending on their expertise on subjects within the relevant Module and retains them through the course as requested.

In case an unforeseen need arises to effect a change of an Instructor, it shall be done only with the prior written approval of the GDCA.

In such an event, any partly covered subject within a Module shall be re-done from its beginning, to facilitate understanding with a uniform approach to the subject.

4.9 Statistical Returns

The operator holding a Flight Operations Officer Training Organization Licence issued by the DGCA is required to implement a programme to ensure that statistical returns will be furnished to the CAASL on a regular basis as stipulated below.

a) List of candidates participating at the course together with their name, addresses, dates of birth and educational qualifications should be submitted to in the commencement of each course.

b) Time table of the course & course programme.

c) Monthly Roster of the On-the-Job Trainees

d) Each module evaluation reports and the On-the-Job Trainee assessment reports

e) List of Instructors

f) A copy of all lesson plans for each subject shall be filed in this office together with a copy of all handouts given to candidates. This requirement shall be met prior to commencement of instructions on each subject.

g) A copy of question papers given in respect of each subject at the interim assessment should be filed with this Directorate immediately after such an assessment.

4.10 Training procedures and quality system

The organization shall establish procedures acceptable to the DGCA to ensure proper training standards and compliance with all relevant requirements in Implementing Standard 50.

The organization shall establish a quality system including;

i. an independent audit function to monitor training standards, the integrity of knowledge examinations and practical assessments, compliance with and adequacy of the procedures, and

ii. a feedback system of audit findings to the person(s) and ultimately to the accountable manager referred in paragraph 4.4 (a) to ensure, as necessary, the corrective action

4.11 Quality Assurance System of the Training Organization

The training organization shall establish a quality assurance system, acceptable to the Licensing Authority granting the approval, which ensures that training and instructional practices comply with all relevant requirements.

A description of the organization's quality assurance system in accordance ICAO Doc 9841 AN/456 Appendix B;

4.11.1 Objective of a quality assurance system

The objective of a quality assurance system is to ensure the achievement of results that conform to the standards set out in the ATO's manuals and in requirements and documents issued by the Licensing Authority, thus promoting continual improvement in the quality of training provided.

1. Quality is an outcome of a number of processes: establishing standards; planning activities and documenting procedures to support such standards; training the personnel involved before implementing the documented procedures; and

measuring the outcomes of the activities to ensure that they meet the standards and expected results. If any non-conformities are found, corrective actions are taken to improve processes and procedures.

2. The instructions and information contained in the following paragraphs provide guidance on the quality assurance system that each ATO should establish in accordance with Appendix 2 to Annex 1.

4.11.2 Elements of a quality assurance system

In a quality assurance system of an ATO, the following elements should be clearly identifiable:

a) the organization's training policy;
b) the training and flight safety standards;
c) the allocation of responsibility;
d) the resources, organization and operational processes;
e) the system to ensure conformity of training with the policy and flight safety standards;
f) the system for identifying deviations from policy and standards and taking corrective action; and
g) the evaluation and analysis of experiences and trends concerning policy, training and flight safety standards, in order to provide feedback into the system for the continual improvement of the quality of training.

4.12 Records

i. Accurate and complete record-keeping is an important aspect of complying with the approval. It is also an essential tool for the ATO to ensure the continuity and consistency of its training. A description of the method used for the completion and retention of the training records.

ii. The training organization shall retain detailed student records to show that all requirements of the training course have been met as agreed by DGCA.

iii. The training organization shall maintain a system for recording the qualifications and training of instructional and examining staff where appropriate.

iv. The records required by (ii) above shall be kept for a minimum period of two years after completion of the training. The records required by (ii) shall be retained for a minimum period of two years after the instructor or examiner ceases to perform a function for the training organization.

4.13 Evaluation and checking

When DGCA has authorized an approved training organization to conduct the testing required for the issuance of a licensing or rating , the testing shall be conducted by personnel authorized by DGCA or designated by the training organization in accordance with criteria approved by DGCA.

DGCA has delegated authority for the approved designated examiners to conduct skill test (practical test/competency check) after phase 2 of the approved training programme subjects to the conditions that the DGCA considers appropriately.

4.14 Examinations

The examination staff shall ensure the security of all questions. Any student found during knowledge examination to be cheating or in possession of material pertaining to the examination subject other than the examination papers and associated authorized documentation shall be disqualified from taking the examination and may not take any examination for at least 12 months after the date of the incident. The DGCA shall be informed of any such incident together with the details of any inquiry within one month.

Any examiner found during a knowledge examination to be providing question answers to any student being examined shall be disqualified from acting as an examiner and the examination declared void. The DGCA must be informed of any such occurrence within 24 hours.

4.15 Safety Management

Sri Lanka shall require, as part of its state safety programme, that an approved training organization that is exposed to safety risks during the provision of its services implement a safety management system acceptable to the Sri Lanka that, as a minimum:

a) identifies safety hazards;
b) ensures the implementation of remedial action necessary to maintain agreed safety performance;
c) provides for continues monitoring and regular assessment of the safety performance; and
d) aims at a continuous improvement of the overall performance of the safety management system.

Note- Guidance on defining safety performance is contained in the Safety Management Manual (SMM) (Doc 9859)

A safety management system shall clearly define lines of safety accountability throughout the approved training organization, including a direct accountability for safety on the part of senior management.

Note 1- A framework for the implementation and maintenance of a state safety programme is contained in Appendix D of the IS 50.

Note 2- The framework for the implementation and maintenance of a safety management system is contained in Appendix C of this ASN 054. Guidance on safety management system is contained in the Safety Management Manual (SMM) (Doc 9859)

4.16 Privileges of the training organization

(a) The training organization may carry out the following as permitted by and in accordance with the training organization training & Procedure manual:

i. conduct of FOO Licence training programme (Phase 1 & Phase 2) to the syllabus approved by DGCA, or part thereof in accordance with T & PM approved by DGCA.
ii. The issue of certificates**,** following successful completion of the approved raining course in Appendix 1.
iii. Knowledge Examinations/OJT assessments for progress tests

(b). Training, knowledge examinations and practical assessments may only be carried out at the locations identified in the approval certificate and/or at any location specified in the training organization training & procedure manual.

(c). By derogation to paragraph (b), the training organization may only conduct training, knowledge examinations and practical assessments in locations different from the paragraph (b) locations in accordance with a control procedure specified in the training & procedure manual.

(d).An organization may not be approved to conduct only examinations unless approved.

4.17 Changes to the training organization

(a). The training organization shall notify the DGCA of any proposed changes to the organization that affect the approval before any such change takes place, in order to enable the DGCA to determine continued compliance with relevant Aviation Safety Notice and to amend if necessary the training organization approval certificate.

(b).The DGCA may prescribe the conditions under which the training organization may operate during such changes unless the DGCA determines that the training organization approval must be suspended.

(c). Failure to inform the DGCA of such changes may result in suspension or revocation of the training organization approval certificate backdated to the actual date of the changes.

4.18 Continued validity

An approval shall be issued for a maximum period of one year from the date of issue. It shall remain valid subject to:

i. the organization remaining in compliance with this Aviation Safety Notice
ii. DGCA being granted access to the organization to determine continued compliance with this Aviation Safety Notice
iii the certificate not being surrendered or revoked.

Upon surrender or revocation, the approval certificate shall be returned to the DGCA.

4.19 Oversight

DGCA shall maintain an effective oversight programme of the approved training organization to ensure continuing compliance with the approval requirements.

4.19.1 Findings

(a). A level 1 finding is one or more of the following:

i. any significant non-compliance with the examination(s) process which would invalidate the examination(s).
ii. failure to give the DGCA access to the organization's facilities during normal operating hours without interrupting there day to day functions.
iii. the lack of an accountable manager.
iv. a significant non compliance with the training process.

(b). A level 2 finding is any non-compliance with the training process other than level 1findings.

(c). After receipt of notification of findings, the holder of the training organization approval shall define a corrective action plan and demonstrate corrective action to the satisfaction of the DGCA within a period agreed with the DGCA.

4.20 Approved Organizations for conduct of Training for FOO/FD's Licence

DGCA has approved the CAASL has granted authority to Sri Lankan Aviation College (previously International Aviation Academy of Sri Lankan AirLines) , to conduct approved training course "training programme of Flight Operations Officer/flight Dispatcher " for issuance of Flight Operations Officer/flight Dispatcher Licence. International Aviation Academy operates by Sri Lankan Air Lines (Pvt) Ltd., under the " Flight Operations Officer Training and Procedure Manual" approved by the CAASL.

Chapter 5 – Examinations

Evaluation is an integral part of the training process to measure whether the candidates / trainees have achieved the expected objectives of the training programme and have demonstrated a level of knowledge appropriate to the privileges granted to the Flight Operations Officer Licence.

It is also essential to inform the trainees on what aspects and how the trainees are evaluated. Through this chapter is described the process involved with the conduct of Flight Dispatcher Licence Examinations in approved ATO and the CAASL Examination for the issuance of a Dispatcher Licence. The approved training organization shall establish examinations standards of the ATO as specified in this manual to a level satisfactory to the DGCA.

5.1 Type of Tests & Examinations

5.1 Knowledge Progress Test

The TO which is approved to conduct approved training of Flight Operations Officer/flight Dispatcher shall conduct knowledge progress tests on completion of the each module in phase 1 as per the training curriculum (Refer Appendix I) . The purpose of these knowledge progress tests to evaluate the trainees' theoretical knowledge on the modules covered through the training programme. The tests shall be conducted by the CAASL approved knowledge instructors according to the standards specified in this manual.

5.2 OJT Assessment

At the end of the practical training assessment the Chief OJT Instructor and the Flight Dispatch Manager to ensure the line Instructors have completed the training for the students as per the guidelines in this document and the trainees have gained the required practical knowledge, when and how the subject matters which were learnt in the classroom are applied and practised for problem solving and any other knowledge required is gained to work as a professional Flight Dispatcher
At the end of the training the Chief OJT Instructor in consultation with the line OJT instructors will conduct the final evaluation for each trainee to assess the knowledge gained.

On-the-Job training Assessment Methods

The OJT instructors shall see any one, or some or all of the following methods to assess…

- Observing trainee at work (speed, quality and accuracy of work)
- Questioning to check knowledge and to some extent the understanding
- Request explanations to check understanding
- Request demonstration to check skills

Assessment by Chief OJT Instructor

The OJT instructor, on completion of an assessment report form (one sheet) will sign the document and handover them to the chief OJT instructor for his assessment. The chief OJT instructor shall do his assessment of the individual based on the OJT instructors report and/or his own observations and judgement . OJT Assessment Form approved by DGCA with OJT guidelines shall be used for Assessment.

Re-assessment by Chief OJT Instructor

The chief instructor is authorised to override, revise and change the decisions made by instructors after personally assessing an individual for particular OJT topic. If this is so, it should be clearly state in the assessment form

Strict Assessment and No Favours

All instructors are advised to be unbiased, fare and very strict during assessments, considering the gravity of the responsibilities of Flight Operations Officers. Instructors are advised not to sympathise with failures or favour any trainee if he/she is not up to the required standard.

Final Assessment Requirements

Final assessment will be done at the completion of OJT by

- Chief OJT instructor
- Flight Dispatch Manager

Final Decision

Pertaining to OJT assessment, the decision of Chief OJT instructor is final, and he is authorised to change or modify the procedure mentioned above, if deemed necessary

Re-assessment of On-the-Job Training

If a Student obtains "Poor" grades during on the-job-training in 03 or less topics/subjects or sections, Trainee will be required to re-sit for a final on-the-job assessment check with Course Director, Flight Dispatch Manager and Chief OJT Instructor within 02 weeks.

If "Poor" grades are obtain for 04 or more topics/subjects or sections, On-the-Job Training will be extend by 06 weeks and will face for a final assessment check with Course Director , Flight Dispatch Manager and Chief OJT Instructor.

5.3 Final Examination /Assessment Conducted by CAASL

Final knowledge Examination

The applicant for FOO/FD licence shall have demonstrated a level of knowledge appropriate to the privileges granted to the holder of a flight operations officer licence, in subjects specified in 3.2 of IS 49.

The CAASL shall conduct a written examination at the examination centre of the CAASL for prior to the issuance of the Flight Operations Officer (FO0) / Flight Dispatcher (FD) licence. The examination is based on the curriculum specified in the Appendix A -1 of this manual .

Final Practical Test/Assessment

Final Practical test/assessment shall be conducted by the panel of practical test examiner designated by DGCA. Every practical test shall be performed under the observation of an observer among the panel and at least one practical test examiner designated by the DGCA who shall furnish to the DGCA a report upon the applicant's performance of the test/assessment on the form No. CAA/PL/M/28 provided for Practical test/assessment. Practical test/examination shall be conducted after successfully completion of final knowledge examination.

During the practical test/examination, the applicant shall demonstrated the ability to:

a) make an accurate and operationally acceptable weather analysis from a series of daily weather maps and weather reports; provide an operationally valid briefing on weather conditions prevailing in the general neighborhood of a specific air route; forecast weather trends pertinent to air transportation with particular reference to destination and alternates;
b) determine the optimum flight path for a given segment, and create accurate manual and/or computer generated flight plans;
c) provide operating supervision and all other assistance to a flight in actual or simulated adverse weather conditions, as appropriate to the duties of the holder of a flight operations officer licence; and
d) Recognize and manage threats and errors.

Each Practical test Examiner before attending to any examination matter shall hold a valid authorization issued by DGCA for that aspect of examination.

5.4 CAASL Approved Examiners

5.4.1 Examiners for Knowledge Examination

Knowledge examiners for progress tests of FOO/FD training programme;

The DGCA shall approve examiners to conduct Knowledge progress test in the approved ATO. The individual, as a participant in the civil aviation system, is responsible for carrying out their activities safely and in accordance with the relevant prescribed standards and practices in this manual. The below mentioned panel of examiners are approved by DGCA to conduct FOO / FD Examinations.

Knowledge examiners for the conduct of final examination by CAASL

DGCA shall appoint/designate Knowledge Examiners for the conduct of final examination for issue of FOO Licence and they are responsible for updating question Bank as required by DGCA and setting question papers time to time when request by DGCA.

Each Knowledge Examiner before attending to any examination matter shall hold a valid authorization issued by DGCA for that aspect of examination.

5.4.2 Pre-requisites for Knowledge Examiners & Responsibilities (Terms of Reference)

5.4.2.1 Pre-requisites for Knowledge Examiners

a) Holding a FOO/CPL/ATPL/ATC licence issued by DGCA Sri Lanka.
b) 2 years' experience as an instructor of FOO/FD Training programme approved by DGCA or similar qualification acceptable to DGCA.
c) Preferably 5 years overall experience in SriLankan Airlines Flight Operations in an Executive Capacity or above.
d) Knowledge of Air Navigation Regulations and its annexes and other relevant regulations pertaining to Civil Aviation.
e) Hold a designation as a Instructors appointed/designated by DGCA & shall have the module based qualifications as per section 4.5.1.6

5.4.2.2 Terms of Reference of Knowledge Examiners

The Knowledge Examiner shall be responsible for:

- Preparation of examination papers for knowledge progress tests conducted by Training Organization and final examination conducted by DGCA.
- Preparation of the examination hall for each examination to ensure compliance with the requirements of CAASL
- Preparation of examination questions / question papers as appropriate to the particular phase or module of the training course.
- Comply with standards specified in this manual & Training & Procedure Manual of the TO.
- Ensure the allocation of examination question papers at the beginning of the examination and retrieve them on completion [check the availability of all pages of examination question papers upon retrieval
- Destroy additional copies of examination question papers immediately after the completion of the examination while keeping the necessary number of copies as required for storage
- Marking of examination papers are done using acceptable marking standards
- Carry out examination analysis in accordance with sub part 5.5.1.3. of this manual.
- Report to the Training Manager of Training Organization and or DGCA any significant failure rates and suggest a course of action to remedy the shortfall.
- The preparation of the correct number copies of 'question papers'.

- The reporting of actual or suspect breaches of security and/or integrity of the examination papers and/or examination pack/question bank to the Technical Training Manager and DGCA.

5.4.3 Panel of Practical Test Examiners –

A Panel of Examiners appointed by the DGCA shall conduct a Practical test / Assessment after successfully completing FOO Training and knowledge examination conducted by DGCA.

Each Practical test Examiner before attending to any examination matter shall hold a valid authorization issued by DGCA for that aspect of examination. Authorization shall be issued by DGCA for a period not exceeding three years.

Examiner/ Assessor shall complete the form CAA/PL/M/28 for final Assessment and forwarded to DGCA..

5.4.4 Pre-requisites & Responsibilities (Terms of Reference) for Practical Test Examiners

5.4.4.1 Pre-requisites for Practical Test Examiners

a) Flight Dispatch Licence issued by DGCA Sri Lanka.

b) Preferably 10 years overall experience in SriLankan Airlines Flight Operations in an OJT Instructor.

c) Knowledge of Air Navigation Regulations and its annexes and other relevant regulations.

d) Having completed train the trainer programme, Human Factors training

e) Having completed Flight Operations Inspector training course or similar training programme `

5.4.4.2 Responsibilities (Terms of Reference) of Practical Test Examiners

Responsibilities & Job Description

Designated practical test examiner/Assessor shall conduct practical test/assessment for the issue of flight Operations Officer licences in compliance with the Air Navigation Regulations of Sri Lanka and Requirements issued by the DGCA in IS 49 and procedures published in the this manual SLCAP 3100. Examiner shall follow ICAO doc 7192 Part D-3 for further guidance.

Responsibilities of all above designated examiners are to assess the suitability of an applicant for the issuance of FOO licence on performance of the practical job tasks associated with the respective privileges of the FOO Licence.

Designated practical test examiner/Assessor shall forward the results of practical test/Assessment to the DGCA, at the earliest possible but not later than one week from the date of the practical test/assessment.

Designated practical test examiner/Assessor shall provide further details/clarifications/explanations on practical test/Assessment conducted by him/her, to the DGCA on own initiation of the Designated practical test examiner/Assessor if seems desired or at request.

Designated practical test examiner/Assessor shall attend training Programmes or familiarization visits offered by the DGCA.

Designated practical test examiner/Assessor shall refrain from carrying out a practical test/Assessment for personnel licensing activity unless the person carries an authorization issued by the DGCA or D(TOPL) of the CAA.

The DGCA reserves the right to withdraw the appointment of a Designated practical test examiner/Assessor at any time without giving reasons for such an action. In such an event, the Designated practical test examiner/Assessor shall return all rubber seals, documents and any other material issued to him/her by the DGCA without delay.

Selection of the applicable Job Tasks & Procedures involved in carrying out those tasks shall be in accordance with the Training & Procedure manual of the TO or

Perusing applicable documents during the process of evaluation & ascertaining the level of proficiency achieved by the particular individual shall be determined & recoded accordingly & shall recommend either the issuance or the denial of the License in the appropriate Report provided for the purpose & sign & submit to DGCA.

Enforcement

CAASL shall, at any time in accordance with its procedures, revoke any Authorisation it has issued in accordance with the requirements of CAASL, if it is established that an Designated practical test examiner/Assessor has not met, or no longer meets, the requirements of CAASL or relevant applicable regulations, practices or procedures or it is proved beyond doubt that a Designated practical test examiner/Assessor has not adhered to the procedure stipulated by this manual when conducting practical test/Assessment . DGCA shall follow the procedure in Enforcement Procedure Manual SLCAP 5350.

In the event it is found that integrity of a Designated practical test examiner/Assessor is in question or procedures adopted by him have been not acceptable as stated in above , FOO Licence issued during a considerable period shall be re-scrutinized for any disparity.

5.5 Examination Procedures for progress tests and practical tests conducted by Training Organization

5.5.1 Procedure for knowledge progress tests

Knowledge progress tests shall be carried out on completion of each Module.

The trainees shall be successful at the knowledge test held on completion of the Theoretical Knowledge Syllabus in order to qualify to sit the Practical Test.

Ground Examination and Test;

General-

All applicants for the final examination for initial issue of an Flight Dispatch's Licence shall pass the following examination and test conducted by training organization in accordance with this procedure approved by DGCA.:

i. Written knowledge examination.

ii. Oral and Practical examination based on the DGCA Practical test /Assessment standards.

The applicant must pass applicable written knowledge examination conducted by to prior to attempting the oral and practical test/assessment.

To appear for the practical test/assessment, the applicants must present documentary evidence satisfactory to TO that the applicant has successfully completed an approved dispatch officer initial training and successfully completed above i .

There should be a minimum of two interim assessments in respect of each subject. Marks scored by a candidate at the interim assessment shall be made known to the candidates as early as possible but in any not event not later than two weeks prior to the final examination.

The method of conducting the above interim assessments should be made known to candidates prior to commencement of such assessments.

Failure-

i. Applicants who fail the ground examination may sit the examination again after 2 weeks provided the applicant has received further instruction.
ii. In the application for the first re-sit, a letter stating that the candidate is prepared for the examination is also required.
iii. Applicants who fail more than twice must wait a minimum of 30 days after the last failure (maximum of 90 days) before becoming eligible to re-sit for the exam.

5.5.1.1 Procedure for authorization for tests

Instructors shall conduct all the required knowledge tests as defined in this manual. Any further formal knowledge tests that an instructor wishes to conduct should be intimated to the Head of Training seeking his approval, stating the need for same, the objectives planned to achieve, the classroom and or other facilities required for the test, and the dates and times of such planned tests.

a. The Head of Training may approve any such test, which does not have either financial implications or interruption to other training programmes.

b. The Head of Training shall forward (with his comment and/or recommendation stating a workable solution) any requests for such tests, which does have financial implications or interruption to other training programmes, to the Accountable Manager for his review and approval.

Trainees eligibility to sit the test shall be determined by the Chief Instructor and any disqualification shall be done in consultation with the Head of Training.

Appeals against such disqualifications may, at the discretion of the Accountable Manager be looked into by him for a final decision and no further appeals shall be entertained.

5.5.1.2 Procedures for knowledge progress test preparation, type of questions and assessments and standards required for a pass

Standard of accomplishment-

The training objective of each module in this manual is described with reference to the establishment of conditions, performance and a standard of accomplishment.

The conditions describe the scenario where trainee performance will be developed and tested while indicating whether actual equipment, mock-ups, or simulators, etc., are to be used.

The standard of accomplishment establishes the level of trainee performance that must be attained and depends on the training equipment available.

In the modules that cover the FOO training syllabus, various parts of the course have been marked with a coding from 1 to 4 indicating an increasing degree of expertise to clarify understanding of desired level of accomplishment, as shown in the table below.

Instructors shall take serious notice of the expected level of accomplishment and give due recognition to it during training sessions as well as in knowledge test preparation, assessment of answers provided by the trainees, based on the IAA requirement set for a pass mark of 80 percent in each end-of-Module Test.

Instructors shall ensure that the questions set for the end-of-Module test encompasses the entire syllabus of the respective Module, giving relative weightage to the level of accomplishment expected for each section of the Module.

Most of the questions, if not all, shall be objective multiple choice type. Each question can be answered by the selection of a single response. The answer to some questions depend on thee response to a previous question to determine the correct answer. The minimum pass mark shall be 90 percent.

The maximum time allowed for taking each test is either 2.5 hours or 3 hours, and is based on previous experience and educational statistics. This amount of time is considered more than enough if trainees have had proper preparation and instruction.

Each Instructor shall send a set of Summary Questions to the Training Manager in tabular format giving the number of Questions set from each section of the relevant Module indicating their relevance to the Level of accomplishment expected.

The questions shall be analysed by the Head of Training together with the respective Instructors and in case of any non-conformance to the Syllabi or the required level of accomplishment, the test may be cancelled and a replacement exam given at the convenience of Training Organizations.

5.5.1.3 Procedure for question analysis, review and issue of replacement exams

Performance evaluation (tests) is an integral part of the training process. Tests should always be prepared with the sole purpose of measuring whether or not the trainee has achieved the training objective.

Trainees must always be informed on how they are going to be evaluated, so they can orient their efforts. The information must include the conditions that will exist during the test, the performance that is expected from the trainees, the standards of accomplishment that have to be met and the consequences of an inadequate performance.

It is recommended that errors on knowledge exams and skill tests be reviewed with trainees to reflect corrections to achieve 100 per cent. Trainees must be informed of the result of their evaluation and instructors must offer correction of improper responses.

Time and resource constraints may limit the amount of testing that can be given to each objective. However, the criticality of the subject and the performance difficulties which can be encountered should give some indication as to when, how and what performance evaluation should be required. Generally speaking, performance measurement shall be undertaken to evaluate whether or not courses taught have been understood by the trainees at the desired level:

1 Skills are best tested by performance tests (the trainee performs the task described in the objective under real or simulated conditions).
2 Knowledge is best tested by oral or written tests.
3 Attitudes are tested by observations of performance or by means of questionnaires.

5.5.1.4 Test reports and records

In the case of Theoretical knowledge tests, the respective instructors shall submit the results of Module tests to the Training Manager through the Training Co-ordinator.

The Training Manager shall review the results and check if any remedial action is required and take action in that regard in consultation with the Accountable Manager.

The Training Manager shall thereafter forward the results sheets to the Course Coordinator for filing of record.

The proposed Course Report to be issued to all successful trainees is given in the Flight Operations Officer Course Report of the Training organization.

5.5.2 Procedure for practical test/assessment

Practical Test Standard

General-

An applicant for an oral and practical examination should have passed the appropriate ground knowledge examination. The applicant is also required to have successfully completed the approved initial training course within the past 3 months.

All practical test/assessments shall be conducted by approved Examiners/Check Dispatchers in the presence of a representative of this Directorate. Procedure for conducting practical test/assessment shall be pre co-ordinated with this Directorate. Candidates shall be made aware on what area that they will be tested at such test/assessment.

Part of the practical examination shall comprise of an actual dispatch of a flight under the supervision of a licensed Flight Operations Officer, copies of all documents used for despatch of such a flight shall be maintained in respect of each candidate.

A candidate shall have performed at least a single familiarisation flight in the cockpit of a commercial aircraft including a landing and takeoff at two different locations if he/she has to be issued with Flight Operations Officer Licence. Form # shall be used by the candidate during such a flight so that he/she can record his observation in respect each phase of the flight starting from pre-departure procedures to post-departure activities with especial reference to matters that are performed by a flight dispatcher. This form shall be submitted to this DGCA when applying for Flight Operations Officer Licence

Required material for the test-

The Flight Operations Officer/ Flight Dispatch examiner is responsible for supplying weather data for the test when current weather information is not available. Materials to be supplied to the applicant are:

Company aircraft operating manual or flight manual
General operations manual and operations specification.
Enroute low/high altitude chart
Standard instrument departure
Standard instrument arrival routes
Standard instrument approach procedures chart
Flight plan form.
Load manifest form
Dispatch release form.
Airman and international information manuals.
Computer and plotter.

Test areas -

Applicant must demonstrate competency in the following areas of operations.

Dispatch exercise (Flight Planning)
Aircraft
Air routes and airports
Airman's information manual
Dispatch and operation control
Emergency procedures

Practical test/Competency Checks;

General-

Flight Operations Officer / Flight Dispatchers are required to demonstrate both knowledge and ability to a Check Dispatcher during a competency check. A Check Dispatcher is defined as any person that the DGCA has designated to conduct the competency check. A ground school instructor may be authorised to conduct a competency check. The instructor must, however, be currently qualified as a Flight Operations Officer / Flight Dispatcher for an airline working as a Flight Dispatcher in the capacity of Supervisor . During the competency check, the candidate only has to demonstrate knowledge and ability concerning those geographic areas for which the candidate is qualified. The competency check must be a comprehensive evaluation in which the Check Dispatcher observes all aspects of the dispatch function. A portion of the competency check must consist of the Flight Operations Officer / Flight Dispatcher candidate releasing actual flights.

Competency Checks for Each Category of Training -

i. After Initial Training.

Flight Operations Officer / Flight Dispatcher first competency check after initial training shall include all of the types of aircraft the Flight Operations Officer / Flight Dispatcher will be qualified to dispatch. TO shall ensure that this competency check is comprehensive enough to allow the Flight Operations Officer / Flight Dispatcher to adequately demonstrate knowledge and ability in normal and abnormal situations.

ii. Recurrent and Re-qualification Training.

Flight Operations Officer / Flight Dispatcher recurrent and re-qualification competency checks must encompass a representative sample of aircraft and routes for which the Flight Operations Officer / Flight Dispatcher maintains current qualification. Also refer clause 3.3 of this manual.

5.5.2.1 Competency Check /practical training Assessment–

Familarization
Flight Operations Control Centre
Air Navigational Service Units

Aircraft and Airport Services
Transference of Duties and Responsibilities
Taking Over Duties and Responsibilities
Equipment and Serviceability Check
Handing Over Duties and Responsibilities
Telephone Conversation
Incoming Calls
Telephone Directories
Outgoing Calls
Documentation
Company Procedures
Documentation Reference
Log Entries
Computer Flight Plan
Description of CFP
Requesting a CFP for Normal Flight
Requesting a CFP for an ETOPS Flight
Extracting Information from CFP
Requesting a CFP for Ad-hoc Flight
Requesting CFP for a Re-Dispatch Flight
ATC Flight Plan
ICAO Flight Plan Form
ATC Flight Plan/Repetitive Flight Plan
Filing the ATC Flight Plan
Fuel Sheet
Description of a Fuel Sheet
Filing the Fuel Sheet
Distribution of a Fuel Sheet
Meteorological and NOTAM Information
Collection of Meteorological Information
The Meteorology Folder
NOTAM Bulleting and Requesting Procedure
Cargo Restrictions and Emergency Duties
Cargo Restrictions
Emergency Duties
Crew Rostering
Reading Crew Rosters (On the System)
Preparation of Crew Lists from the Roster
Flight Time Limitations
Introduction to Crew Web

Flight Delays
Delay Co-ordination
Re-scheduling and Re-routing
Handling Other Airline Flights
Ad-hoc Flights
Scheduled Flights
Over Flying Clearance
Reading Charts
Requesting Over Flying Clearance
Receiving Over Flying Clearance
Communication
Methods of Communication
Transceivers
SITA Text
MARS Reservation System
Flight Briefing
Collection of Data
Pre-Flight Briefing (ETOPS, Non-ET00P and Re-dispatch Flights)
Post Flight Briefing
Flight Monitoring
Introduction to the Flight Monitoring
Fleet Watch System
Monitoring a Normal Schedule Flight and ETOPS Flight
Monitoring a Delayed Flight
Flight Movement Report

5.5.3 Procedure for Final knowledge Examination conducted by DGCA for issuance of licence.

The applicant shall have demonstrated a level of knowledge appropriate to the privileges granted to the holder of a Flight Operations Officer Licence in curriculum specified in the Appendix A -1 of this manual .

Examination procedure for conduct of Final examination by DGCA and is in accordance with the Examination Procedure Manual (SLCAP 3080).

An applicant for final examination should have successfully completed the approved initial training course within the past 3 months and should passed the appropriate ground knowledge examination.

The applicant is also required to complete successfully phase 2 –practical training and successful at the practical assessment conducted by examiners (Check Dispatchers) approved by DGCA.

Preparation of question papers is in accordance with the Examination Procedure Manual (SLCAP 3080).

5.5.3.1
Preparation of question Papers-Preparation of questions papers for all the pertinent modules are done by panel of Designated knowledge Examiners (holding a valid authorization issued by DGCA. Questions are stored & maintained in the designated question Bank & each & every paper produced by the bank is certified by authorized examiners of the panel appointed by DGCA.

Questions for the input of the bank are produced & certified by a panel appointed for the purpose by the DGCA & re-evaluated by the panel every three years, as per Examinations Procedures Manual SLCAP 3080.

5.5.3.2 Question bank

Question bank available for FOO Examination at the Personnel Licensing Section Examination Unit. Currently question bank is maintained in hard copy format as well as electronic format. Question bank files are stored in secure cupboards.

Knowledge Examiner assigned is responsible for selecting questions from the question bank and compilation of the question papers(s). It is required to ensure minimum of 10% questions are changed every time a question paper is compiled.

Time to time instructors and knowledge examiners is tasked with generation of new questions. The questions generated by instructors are validated by Knowledge Examiner before adding to the question bank.

Access to the question bank is restricted to Knowledge Examiners and DD(PL) and DGCA authorized personnel only.

5.5.3.1 Conduct of Examination

The examination shall consists of following question papers.

	Subject/Module	**Duration**	**Type of Question per paper At least**
1	Air Traffic Management	2hrs & 30 min	MCQ & Essay both
2	Communication	2 hrs	MCQ & Essay both
3	Aircraft Mass & Balance Control	3hrs & 30min	MCQ & Essay both

4	Navigation	3 hrs	MCQ & Essay both
5	Dangerous Good by Air	1hr	MCQ & Essay both
6	Security	1hr	MCQ & Essay both
7	Human Factors	1hr	MCQ & Essay both
8	Meteorology	3hrs	MCQ & Essay both
9	Flight Planning	2hrs & 30min	MCQ & Essay both
10	Flight Monitoring	2hrs & 30min	MCQ & Essay both
11	Aircraft Mass & Performance-I	3hrs & 15 min	MCQ & Essay both
12	Civil Air Law & regulations	2 hrs	MCQ & Essay both
13	Aviation Indoctrination	2 hrs & 30 min	MCQ & Essay both

5.5.3.2 Examination Conditions

Seventy-five (75%) of the marks scored at this examination would be considered as pass for the final result in respect of each subject except DGR. The pass mark for DGR would be 90%.

If a candidate has scored an aggregate of 65% - 69% then he/she would have to appear for an oral examination conducted by this Directorate An oral examination is given to a candidate only once for each subject.

Repeat examinations will be conducted after 30 days of the release of final results.,

5.6 Withdrawal

Examiners are strongly cautioned against the following as it is detrimental to the objectives and the purposes of their appointed task(s):

Lack of Consistency, Lack of Fair-play & Justice, Lack of Decorum, Carelessness, Flippant Attitude, Lack of Self Discipline, Sarcasm, Argumentativeness, Being no temperamental, Being over-bearing Familiarity, Bias, Prejudice, Favoritism, Bad manners, Fault finding / Critical of Higher Management, Excessive Humour, Over Emphasis on a Single Incident, Discussing level of performance of one candidate with another.

The designation and the certification issued by the DGCA is subject to withdrawal or imposition of restrictions at any given time under one of more of the following circumstances:

a) Expiry of the Validity of corresponding Rating(s) and/or License
b) Doubt and/or Deterioration on the proficiency in the specialty of examiner under reference

c) Serving a period of Remedial Action(s) subsequent to an Accident/Incident Investigation or Reactive method adopted under Safety Management System in flight Operations and Civil aviation.
d) Observed to have deteriorated supervisory skills and/or inter-personal relationships
e) Any other background deemed as unsafe for operational and/or evaluation tasks of flight operations.

5.7 System of Supervision by CAASL

Civil Aviation Authority of Sri Lanka shall monitor the standards of all designated FOO Examiners through a CAASL Inspector or senior examiner specifically authorized for this purpose conducting or monitoring an examination when a designated FOO Examiner is conducting an assessment on a candidate

The purpose of monitoring the activities of each designated FOO Examiner is to ensure that:

1) his/her reports are complete, accurate and meaningful;

2) his/her examinations cover the required sequences;

3) his/her conduct of examination is fair and in conformance with the standards and

4) procedures described in this manual;

5) He/she is acting within the limits of his/her authority.

5.8 CAASL's Values & Code of Ethics for Designated Examiners :

5.8.1 CAASL's Values

a) Assign priority to safety;

b) Excel in the services the CAASL provides to our country;

c) Have a 'can do' attitude in everything the CAASL undertake;

d) Aim to be reliable and realistic;

e) Be willing and able to change in pursuit of continuous improvement;

f) Work together to achieve success;

g) Be open and honest;

h) Promote efficiency and regularity in everything the CAASL does;

i) Trust and respect the colleagues;

j) Value everyone's contribution;

k) Recognize our social responsibilities;

l) Enjoy what the CAASL does

m) Take pride in the CAASL professional approach and

n) Have a balanced home and work environment.

5.8.2 CAASL's Code of Conduct is:

A duty of care to observe standards of professionalism, equality and justice when dealing with other people in the course of their CAASL employment.

a) This means they will: at all times, behave in ways that uphold CAASL's values

b) treat everyone with respect and courtesy;

c) not allow personal relationships to affect professional relationships;

d) refrain from all forms of harassment;

e) refrain from acting in any way that would unfairly harm the reputation of any CAASL employee;

f) where appropriate, intervene constructively where an employee's behavior is clearly in breach of this code, and report any suspected fraud, corrupt, criminal or unethical behavior to the appropriate person within CAASL; and

g) respect an individual's right to privacy and protect and maintain the confidentiality of personal information.

h) An obligation to CAASL in terms of protecting its integrity and reputation, and for the use, care and responsible management of its resources. This means they will, in the course of their CAASL employment:

i) behave honestly and with integrity

j) act with care and diligence;

k) comply with all applicable Sri Lankan laws

l) comply with any lawful and reasonable direction given by someone with the appropriate authority.

m) not make improper use of inside information or their duties, status, power or authority in order to gain, or seek to gain, a benefit for themselves or another person;

n) protect and maintain the confidentiality of all information to which they have access during their course of their CAASL employment;

o) not disclose any information that they obtain or generate in connection with their employment if it is reasonably foreseeable that the disclosure could be prejudicial to the effective working of government;

p) not represent themselves as spokespersons for CAASL or the Sri Lankan Government unless properly authorized to do so;

q) not provide false or misleading information in response to a request for information that is made for official purposes;

r) refrain from engaging in any outside work without permission and/or where such work would compromise their integrity and independence;

s) use CAASL and government resources in a proper manner; and

t) comply with any other conduct requirement prescribed in applicable legislation, policy.

u) obligation to act appropriately when a conflict arises between their self-interest and their duty to CAASL and the Sri Lankan Government. This means they will;

v) disclose, and take reasonable steps to avoid, any conflict of interest (real or apparent) in connection with their CAASL employment.

5.8.3 Code of Ethics for Designated Examiners

Principle 1

Designated examiners shall have respect for the humanity and dignity of each of their test takers. They shall provide them with the best possible professional consideration and shall respect all persons' needs, values and cultures in the provision of while conducting examinations & testing service.

- Designated examiners shall not discriminate against nor exploit their test takers on grounds of age, gender, race, ethnicity, sexual orientation, language background, creed, political affiliations or religion, nor knowingly impose their own values (for example social, spiritual, political and ideological), to the extent that they are aware of them.

- Designated examiners shall never exploit their clients nor try to influence them in ways that are not related to the aims of the service they are providing or the investigation they are mounting.

- Sexual relations between designated examiners and their test takers are always unethical.

- Teaching and researching testing involving the use of test takers (including students) requires their consent; IT ALSO REQUIRES respect for their dignity and privacy. Those involved should be informed that their refusal to participate

will not affect the quality of the DE's service (in teaching, in research, in development, in administration). THE USE OF all forms of media (paper, electronic, video, audio) involving test takers requires informed consent before being used for secondary purposes.

- Designated examiners shall endeavor to communicate the information they produce to all relevant stakeholders in as meaningful a way as possible.
- Where possible, test takers should be consulted on all matters concerning their interests.

Principle 2

Designated examiners shall hold all information obtained in their professional capacity about their test takers in confidence and they shall use professional judgment in sharing such information. Annotation

- In the face of the widespread use of photocopied materials and facsimile, computerized test records and data banks, the increased demand for accountability from various sources and the personal nature of the information obtained from test takers, designated examiners are obliged to respect test takers' right to confidentiality and to safeguard all information associated with the tester-test taker relationship.

- Confidentiality cannot be absolute, especially where the records concern students who may be competing for admissions and appointments. A careful balance must be maintained between preserving confidentiality as a fundamental aspect of the tester's professional duty and the wider responsibility the tester has to society.

- Similarly, in appropriate cases, the tester's professional colleagues also have a right to access data of test takers other than their own ion order to improve the service the profession offers. In such cases, those given access to data should agree to maintain confidentiality.

Principle 3

Designated examiners should adhere to all relevant ethical principles embodied in national and international guidelines when undertaking any trial, experiment, treatment or other research activity.

Annotation

- Examine/testing progress depends on research, which necessarily involves the participation of human subjects. This research shall conform to generally accepted principles of academic inquiry, be based on a thorough knowledge of the professional literature; and be planned and executed according to the highest standards.

- All research must be justified; that is proposed studies shall be reasonably expected to provide answers to questions posed.

- The human rights of the research subject shall always take precedence over the interests of science or society.

- Where there are likely discomforts or risks to the research subject, the benefits of that research should be taken into account but must not be used in themselves to justify such discomforts or risks. If unforeseeable harmful effects occur, the research should always be stopped or modified.

- An independent Ethics Committee should evaluate all research proposals in order to ensure that studies conform to the highest scientific and ethical standards.

- Relevant information about the aims, methods, risks and discomforts of the research shall be given to the subject in advance. The information shall be conveyed in such a way that it is fully understood. Consent shall be free, without pressure, coercion or duress.

- The subject shall be free to refuse to participate in or to withdraw from, the research at any time prior to publication of research results. Such refusal shall not jeopardize the subject's treatment.

- Special care shall be taken with regard to obtaining prior consent in the case of subjects who are in dependent relationships (for example, students, the elderly, proficiency challenged learners).

- In the case of a minor, consent shall be obtained from a parent or guardian but also from the child if he is of sufficient maturity and understanding.

- Confidential information obtained in research shall not be used for purposes other than THOSE specified in the approved research protocol.

- Publication of research results shall be truthful and accurate.

- Publication of research reports shall not permit identification of the subjects who have been involved.

Principle 4

Designated examiners shall not allow the misuse of their professional knowledge or skills, in so far as they are able.

Annotation

- Designated examiners shall not knowingly use their professional knowledge or skills to advance purposes inimical to their test takers' interests. When the progress of the tester's intervention is not directly to the benefit of the test takers (for example when they are asked to act as trial subjects for a proficiency test designed for some other situation), its nature shall be made absolutely clear.
- Non-conformity with a society's prevailing moral, religious etc values, or status as an unwelcome migrant, shall not be the determining factor in assessing ability.
- Whatever the legal circumstances, designated examiners shall not participate, either directly or indirectly in the practice of torture or other forms of cruel, inhuman or degrading punishment (see Declaration of Tokyo 1975).

Principle 5

Designated examiners shall continue to develop their professional knowledge, sharing this knowledge with colleagues and other Examiners.

Annotation

- Continued learning and advancing one's knowledge are fundamental to the professional role; failure to do so constitutes a disservice to test takers.

- Designated examiners shall make use of the various methods of continuing education that are available to them. These may involve participation in continuing testing/examinations programmes and professional conferences, and the regular reading of relevant professional publications.

- Designated examiners shall take the opportunity to interact with colleagues and other relevant professionals as an important means of developing their professional knowledge.

- Designated examiners shall share new knowledge with colleagues by publication in recognized professional journals or at meetings.

- Designated examiners shall be expected to contribute to the education and professional development of designated examiners in training and to the drawing up of guidelines for the core requirements of that training.

- Designated examiners shall be prepared to contribute to the education of students in the WIDER FOO professions.

Principle 6

Designated examiners shall share the responsibility of upholding the integrity of the testing profession.

Annotation

- Designated examiners shall promote and enhance the integrity of their profession by fostering a sense of trust and mutual responsibility among colleagues. In the event of differences of opinion, viewpoints should be expressed with candour and respect rather than by mutual denigration.

- Designated examiners develop and exercise norms on behalf of society. As such theirs is a privileged position which brings with it an obligation to maintain appropriate personal and moral standards in their professional practice, and in those aspects of their personal life which may reflect upon the integrity of that practice.

- Designated examiners who become aware of unprofessional conduct by a colleague shall take appropriate action; this may include a report to the relevant authorities.

- Failure to uphold this Code of Ethics will be regarded with the utmost seriousness and could lead to severe penalties including withdrawal of designation.

Principle 7

Designated examiners in their societal roles shall strive to improve the quality of testing, assessment and teaching services, promote the just allocation of those services and contribute to the education of society regarding FOO proficiency.

Annotation

- Designated examiners shall be prepared by virtue of their knowledge and experience to advise those responsible for the provision of testing services.

- Designated examiners shall be prepared to act as advocates and join with others in ensuring that testing test takers have available to them the best possible testing service.
- Designated examiners shall be prepared to work with advisory, statutory, voluntary and commercial bodies that have a role in the provision of testing services.
- Designated examiners shall take appropriate action if services, by reason of fiscal restriction or otherwise, fall below minimal standards. Exceptionally, designated examiners may have to dissociate themselves from such services provided that this is not harmful to their test takers.
- Designated examiners shall be prepared to interpret and disseminate relevant scientific information and established Professional opinions to society. In so doing, designated examiners shall clarify their status as either spokespersons for a recognised professional body or not. If the views expressed are contrary to those generally held, they shall so indicate.
- It is reasonable for designated examiners to make scientifically substantiated contributions to public debate on sensitive socio-political issues, such as race, disadvantage and child rearing.
- Designated examiners shall differentiate between their role as educators based on professional knowledge and their role as citizens.
- In fulfilling their responsibilities under this principle, designated examiners shall take care to avoid self-promotion and the denigration of colleagues.
- Designated examiners shall make clear that they do not claim (and are not seen to claim) that they alone possess all the relevant knowledge.

Principle 8

Designated examiners shall be mindful of their obligations to the society within which they work, while recognizing that those obligations may on occasion conflict with their responsibilities to their test takers and to other stakeholders.

Annotation

- When test/examination results are obtained on behalf of institutions (government departments, professional bodies, universities, schools, companies) designated examiners have an obligation to report those results

accurately, however unwelcome they may be to the test takers and other stakeholders (families, prospective employers etc).

- As members of the society in which they work, designated examiners should recognize their obligation to the testing requirements of that society, even when they may not themselves agree with them. Where their disagreement is of sufficient strength to qualify as a conscientious objection, they should have the right to withdraw their professional services.

Principle 9

Designated examiners shall regularly consider the potential effects, both short and long term on all stakeholders of their projects, reserving the right to withhold their professional services on the grounds of conscience.

Annotation

- As professionals, designated examiners have the responsibility to evaluate the ethical consequences of the projects submitted to them. While they cannot consider all possible eventualities, they should engage in a thorough evaluation of the likely consequences and, where those consequences are in their view professionally unacceptable, withdraw their services. In such cases, they should as a matter of course consult with fellow designated examiners to determine how far their view is shared, always reserving the right, where their colleagues take a different view, to make an individual stand on the grounds of conscience.

PART II

AERONAUTICAL STATION OPERATOR LICENCE PROCEDURE

CHAPTER 1 – GENERAL

An Aeronautical Communication Station (Aero Mobile Communication Center) in Sri Lanka shall be operated by personnel licenced by DGCA Sri Lanka with effect from 15th October 2010.

DGCA Sri Lanka shall issue continuing type (non-expiry type) of Aeronautical Station Operator Licence. Therefore an Aeronautical Communication Station (Aero Mobile Communication Center) in Sri Lanka shall be operated by personnel licenced by DGCA Sri Lanka with effect from 15th October 2010.

Unlicensed individuals shall not operate as Aeronautical Station Operators after 15th of October 2011 unless they meet the requirements at 2.0 of this Manual.

For the issuance of a Aeronautical Station Operator Licence an applicant shall meet the required specified in respect of age, knowledge, experience and skill as are specified in section and as per chapter 2.0.

An Applicant for an Aeronautical Station Operator Licence shall demonstrate in the manner approved by DGCA Sri Lanka as per this Manual SLCAP 3100, such requirements in respect of knowledge and skill.

A holder of Aeronautical Station Operator Licence shall not exercise the privileges of the licence unless he/she maintains competency and meets the requirements for recent experience at paragraph 4.0. and 5.0. of chapter 2.

Chapter 2 – Requirements for Aeronautical Station Operator Licence

2.1 Requirements for the Issue of the Licence.

2.1.1 Requirement for issuance of Aeronautical Station Operator Licence have been published in the Implementing Standard 048.

2.2 Privileges and Conditions

Subject to compliance with the requirements specified in 1.2.5.1 and 1.2.9 of IS 50, the privileges of the holder of an Aeronautical Station Operator Licence shall be to act as an operator in an aeronautical station (Aero mobile Communication Center). Before exercising the privileges of the licence, the holder shall be familiar with all pertinent and current information regarding the types of equipment and operating procedures used at the aeronautical station.

2.3 Recent Experience & Proficiency Checks

2.3.1 Recent Experience

A holder of an Aeronautical Station Operator Licence shall have satisfactorily served in an Aeronautical Communication Station at least for a continuous period of 30 working days, within six months.

2.3.2 Proficiency Checks

A holder of an Aeronautical Station Operator Licence shall

i) have satisfactorily completed a proficiency check (check II) within the immediately preceding one year of exercising the privileges of the licence.

and

ii) have demonstrated his proficiency in English Language at appropriate interval as required by ASN 054.

2.4 Regaining Competency (Recent Experience)

A licence holder who has not served in an Aeronautical communication Center at least for a continuous period of 30 working days, within six months shall complete the requirements as follows to regain competency.

i) Not served for More than 30 days but less than 06 weeks

a) Shall satisfactorily complete 03 On-The –Job sessions in a continuous period of 06 working days under the supervision of a qualified ASO approved by DGCA Sri Lanka.

ii) More than 06 weeks less than 08 weeks.

a) Shall satisfactorily complete 06 On-The-Job Sessions under the supervision of a qualified ASO in a period of continuous 10 working days.

iii) More than 08 weeks less than 12 weeks.

a) Shall satisfactorily complete 09 On-The-Job Sessions under a qualified ASO in a period of continuous 14 working days.

iv) More than 12 weeks less than 20 weeks

a) Shall satisfactorily complete 12 On-The-Job Sessions under supervision of a qualified ASO in a period of continuous 18 working days.

v) 06 months or more
Shall satisfactorily complete a

a) Refresher training on knowledge
b) On the Job Training and
c) Demonstration of competency as approved by DGCA.

2.5 Validation/ Conversion/ Credit

DGCA Sri Lanka shall not validate or issue an Aeronautical Station Operator Licence on conversion or on credit, to a licence or a certificate issued by any other contracting state to Chicago Convention on International Civil Aviation.

2.6 Recent Competency Plan

ASO Licence holder shall work at the Aeronautical Mobile Service centre Ratmalana not exceeding 06 months to considers having Licence recency & competency During this period continues period of 30 working days should be the minimum requirement

ASO license holder failed to fulfill the above requirement treated as loss for having ASO licence recency & competency Hence following procedure need to be followed for regain licence recency & competency

i) Reported for work at the AMS centre Ratmalan within 30days

a) Shall work under supervision of a licence holder (nominated by Head of ANS) for a period of continues 03 working days .Satisfactory work performance will be considered having licence recency & competency

ii) Reported for work at the AMS centre Ratmalan more than 30days less than 06 weeks

a) Shall follow 03 On-The-Job Sessions under supervision of supervisor nominated by the Head of ANS for a period of continuous 06 working days immediately after reporting for duty. Satisfactory report forwarded to the Head of ANS will be considered having licence recency & competency

iii) Reported for work at the AMS centre Ratmalan more than 06 weeks less than 08 weeks.

a) Shall follow 06 On-The-Job Sessions under supervision of supervisor nominated by the Head of ANS for a period of continuous 10 working days immediately after reporting for duty. Satisfactory report forwarded to the Head of ANS will be considered having licence recency & competency

iv) Reported for work at the AMS centre Ratmalan more than 08 weeks less than 12 weeks.

a) Shall follow 09 On-The-Job Sessions under supervision of supervisor nominated by the Head of ANS for a period of continuous 14 working days immediately after reporting for duty. Satisfactory report forwarded to the Head of ANS will be considered having licence recency & competency

v) Reported for work at the AMS centre Ratmalana more than 12 weeks less than 20 weeks

a) Shall follow 12 On-The-Job Sessions under supervision of supervisor nominated by the Head of ANS for a period of continuous 18 working days immediately after reporting for duty. Satisfactory report forwarded to the Head of ANS will be considered having licence recency & competency

vi) Reported for work at the AMS centre Ratmalana after 06months or more

a) Along with the details of non performance duties at the AMS centre will be forwarded to DGCA Sri Lanka for his concurrence.

CHAPTER 3 – TRAINING & TRAINING ORGANIZATIONS

3.1 Introduction

To provide participants an extensive knowledge and skill required to perform duties at Aeronautical Mobile Service as Aeronautical Mobile Service Officers in accordance to the Standards and Recommended Practices published in ICAO Annexed and documentss by confirming Safe, Efficient, Regular and Economical operation of Air Navigation , DGCA granted approval to Civil Aviation Training Centre(CATC), Airport & Aviation Services Ltd, Kandawala Road, Ratmalana to conduct approved training programme ‘’ Aeronautical Mobile Service Officer Course - ICAO 171.

Aeronautical Communication Officers Grade 11, who have completed an uninterrupted service of three years or more as ACO11 are eligible to apply to follow the course. Selection will be don e by the company using criteria approved by DGCA.

In all matters pertaining to this course the Head of Civil Aviation Training will be the Authorized Officer acting for and on behalf of Airport & Aviation Services (SL) Limited.

The right of interpretation of this Training Manual shall be vested solely with the Director General of Civil Aviation.
No changes/amendments to the approved training programme be effected without the explicit written approval of the Director General of Civil Aviation.

3.2 Batch Size

A minimum number of 04 (four) and a maximum number of 06(six) participants shall be accommodated per batch.

3.3 Medium of Instructions

Medium of instruction shall be in English

3.4 Course Duration

50 working days and 150 hours On-the-job Training.

3.4 Course Breakdown

The course consists of two phases
phase-1

Theoretical/Practical training at Civil aviation Training Centre for 50 working days.

Phase-11

After successful completion of the training at the Civil Aviation Training Centre the trainee will be eligible for deployment on on-the-job training at the Air Navigation Services Division.

3.5 Attendance

A trainee is required to achieve a minimum attendance of 95% during the course in order to be eligible to sit the final examinations.

3.6 Progress Tests

Progress tests will be held regularly to ascertain the progress of the trainees.

De-briefing of progress test will be conducted individually. The results of the progress tests will be filed in the training files of individual trainees.

The results of the progress tests will be filed in the training files of individual trainees.

3.7 On – the –Job Training

The Communication Officers, on successful completion of the approved course(s), are required to undergo on-the-job training (OJT at the stations of their posting for a minimum of a specified period as per the established OJT Programme. The COs during OJT shall have demonstrated a level of knowledge, skill and experience in specified topics as prescribed in ICAO Annex 1 and relevant Aviation Safety Notices (ASN No. 111) promulgated by Civil Aviation Authority of Sri Lanka (CAASL) for becoming eligible to take the final assessment conducted under the auspices of CAASL

This properly planned systematic OJT Programme would ensure minimum failures while gifting the system with a group of personnel who are professionally competent and appropriately confident to perform the required tasks at Operational Units of Workplace.

3.8 Training Organization

Training for Aeronautical Station Operator shall be conducted at the Civil Aviation Training Centre(CATC), Airport & Aviation Services Ltd, Kandawala Road, Ratmalana.

Certification of Training Organization is in accordance with chapter 4 of SLCAP 3060-ATC Assessment Procedure Manual.

CHAPTER 4 – EXAMINATIONS

4.1 Knowledge Examination

4.1.1 Subjects of the Examination

The Final Examination shall consist of following subjects and following :

	Subject	% Marks	Weightage
(1)	Aeronautical Telecommunication	P1	0.1
(2)	Aeronautical Mobile Service	P2	0.1
(3)	Air Traffic Services	P3	0.1
(4)	Rules of the Air	P4	0.1
(5)	Air Law	p5	0.1
(6)	Meteorology	p6	0.1
(7)	Principle of Flight	p7	0.1
(8)	Flight Navigation	p8	0.1
(9)	Radio Navigation	p9	0.1
(10)	AMS data entry	p10	0.1
(11)	Practical (Simulator)	P11	0.4

Overall average will be computed as follows:-

Overall average = 0.1 x (P1+ P2 + P3 + P4 +p5 + p6 + p7 + p8 + p9 + p10) + 0.4 P11

4.1.2 Final Examination Procedure

(1) Final Examination
(2) In respect of each of the subjects (1) to (4) listed above, written examinations will be conducted before the end of the course. The pass mark for each subject is 70%.

(2) The Simulator practical examination will be conducted at the end of the course. The pass mark for the practical test (simulator) is 70%.

The practical test will be conducted by a Board of Examiners appointed by the Director General of Civil Aviation. This Board will be the sole authority on the results of the practical examination.

(3) It is compulsory that the trainee passes in all five subjects. If a trainee fails to obtain marks equal to or greater than 70% in respect of any subject, he/she will be referred in that subject.

4.1.3 Repeat Examinations

(1) If a trainee is referred in any theory subjects he/she will be allowed to sit a repeat examination for those subjects.

(2) If a trainee is referred in the practical test he/she will be allowed to repeat the practical examination.

(3) If at least one trainee has been referred the necessary repeat examination will be held before the trainee is deployed for On-the-job training.

(4) The purpose of a repeat examination will be purely to provide a referred trainee with a second attempt to pass the referred subjects(s). If a trainee obtains marks equal to or greater than 70% in any subject at a repeat examination, he/she will pass that subject and his/her marks for that subject will be deemed as 70%.

(5) If a trainee scores less than 70% in any subject at a repeat examination, he/she will fail that subject. There will be no provision to be re-referred.

4.1.4 Examination Results

(1) The results of all progress tests will be announced to the trainees.

(3) In respect of the Final Examination (Theory) the trainee will be informed whether he/she has passed or has been referred in respect of each subject.

(4) In the case of the Simulator Practical Examination each trainee will be informed whether he/she has passed or has been referred immediately after the test.

(5) The final grading obtained by the trainee will be informed to each trainee, in respect of all subjects before the commencement of the on-the-job training.

4.1.6 Conditions for successful completion of the course

A trainee will successfully complete the course when he/she passed in all subjects

at the final examination.

(1) The Certificate will be awarded only on the successful completion of the course.

(2) The certificate will indicate the name of the course, duration and the list of subjects conducted at the Final Examination.

(3) The Certificate may be signed by the Director General of Civil Aviation and Head of the Civil Aviation Training of Airport & Aviation Services (SL) Limited.

4.2 On –the –Job Assessment

HANS shall submit the OJT overall performance record to CAASL & assessment shall be conducted at the AMS centre.

A panel of examiners is appointed by the DGCA, shall conduct a skill test at the AMS centre and assessment report signed by the examiners shall be forwarded to the DGCA for issuance of licence.

OJT Assessment areas are in accordance with Appendix VI.

4.3 Designated Examiners/check Operators

Skill test examiners panel appointed by DGCA shall consists of following members.

- DDG(FSR)- Head of the panel
- D(A&NS)
- D(TOPL)
- HANS

Following 04 qualified Aero Com Managers designated by DGCA

- Manager Grade 2 – Aero Com
- Manager Grade 3 – AMS
- Manager Grade 3 – RMA
- Manager Grade 3 – BIA

4.3.1 Pre-requisite qualifications for Check Operators

Check Operators shall have

- Have a Minimum of three (05) years of experience as an Senior Aeronautical Communication Officer.
- posses any other appropriate additional qualification(s) as required by the DGCA

4.3.2 Selection Criteria

Selection of Operators shall be based on the personnel's commitment and the current record of performance in operational duties in addition to the qualifications and experience prescribed in 4.3.1 above.

Applications shall be called for through a Notice under the signature of the Head of Air Navigation Services or his/her designated officer circulated for the attention of all Aeronautical Station Operators where those eligible will apply in writing.

An Interview conducted by a Panel appointed by the Head of Air Navigation Services (HANS) shall make the initial selection and the names of the successful candidates shall be submitted to HANS.

4.3.3 Recommendations

HANS may review the names of the successful candidates submitted by the Panel if so deem necessary, and shall forward them to the DGCA with his/her recommendations for consideration to be appointed as Check Controllers.

4.3.4 Appointment Procedure

The appointment of Check Operators shall be made by the Director General of Civil Aviation of Sri Lanka or on his behalf the Deputy Director/Personnel Licensing of CAASL (DD/PL).

The names of Aeronautical Communication Officers selected as per 4.3.2 and 4.3.3 above and submitted to the DGCA or DD/PL by HANS shall be considered by the DGCA for appointment as Check Operators.

These appointments shall , at the discretion of DGCA/ DD-PL, be made valid only for an ongoing OJT Programme expected to be concluded in the near future, or for a specified period determined by the DGCA as appropriate. In either case, such appointment shall deem to have ceased to be valid in the event validity of the ASO Licence and/or at any given time during the period of this appointment.

4.3.5 Designation / Appointment

The successful candidate(s) for the appointment as Check Operators shall be certified and designated as 'Check Controllers' by the DGCA and be issued with a certificate describing the Terms of Reference

4.3.6 Terms of Reference

Panel, when so appointed by Director General of Civil Aviation shall perform specific duties in relation to conducting of skill test for the issue of Aeronautical Station Operator Licence to an Aeronautical Station Operators in Sri Lanka.

Panel is authorized for the following.

1. Determining the expected proficiency level of Aeronautical Station Operator's skill test.
2. Development of skill test composition & time duration.
3. Determination of skill test elements and evaluation format (CAA/PL/M/16).
4. Recommendation of the skill test examiners and the procedure for the issuance of initial ASO Licence.
5. Recommendation to designate skill test examiners for issuance of ASO licence after the initial issue.
6. Recommendation of competency and recency requirements for continued exercising of privileges of ASO licence.
7. Level of delegation of authority for renewal of ASO licence.

APPENDIX 1
BASIC KNOWLEDGE REQUIREMENT
Flight Operations Officer Licence

TABLE 1

Subject matter	*Recommended duration (hours)*		*Degree of expertise*
	*Trainees **without** previous aviation experience 1-A*	*Trainees **with** previous aviation experience 1-B*	
Chapter 3 — Civil air law and regulations	**30**	**18**	
Certification of operators			2
The Convention on International Civil Aviation (The Chicago Convention)			2
International air transport issues addressed by the Chicago Convention			2
The International Civil Aviation Organization (ICAO)			2
Responsibility for aircraft airworthiness			3
Regulatory provisions of the flight manual			3
The aircraft minimum equipment list (MEL)			3
The operations manual			3
Chapter 4 — Aviation indoctrination	**12**	**6**	
Regulatory			3
Aviation terminology and terms of reference			3
Theory of flight and flight operations			2
Aircraft propulsion systems			2
Aircraft systems			2
Chapter 5 — Aircraft mass (weight) and performance	**27**	**15**	
Basic principles for flight safety			3
Basic mass (weight) and speed limitations			3

Take-off runway requirements			3
Climb performance requirements			3
Landing runway requirements			3
Buffet boundary speed limitations			3
Chapter 6 — Navigation	**24**	**12**	
Position and distance; time			3
True, magnetic and compass direction; gyro heading reference and grid direction			2
Introduction to chart projections: The gnomonic projection; the Mercator projection; great circles on Mercator charts; other cylindrical projections; Lambert conformal conic projection; the polar stereographic projection			2
ICAO chart requirements			3
Charts used by a typical operator			3
Measurement of airspeeds; track and ground speed			3
Use of slide-rules, computers and scientific calculators			3
Measurement of aircraft altitude			3
Point of no return; critical point; general determination of			3
Introduction to radio navigation; ground-based radar and			2
Navigation procedures			3
ICAO CNS/ATM systems (an overview)			1
Chapter 7 — Air traffic management	**39**	**21**	
Introduction to air traffic management			2
Controlled airspace			3
Flight rules			3
ATC clearance; ATC requirements for flight plans; aircraft			3
Flight information service (FIS)			3
Alerting service and search and rescue			3
Communications services (mobile, fixed)			3

Aeronautical information service (AIS)			3
Aerodrome and airport services			3
Chapter 8 — Meteorology	**42**	**21**	
Atmosphere; atmospheric temperature and humidity			2
Atmospheric pressure; pressure-wind relationships			2
Winds near the Earth's surface; wind in the free			3
Vertical motion in the atmosphere; formation of clouds and			2
Thunderstorms; aircraft icing			3
Visibility and RVR; volcanic ash			3
Surface observations; upper-air observations; station			3
Air masses and fronts; frontal depressions			2
Weather at fronts and other parts of the frontal depression;			2
General climatology; weather in the tropics			1
Aeronautical meteorological reports; analysis of surface and			3
Prognostic charts; aeronautical forecasts			3
Meteorological service for international air navigation			4
Field trip to local meteorological office			2
Chapter 9 — Mass (weight) and balance control	**27**	15	
Introduction to mass and balance			3
Load planning			3
Calculation of payload and loadsheet preparation			3
Aircraft balance and longitudinal stability			3
Moments and balance			3
The structural aspects of aircraft loading			3
Dangerous goods and other special cargo			3
Issuing loading instructions			3
Chapter 10 — Transport of dangerous goods by air	**9**	9	
Introduction			
Dangerous goods, emergency and abnormal situations			3

Source documents			3
Responsibilities			3
Emergency procedures			3
Chapter 11 — Flight planning	**18**	**9**	
Introduction to flight planning			2
Turbo-jet aircraft cruise control methods			3
Flight planning charts and tables for turbo-jet aircraft			3
Calculation of flight time and minimum fuel for turbo-jet			3
Route selection			3
Flight planning situations			3
Reclearance			3
The final phases			3
Documents to be carried on flights			3
Flight planning exercises			3
Threats and hijacking			3
ETOPS			2
Chapter 12 — Flight monitoring	**16**	**16**	
Position of aircraft			3
Effects of ATC reroutes			3
Flight equipment failures			3
En-route weather changes			3
Emergency situations			3
Flight monitoring resources			3
Position reports			3
Ground resource availability			3
Chapter 13 — Communications — Radio	**18**	**6**	
International aeronautical telecommunications service			2
Elementary radio theory			2
Aeronautical fixed service			2

Aeronautical mobile service			2
Radio navigation service			2
Automated aeronautical service			2
Chapter 14 — Human Factors	**15**	**15**	
The meaning of Human Factors			3
Dispatch resource management (DRM)			4
Awareness			3
Practice and feedback			3
Reinforcement			3
Chapter 15 — Security (emergencies and abnormal	**8**	**6**	
Familiarity			3
Security measures taken by airlines			3
Procedures for handling threats, bomb scares, etc.			3
Emergency due to dangerous goods			3
Hijacking			3
Emergency procedures			3
Personal security for the FOO/FD			3

TABLE 2

Subject matter	*Recommended duration*
Chapter 16 — Applied practical training	
Applied practical flight operations	25 hours
Simulator LOFT observation and synthetic flight training	4 hours
Flight dispatch practices (on-the-job training)	13 weeks
Route familiarization	1 week

APPENDIX II
SYLLABUS OF PHASE 1 (KNOWLEDGE)
FLIGHT OPERATIONS OFFICER LICENCE

MODULE 1 - CIVIL AIR LAW AND REGULATIONS

1.1 Introduction

1 International aircraft operation is governed by the rule of law; that is to say, a number of Conventions, Regulations, Legislation, Orders, Agreements, etc. have been promulgated among and within States since the first flight by a heavier-than-air machine to ensure that flights are operated in a safe and orderly manner. Achievement of safety and regularity in air transportation operation requires that all States accept and implement a common standard of aircraft operation in regards to training, licensing, certification, etc., for international operations. The standardization of operational practices for international services is of fundamental importance to prevent costly errors which may be caused by misunderstanding or inexperience. Although this manual and other ICAO manuals address international aircraft operation, the need for standardization is equally applicable to any aircraft operation.

2 International and national regulations and air laws are promulgated to ensure safety, regularity and efficiency of international aircraft operation. On the international scene, ICAO, pursuant to the provisions of Article 37 of the Convention on International Civil Aviation, develops and adopts Standards and Recommended Practices (Annexes to the Convention) as the minimum requirement for aircraft operation. National regulations are developed on the basis of those Standards and Recommended Practices with some variations to suite the specific requirements of individual States. States may enact legislation that may significantly differ from that enacted in other States. However, inter- national aircraft operations share many regulations, laws and statutes. The syllabus contained in this chapter gives a general view on air law as adopted by ICAO and practised in international aircraft operations.

1.2 Training objectives

Conditions: Provided with a broad outline of the regulatory requirements to be met by an operator engaged in commercial air transport and outlining significant regulatory docu- ments to the flight operations officer/flight dispatcher (FOO/FD) including operational control concepts that illustrate the appli- cation of regulatory requirements to the FOO/FD's work,

Performance: The trainee will be able to identify the role of international and national aviation regu- latory bodies, identify the importance of applicable regulations to aircraft operation and apply regulations relating to aircraft operation in those areas which fall under the duties and responsibilities of the FOO/FD.

Standard of accomplishment:
The regulations and legislation applicable to the described case will be thoroughly identified and its provisions and practical applications understood and implemented as required.

1.3 Required knowledge, skill and attitude

1.3.1 Certification of operators

Goal: *To enable the trainee to identify the basic requirements for authorization to operate a commercial air transportation service.*

State authority functions

- protecting public interests by:

— establishing the need for and feasibility of air service

— ensuring the safety of flight operations conducted within the State

- regulating the degree of competition between operators
- exercising control over commercial air operators
- controlling requirements for State-owned or State- operated facilities and services

Common methods of exercising State authority

- incorporation of civil aviation acts, laws and statutes into the State's legal system
- establishment of a State Civil Aviation Authority (CAA) with power to:

— apply principles set forth in aviation law

— develop civil air regulations and orders

— establish requirements for issue of licences, certifi- cates and other instruments of authority deemed necessary for commercial air transport

— inspect all aspects of commercial air transport operations to ensure continuing compliance with State requirements

— recommend corrective action to air operators

— revoke air operators' licences

Air operator certificate

- operator's authority to engage in specific air transpor- tation operations including:

— categories of operations

— routes and frequency of operation for scheduled services

— areas of operation for non-scheduled services

— terminal, alternate and emergency airports

— aircraft types as well as major equipment such as navigation and communication systems

- requirement for an operator to satisfy the State with respect to:

— managerial and technical competency to operate the proposed service

— qualifications, training and competency of personnel

— financial resources
— equipment
— maintenance
— flight manuals
— operations manual(s)
• requirement for the satisfactory completion of a State operational inspection:
— ground operations
• fixed facilities
• mobile equipment
• operational control provisions:
— provisions for record keeping
• flight operations officer competency and licences
• flight crew competency and licences
• cabin crew competency and licences
• state/operator duty and flight time limitations:
— flight operations
• inspections or proving flights without passengers
• operational control efficiency:
— provisions for aircraft maintenance and inspection

1.3.2 The Convention on International Civil Aviation

Goal: *To outline the general provisions of the Convention on International Civil Aviation (Chicago, 1944) and to identify some of the international air transport problems addressed by the Convention and the "Five Freedoms" of the air.*

The Convention on International Civil Aviation

• a brief history of the Convention on International Civil Aviation held at Chicago in 1944 and commonly referred to as "The Chicago Convention" or "The Convention"
• Contracting States
• principal considerations:
— sovereignty of States over their airspace
— rights of flight over territory of Contracting States
— measures to facilitate international air navigation
— international Standards and Recommended Practices
— establishment of an authority to administer and regulate civil aviation activities

Sovereignty of airspace

• State sovereignty over the airspace above its territories

- legal problems related to a State's airspace not resolved by the Convention:

— height airspace extends to

— distance beyond the State land mass

- sovereignty over international airspace (such as high seas)

Rights of commercial flight over the territories of Contracting States

- conditions for overflying a Contracting State's airspace without special permission or agreement for aircraft NOT engaged in scheduled service, not carrying any payload (passengers, cargo, mail, etc):

— provisions of the Convention

— rights to make stops for non-traffic purposes

— possibilities for the privilege of taking on payload

— aircraft excluded (State aircraft such as military aircraft)

- agreements and special permissions required by aircraft engaged in scheduled services:

— the freedoms of the air

— the Two Freedoms Agreement (common)

— the Five Freedoms Agreement (rare)

— bilateral and multilateral treaties (most common)

- privileges granted by the Two Freedoms Agreement:

— overfly without landing

— land for non-traffic purposes

- privileges granted by the Five Freedoms Agreement:

— overfly without landing

— land for non-traffic purposes

— offload payload from the State of aircraft registry

— take on payload destined for the State of aircraft registry

— take on payload destined for other States that have accepted the Five Freedoms Agreement

1.3.3 International air transport issues addressed by the Convention

Goal: *To enable the trainees to identify issues of concern to international air transportation that are addressed by the Convention.*

Note.— Examples of problems in international air transportation operation are included under this item to enable trainees to appreciate the need for international agreement (the Convention) and an international organiz- ation (ICAO) to oversee the development and implemen- tation of international standards (Annexes to the Convention). Issues identified below are not exhaustive, and instructors and trainees are encouraged to discuss issues that they deem important.

Problems addressed by the existence of an international agreement

• issues concerning the travelling public:

— availability of regular services

— fares and baggage allowances

— facilitation

— safety in flight and on the ground

— reliability of services

• issues concerning the State:

— protection of the public's interest

— effects on national economy

— effects on the environment

— effects on national security

— services to be provided to operators

— efficient and economic interface with other States on services such as air traffic control and search and rescue, and on facilities such as those required for communication, navigation and air traffic control

— charges for services and facilities made available to operators

• issues concerning aircraft manufacturers:

— standard of certification in various States

— modifications required and additional limitations imposed by States

— variety of aircraft equipment required to operate with different ground-based facilities

— support and maintenance for the manufacturer's product

• issues concerning operators:

— traffic rights

— protection of commercial interests

— legal liabilities

— custom and immigration services

— availability of required services and facilities to a given standard

• issues concerning flight crew members:

— differences in air traffic control, navigation, com- munication procedures and operational standards

— availability of critical information for aircraft operation, facilities and other essential services

— major differences in State regulations and rules of the air promulgated by different States

— different standards of performance for operational personnel, creating misunderstandings and con- fusion

— differences in the requirements of States regarding the documents to be carried on board an aircraft

— issues to be discussed in the following paragraph(all FOO/FD concerns)

• issues concerning FOO/FDs:

— most of the items indicated above

— specific flight planning problems including the availability and reliability of meteorological infor- mation, serviceability of facilities, flight plan format, and time and method of filing

— flight monitoring problems due to lack of updated information and communication facilities

1.3.4 The International Civil AviationOrganization (ICAO)

Goal: *To familiarize the trainee with the functions of the International Civil Aviation Organization (ICAO) and to identify documents and publications produced by ICAO that are related to the FOO/FD's responsibilities.*

The International Civil Aviation Organization

• brief history of the organization and its functions:

— terms of reference and objectives

— organizational structure

— the process of making international standards

— end-product of its activities

ICAO documents and publications

Note.— A list of relevant ICAO documents and publications is in the Appendix — References.

• the ICAO Annexes to the Convention on International Civil Aviation:

— brief outline of the purpose and content of each Annex with special emphasis on provisions directly related to FOO/FD duties and responsibilities (the instructor is expected to link these provisions to the issues identified in the previous lesson)

— practical application of the provisions of the Annexes to FOO/FD duties and responsibilities, normally by referring to the aircraft manual and the operations manual

• publications related to the Procedures for Air Navi- gation Services (PANS) and technical publications related to FOO/FD duties and responsibilities:

— brief outline of information on PANS and technical publications to further assist the FOO/FD recognize:

• the scope of his responsibility

• location of useful reference material

• abbreviations and terms used in aircraft operation

— Air Navigation Plans:

• examine the Air Navigation Plan most relevant to the area in which the trainee's organization operates:

— for general familiarization and possible on- the-job reference

— to outline problems of implementation and maintenance of facilities

— for use of plan data for planning and conducting current operations

1.3.5 Responsibility for aircraft airworthiness

***Goal**: To identify responsibilities for the airworthiness and maintenance of aircraft from an FOO/FD's viewpoint.*

State responsibility for the maintenance of aircraft airworthiness

• the Convention's requirement for each Contracting State to:

— comply with international standards

— ensure that each aircraft on register and all essential on-board equipment are maintained in airworthy condition

• State enactment of legislation and the establishment of a Civil Aviation Authority (CAA) with the responsi- bility for:

— aircraft registration

— airworthiness certificate (CofA) which may be based on CofA of State of manufacture

— any required modifications to the aircraft limi- tations, operating procedures and the associated aircraft flight and maintenance manuals

— the issuance of orders and regulations including those required to implement the provisions of the Annexes

— the establishment of an Aeronautical Inspection Directorate (AID)

• responsibilities of the AID including:

— inspection of records

— aircraft and equipment tests

— personnel qualifications

— surveillance of the aircraft maintenance process

Operator's responsibility for the maintenance of aircraft airworthiness

Note.— Operators may have their own State-approved maintenance organization or may enter into an agreement with an external approved maintenance organization. Detailed information for the approval of maintenance organizations is provided in Annex 1 — Personnel Licensing *and Annex 6 —* Operation of Aircraft*, Part I.*

• responsibility for providing a maintenance release before an aircraft can engage in commercial operations, signed as per Annex 1 and Annex 6 requirements, and for ensuring that all maintenance work has been completed to the required standards in accordance with the provisions specified in the approved maintenance

manuals

Operator's responsibility for loading data (loadsheet)

• the requirements for all aircraft to be operated within the certified mass and centre of gravity (CG) limitations given in the approved flight manual

• operator requirement for a mass control organization to:

— maintain a record of the mass and its distribution for each aircraft

— incorporate changes due to aircraft and equipment modifications

— prepare loading schedules suitable for the operator's mathematical, tabular, mechanical, or computer methods of load control

— periodically sample the mass and CG of its aircraft

• means of controlling mass (normally exercised by maintenance or engineering personnel)

Note.— Basic data for each aircraft are provided to personnel engaged in the day-to-day calculations of mass and CG and the application of this data is covered in Chapter 9 — Mass (Weight) and Balance Control. The FOO/FD's responsibility in this regard is to ensure that each flight operates within its mass and CG limitations.

1.3.6 Regulatory provisions of the flight manual

Goal: *To outline the content of a typical flight manual and to identify aircraft limitations that are of significance to the FOO/FD.*

Flight manual authority

• production and initial approval of a flight manual as an integral part of the aircraft certification process by the State of aircraft manufacture

• possible format, provisions and title modification by the State of registry

• requirement to adhere to the provisions of the flight manual, approved by the State of registry, before an aircraft is allowed to be dispatched or operated

Contents of a typical flight manual

• limitations

• performance data

• normal operating procedures

• emergency and abnormal operating procedures

• aircraft description

• aircraft systems:

— description

— normal operation

— abnormal operation

• general operating limitations that must be completed:

— certification status
— kinds of aircraft operation
— flight manoeuvring load acceleration limits
— flight crew

mass and balance limitations that must be completed:
— maximum structural mass
— empty/basic/dry operating mass and passenger capacity
— centre of gravity limits
— fuel density loading limits
— deficiencies

• performance limitations that must be completed:
— operational limits
— wind vector limits
— runway contamination limits
— conditions under which thrust deterioration can take place
— deficiencies

• operating speed limitations that must be completed:
— maximum operating speed limit, V_{mo}
— maximum manoeuvring speed limit, V_a
— maximum flap extended speed limit, V_{fe}
— maximum landing gear extended speed limit,V_{le}
— maximum landing gear operating speed limit, V_{lo}

Aircraft systems that are of significance to the FOO/FD, and the effect of their serviceability

• air conditioning and pressurization system:
— operating altitude
— route operation
— passenger comfort
— cargo sensitivity
— structural integrity, cycles

• automatic flight control system:
— landing minima
— fuel consumption
— minimum navigation performance specifications (MNPS)

• communication systems:
— route operation

- equipment and furnishings:

— route operation

— altitude

— maximum passenger numbers

— speed

- flight controls:

— speed, altitude, mass, aircraft handling

— permissible flights

- fuel systems:

— fuel types

— fuel density

— maximum tank capacity/range

— maximum zero-fuel mass

— minimum/maximum fuel tank temperatures

— maximum altitude/outside air temperature

— minimum fuel

— distribution

— mass and balance

- ice and rain protection systems:

— route operation versus meteorological forecast

- navigation equipment:

— route operation

— landing minima

— minimum navigation performance specifications(MNPS)

- auxiliary power unit:

— suitability alternate/en-route alternate airport

— route operation

1.3.7 The aircraft minimum equipment list (MEL)

Goal: *To enable the FOO/FD to use the aircraft minimum equipment list (MEL) during flight planning.*

General description

- contents and purpose
- general policy on:

— multiple deferments

— continued deferments

— authority for use and interpretation of the MEL

• definitions and standards nomenclature:

— item number

— system or component

— quantity per aircraft

— aircraft dispatch minimum

— qualifying conditions

• use of the MEL by the FOO/FD:

— to determine if State regulations and company policy permit the flight to be planned with an aircraft that is not completely serviceable

— to determine what qualifications and additional limitations must be observed in the preparation of the flight plan

• use of the MEL by maintenance:

— precautions to be observed prior to maintenance release of aircraft when the MEL is applied

— specific MEL maintenance procedures to be observed

— where and when maintenance may apply the MEL

• use of the MEL by the flight crew:

— flight planning considerations

— specific MEL flight operating procedures to be observed

— final authority in the event of disagreement over use or interpretation of the MEL

1.3.8 The operations manual

Goal: *To identify the authority of the operations manual and to outline typical contents and regulations that are of significance to the FOO/FD.*

Note.— ICAO Doc 9376, Preparation of an Operations Manual, *may be used as an example of the content of an operator's operations manual.*

Authority of the operations manual

• a prime source of authoritative information required by the FOO/FD to comply with:

— State regulations

— operator policies and procedures

• State requirement for the operator to produce an operations manual:

— before getting an air operator certificate

— to ensure that the operator is aware of and complies with all relevant State regulations

— to ensure that the operator complies with the provisions of Annex 6 for international air transport

— to ensure that all amendments of a regulatory nature are approved by the State

Note.— In addition to meeting State requirements, the operator may include details of corporate policies and procedures in the operations manual. Other details may be included in other manuals such as the mainten- ance manual, aeronautical information manual, flight operations manual, and mass and balance control manual, as applicable. If such manuals are used by the operator, the instructors must acquaint FOO/FD trainees with the content of such manuals.

Operations manual format and content

• varies widely to meet the specific requirements of States and operators

• the use of several independent sections or volumes permits the individual to use, carry and amend those parts applicable to their duties

MODULE 2 – AVIATION INDOCTRINATION

2.1 Introduction

2.1.1 Flight Operations Officer/Flight Dispatcher (FOO/FD) training should, in addition to those subjects which directly concern FOO/FD responsibilities, include knowledge of other aspects of aviation operations. This consideration will provide the trainees with a more complete comprehension of their working environment.

2.1.2 Under this general subject, FOO/FDs are expected to learn commonly used aviation terminologies and be able to apply them in the appropriate context as required. They will also be introduced to the theory and physiology of flight which should enable them to acquire knowledge of the principles of flight.

2.1.3 Knowledge gained by FOO/FDs in these subjects constitutes an important part of aircraft operation; it will permit a more comprehensive operational understanding, develop general awareness of air transport operation and improve communication with crew members and mainten- ance personnel, thus improving the over-all safety of aircraft operation. Nevertheless, it must be realized that the knowledge imparted in most of the items presented is basic and not meant to produce FOO/FD experts on the subjects. However, their value as an introduction to the aircraft operation environment and their capacity to promote better understanding with flight crew members and other personnel in the industry cannot be overstated.

2.2 Regulatory

Note.— Knowledge, skill and attitude relevant to the responsibilities of the FOO/FD are covered in the previous chapter. Those aviation regulatory and other relevant bodies not discussed in Chapter 3 are covered here. FOO/FDs, performing their normal duties, may come into contact with these bodies, and introductory knowledge of their activities is considered beneficial.

2.2.1 Training objectives

Conditions: Given pertinent information on relevant aviation regulatory and other bodies and a description of a situation related to FOO/FDs,

Performance: The trainee will be able to identify other aviation organizations and their role in the over-all operation of aircraft in international air navigation.

Standard of accomplishment:
The legislation applicable to the described case will be thoroughly identified and its provisions and practical applications understood.

2.2.2 Required knowledge, skill and attitude

• objectives of and roles played by the International Air Transport Association (IATA) and other relevant inter- national, regional and national aviation organizations;

• objectives of and roles played by national civil aviation regulatory bodies (e.g. civil aviation authorities and airport authorities) and other aviation regulatory bodies (e.g. customs, immigration, health, and security) that FOO/FDs may come into contact with;

• the airline's organizational structure, administrative requirements relating to FOO/FDs, organizational links between FOO/FDs and crew members;

• specific State and company regulations applicable to the dispatch of an aircraft.

2.3 Aviation terminology and terms of reference

Note.— To emphasize working relationships and enhance communication between FOO/FDsand crew

members, it is recommended that the following subjects be delivered by personnel from the flight operations department.

2.3.1 Training objectives

Conditions: Given short descriptions of aircraft/air transport operation,

Performance: The trainee will be able to define aviation terminologies common to air transport operation and identify relevant terms of reference common to aircraft operation, applying them in the appropriate context.

Standard of accomplishment:
For safety-related items and for items of daily routine use, a 100 per cent correct response is required. For other items, a different standard may be established.

2.3.2 Required knowledge, skill and attitude

• identify terminologies common to air transport oper- ation and apply them in

the appropriate context;

- importance to flight safety of using correct terminologies;

- measurement units used in aircraft operation;

- the correct application of the phonetic alphabet in aviation-related communication; examples of misunder- standings that may arise from improper use and their effect on flight safety (use factual accident/incident examples, if available).

2.4 Theory of flight and flight operations

Note.— Please note that some of the subjects discussed here may, because of their importance to the aircraft dispatch profession, be covered in more detail in the following chapters, as applicable.

2.4.1 Training objectives

Conditions: Using realistic models, photographs or drawings of aircraft, or during a tour of an actual aircraft,

Performance: The trainee will be able to identify and describe the basic components of an aircraft, their use and operation, and the effect of those components on flight and cabin conditions. He will have a clear understanding of the theory of flight and the basic environment relating to aircraft operations.

Standard of accomplishment:
Basic components must be correctly associ- ated with basic use and operation. Safety- related items such as critical surfaces, ice formation, and surface contamination must be 100 per cent correct.

2.4.2 Required knowledge, skill and attitude

- identification of the main components of an aircraft and their basic function both on the ground and in flight; flight deck equipment including weather radar, cockpit voice recorder; basic flight instruments: airspeed indicator, altimeter, magnetic compass, etc.;

- hazards associated with volcanic ash/dust, ice forma- tion on wings and control surfaces, the recognition and reporting of such phenomena;

- flight control surfaces and flight controls and their function; the four forces (thrust, lift, drag and gravity) acting on an aircraft; the three axes (yaw, pitch and role) and the movement around each axis;

- recognition of aircraft critical surfaces and hazards to flight associated with the contamination of those surfaces; awareness of conditions most likely to produce surface contamination; role of the FOO/FD if surface contamination is suspected before aircraft departure;

• the timely communication, to the flight crew, of observed or reported deficiencies in the safe operation of the aircraft.

2.5 Aircraft propulsion systems

2.5.1 Training objectives

Conditions: Provided with appropriate reference material and, if practicable, participating in an actual inspection of an aircraft engine,

Performance: The trainee will be able to identify the principal differences in the different types of aircraft propulsion systems and their significance to aircraft operation.

Standard of accomplishment:
Principles of aircraft propulsion systems must be thoroughly understood and the trainee must be able to describe the signifi- cance to flight operation of the various types of aircraft propulsion systems.

2.5.2 Required knowledge, skill and attitude

• types of aircraft propulsion systems:
— propeller-driven aircraft
— jet-propelled aircraft
• propeller-driven aircraft:
— type of engine used (turboprop, piston)
— basic principles of operation
— propulsion efficiency
• jet-propelled aircraft:
— pure jet engine
— fan jet or bypass engine
— basic principles of operation
— propulsion efficiency
• operational differences between jet, turboprop and piston engine aircraft:
— due to different means of propulsion
— due to significant differences in performance

2.6 Aircraft systems

2.6.1 Training objectives

Conditions: Providedwith appropriate reference material and study guides and aids,

Performance: The trainee will be able to gain a general understanding of principal aircraft systems and the effects of system deficiencies.

Standard of accomplishment:

The trainee is expected to demonstrate adequate understanding of the basic systems and satisfactorily explain the effects of their failure on aircraft performance.

Note 1.— It is recommended that items such as general description, operating principles, normal functions, system redundancy and provisions for alternative operations for typical systems in a modern jet aircraft be briefly covered during this session.

Note 2.— It is also recommended that emphasis be put on the possible sequences of systems deficiencies or failures that are not self-evident to the trainee. Those listed under "planning" are relevant to the FOO/FD while the aircraft is on the ground. Those listed under "in-flight" are of significance to the FOO/FD when the aircraft is airborne.

2.6.2 Required knowledge, skill and attitude

Air-conditioning and pressurization systems

- planning:

— cruising altitude restrictions

— ground support requirements for passenger comfort and live or perishable cargo

- in-flight:

— safety and comfort jeopardized

— possible requirements for rapid descent

— reduced range at lower altitudes

Automatic flight control systems

- planning and in-flight:

— prerequisite for category II and III instrument approaches

— flight crew fatigue

Electrical power

- in-flight:

— reduced communications and navigation capabilities

— requirements for and limitations on the use of alternative power sources to operate systems

Flight controls

- planning and in-flight:

— restricted operating speeds

— increased runway length requirement

Fuel

- planning:

— fuel load and distribution

— mass limitations

• in-flight:

— fuel dumping system

Hydraulic power

• in-flight:

— requirement for the use of alternative power sources for various systems

— possible increased runway length requirement

Ice and rain protection

• planning and in-flight:

— ability to operate under adverse weather conditions

Landing gear

• planning and in-flight:

— restricted operating speeds

— increased runway length requirement

— restricted ground manoeuvrability

Navigation systems

• planning:

— route restrictions

— increased landing minima

• in-flight:

— deviation from planned route (time and fuel consumption)

— increased landing minima

Communications systems

• planning:

— route restrictions

• in-flight:

— deviation from planned route (time and fuel consumption)

— possible need to initiate distress procedures, alert search and rescue facilities

Note.— Navigation and communication systems, facilities and procedures are covered in more detail in their respective chapters.

Pneumatic systems

• planning:

— take-off mass restrictions

• in-flight:

— air-conditioning and pressurization problems

— requirements for alternative power sources

— possible requirements to descend to lower altitude

— increased runway length requirement

Airborne auxiliary power unit

• planning:

— ground support equipment required for electrical and electronic systems, air-conditioning and engine starting

Module 3 - AIRCRAFT MASS (WEIGHT) AND PERFORMANCE

3.1 Introduction

3.1.1 Today, aviation technology has evolved to such an extent that aircraft manufacturers can and do design and produce aircraft whose performance is designed to match the requirements of the market. Aircraft performance has, through the years, been refined to such a degree that it has literally become the nucleus for the growth of the air transportation industry. When the performance of aircraft is improved or when aircraft are designed to perform so that they satisfy a given market, the running cost is decreased and that translates into lower fares, creating the possibility of carrying more passengers. Of course, modern commer- cial aircraft operation demands that a high level of performance be achieved without prejudicing the high safety standards.

3.1.2 The commercial value of improved aircraft performance mainly depends on the efficiency with which the aircraft is operated. The wide range of fleet available to the operator may lead to the misuse or mismatch of equipment to the operation. One of the main responsi- bilities of the flight operations officer/flight dispatcher (FOO/FD) is to ensure that this mismatch does not occur and that aircraft are operated within their mass and performance limitations.

3.1.3 In this chapter, the trainee will be introduced to aircraft performance by outlining some of the factors that must be considered by the FOO/FD during flight planning. It is also designed to enable the trainee to determine the maximum permissible take-off and landing mass under variable operating conditions using flight manual data.

3.2 Basic principles for flight safety

3.2.1 Training objectives

Conditions: Provided with appropriate and pertinent reference material and aircraft performance data, including an outline of the factors that must be considered for flight planning purposes,

Performance: The trainee will be able to identify basic principles of safety of aircraft mass and performance limitations.

Standard of accomplishment:
The basic principles for flight safety must be thoroughly understood and the trainee must be able to determine the maximum permissible take-off and

landing mass under variable operating conditions using flight manual data.

3.2.2 Required knowledge, skill and attitude

Aircraft certification considerations

- aircraft structural strength
- loads to which an aircraft will be subjected
- speed limitations
- operating environment
- performance capabilities
- runway lengths
- terrain over which the aircraft will operate

Aircraft certification standards

- variation among different aircraft categories
- detail variation between States
- provision of a high degree of safety by ensuring that all significant factors, from take-off to landing, are considered
- insurance that the aircraft operating mass or centre of gravity never exceeds that at which all requirements can be met for the planned conditions

FOO/FD's responsibility to ensure that every flight plan complies with all the mass and performance limitations in the flight manual

Aircraft operating environment envelope

- consideration of extreme situations under which the aircraft is certified for operation
- consideration of factors in addition to aircraft structural and performance limitations:

— pressurization capability

— aircraft systems limitations

— use of aircraft operating environment envelope chart in a typical flight manual

3.3 Basic mass and speed limitations

3.3.1 Training objectives

Conditions: Provided with appropriate and pertinent reference material and aircraft performance data, including an outline of the factors that must be considered for flight planning purposes,

Performance: The trainee will be able to identify the reasons for the various mass and speed limitations of an aircraft.

Standard of accomplishment:
The principal reasons for the basic mass and speed limitations of an aircraft must be thoroughly understood and the trainee must be able to determine mass and speed limitations of an aircraft under variable operating conditions using flight manual data.

3.3.2 Required knowledge, skill and attitude

Maximum structural mass

- basic consideration of the positive and negative load factor limits:

— normal

— ultimate

- bending moments and mass distribution
- zero-fuel mass
- take-off mass
- ramp mass
- landing mass etc.

Speed limitations

- requirement to express in terms of:

— indicated airspeed (IAS)

— Mach number

- designed dive speed
- maximum operating speed
- normal operating speed

Flight strength diagram

- coordinates:

— positive and negative load factors

— indicated airspeed

- the boundary of the aircraft operating envelope for a specified mass:

— stall regions

— limiting load factors

— limiting airspeed

- use of the envelope to illustrate:

— effects of wind gusts

— reasons for margins between designed, maximum and normal operating speed limits

— manoeuvring speed limit

— some turbulence penetration speed considerations

3.4 Take-off runway requirements

3.4.1 Training objectives

Conditions: Provided with appropriate and pertinent reference material and aircraft performance data, including an outline of the factors that must be considered for determining take-off runway length,

Performance: The trainee will be able to identify all factors considered necessary for establish- ing take-off runway length requirements and for calculating those requirements accurately and within a reasonable time frame.

Standard of accomplishment:
All factors involved in establishing take-off runway length must be thoroughly understood and the trainee must be able to determine required take-off runway length using aircraft operations and flight manual data.

3.4.2 Required knowledge, skill and attitude

Note 1.— The fundamental principle is that the take-off mass must never exceed that for which runway length and subsequent aircraft performance standards have been established.

Note 2.— Different States have developed different standards and regulations but the principles are similar.

Piston engine aircraft take-off requirements

- basis for take-off runway length requirement on the assumption that:

— the most critical engine fails at the most critical time

— the aircraft is loaded to the most adverse centre of gravity

- the effect of loss of power of the most critical engine
- effect of runway limitation on take-off mass to meet the above criteria for actual conditions of:

— usable runway length

— pressure altitude

— temperature

— headwind or tailwind component

— runway slope

— runway contamination

— flap position

Turbo-jet aircraft take-off requirements

- clearways
- runway requirement
- alternatives to the balanced field length method normally used to select the critical engine failure speed V_1 for piston engine aircraft
- consideration of available stopways and clearways to calculate critical engine

failure speeds which maximize the permissible take-off mass from available runways

• the application of the same basic principles as for piston engine aircraft and the requirement for the mass of the aircraft not to exceed that which will enable it to:

— be well above the end of the runway during a normal take-off

— brake to a stop if an engine fails at any time up to V_1

— reach at least 35 feet over the clearway if engine failure occurs at V_1 or above (outboard engine), adverse aircraft handling problems

Note.— For turbo-jets, V_2 must be 120 per cent of

• critical engine failure speed V_1 characteristics:

— theoretically it depends on:

- mass
- runway slope
- runway braking coefficient
- pressure altitude
- temperature
- wind component
- flap position

— it is actually established:

- primarily on mass and flap position
- making small corrections for altitude, temperature and wind
- using methods found in the aircraft flight manual

• the meaning and calculation of take-off safety speed V_2

stalling speed and 110 per cent of the minimum speed for straight flight without excessive bank.

• flap position for take-off

• reduced thrust take-off

Take-off speeds and runway length calculations

• practical exercises requiring trainees to obtain data from representative flight manuals for both piston engine and turbo-jet aircraft and from tables and graphs:

— to determine runway limitations due to:

- crosswinds
- tailwind component
- rain, slush, and snow

— to calculate V_1, VR, and V_2V_2 for different aircraft types

— to calculate required runway lengths for a very wide range of conditions

• the normal source of information for:

— runway length

— stopways and clearways

— runway slope

— airport pressure altitude

— airport temperature

— wind components

3.5 Climb performance requirements

3.5.1 Training objectives

Conditions: Provided with appropriate and pertinent reference material and aircraft performance data, including an outline of the factors that must be considered in determining aircraft climb performance,

Performance: The trainee will be able to identify the performance requirements throughout flight that the FOO/FD must consider during flight planning and for the calculation of climb performance.

Standard of accomplishment:
All factors involved in establishing aircraft climb performance limitations must be thoroughly understood and the trainee must be able to apply climb performance derived from planning the whole flight.

3.5.2 Required knowledge, skill and attitude

Note.— Runway length requirements only ensure that aircraft reach a safe height over the end of the runway or clearway. Climb performance requirements must be calcu- lated and applied to determine the effective over-all performance of the aircraft.

The take-off flight path

• extension: from the end of the runway or clearway until the aircraft is 1 500 feet above the airport

• the four segments in which the aircraft configuration and climb gradients are specified

• the need to ensure terrain clearance by at least 35 feet without obstacles in the take-off flight path

• consideration of obstacles in an area where the dimensions increase with distance from the end of the runway

The climb sequence

• the first segment

• the second segment

• the third and final segment during which the aircraft is in transition with flaps being raised and the aircraft accelerating to commence the en-route phase

Mass/altitude/temperature (MAT) limits for take-off

• the effects of mass, altitude and temperature on the aircraft's ability to meet the required climb gradients in each segment

• MAT limitations to establish the maximum permissible take-off mass from a performance viewpoint in terms of airport pressure altitude and temperature

• MAT limitations that are included in the flight manual and must always be observed by the FOO/FD

En-route considerations

Note.— Aircraft performance must always be adequate to reach a suitable airport for landing, should an engine fail.

• factors to be considered include:

— requirements to specify minimum climb perform- ance 2 000 feet above the terrain using maximum continuous power

— application of two engine-out en-route climb requirements when there is no suitable airport within 90 minutes' flying time

Note.— En-route climb performance data are not included in all operators' flight manuals because route analysis to meet all requirements is relatively complex, en- route climb requirement and aircraft drift-down consider- ations need only be considered for one set of standard conditions, and the requirements can be met by publishing limiting take-off mass for aircraft flying over terrain- critical routes.

requirement for FOO/FDs to:

— be aware of the requirements for en-route performance

— ensure that no flight is planned to take off at a greater mass than will permit those requirements to be met anywhere along the route

— be particularly cautious when planning new routes over high terrain, bearing in mind that they may not have been subject to detailed performance analysis

Approach and landing

• establishment of requirements to ensure an adequate margin of performance during approach and landing

• requirements for an aircraft in approach configuration to meet approach climb performance requirements with a failed engine

• requirements for an aircraft in landing configuration to meet landing climb requirements with all engines operating

Mass/altitude/temperature (MAT) limits for landing

• the effects of mass, altitude and temperature on the aircraft's ability to meet the approach and landing climb requirements

• MAT limitations to establish the maximum permissible landing mass from a performance viewpoint in terms of airport pressure altitude and temperature

• MAT limitations that are included in the flight manual and must always be observed by the FOO/FD

Take-off and landing MAT calculations

• practical exercises requiring trainees to obtain MAT limit data from representative flight manuals for both piston engine and turbo-jet aircraft and from tables and graphs to:

— determine the maximum permissible take-off and landing mass from a MAT performance viewpoint for a wide range of pressure altitudes, temperature and flap positions

— determine airport temperatures that will restrict take-off and landing mass from a MAT perform- ance viewpoint

— identify the sensitivity of aircraft with respect to airport temperature and pressure when MAT is limited for take-off or landing mass

— identify the need for MAT limits and mass corrections thereto from tables designed for specific airport altitudes (for non-standard pressure)

— identify flight manual provisions for compliance with en-route climb requirements

Note.— The instructor should remind trainees of the limitations other than MAT that may determine maximum permissible take-off and landing mass.

3.6 Landing runway requirements

3.6.1 Training objectives

Conditions: Provided with appropriate and pertinent reference material and aircraft performance data, including an outline of the factors that must be considered for determining landing runway length,

Performance: The trainee will be able to identify all factors considered necessary for establishing land- ing runway length requirements and for calculating the length.

Standard of accomplishment:
All factors involved in establishing landing runway length must be thoroughly under- stood and the trainee must be able to determine required landing runway length using aircraft operations and flight manual data.

3.6.2 Required knowledge, skill and attitude

Note.— In addition to meeting structural and climb performance requirements, the landing mass must never be planned to exceed that for which there is adequate landing distance. The runway length requirements are similar for piston engine aircraft and turbo-jets.

Landing distance requirements

• the assumption that an aircraft is expected to cross the end of the runway at 130 per cent of the stall speed for landing configuration

• measurement of the distance required to stop on a hard dry runway using full braking

length of the required distance — 167 per cent of that needed to stop on a hard runway

• margin required (15 per cent) when landing weather conditions are poor or the runway is wet or slippery

• relaxation of margins for alternate airports used to meet the en-route climb performance requirements

Calculation of landing distance

• factors to be considered in the calculation of landing distance:

— mass

— pressure altitude

— temperature

— headwind or tailwind component

— runway contamination

— flap position

— serviceability of brakes, spoilers, thrust reversers

— obstacles in the landing flight path

— use of tables and graphs to calculate factors enumerated above

— requirement for additional distance if brake systems are not fully serviceable or manual spoiler extension is required

— additional margin of safety provided by reverse thrust to compensate for wet and slippery runways

— methods used to estimate runway braking coefficients

— effect of obstacles that project into the imaginary horizontal plane of the approach path, resulting in the elimination of the value of part of the runway for planning purposes. Stress that only the distance from the displaced threshold may be considered.

Landing runway calculations

• practical exercises requiring trainees to obtain landing runway length from representative flight manuals using available tables and graphs to:

— determine the landing runway lengths required for a wide range of mass, altitudes, temperatures, winds, and flap positions

— determine the maximum permissible landing mass using a wide range of runway limiting factors

— determine flight manual limitations on landing due to runway contaminants and crosswinds

Note.— The instructor should remind trainees of why the runway lengths used in practical operations may differ from their calculated distances and should explain why the pilot-in-command may be reluctant to use a runway that is slippery or likely to cause hydroplaning, particularly if it also has a strong crosswind.

3.7 Buffet boundary speed limitations

3.7.1 Training objectives

Conditions: Provided with appropriate and pertinent reference material, and aircraft flight and operations manuals,

Performance: The trainee will be able to identify aircraft buffet characteristics that must be con- sidered during flight planning.

Standard of accomplishment:
Effects of low- and high-speed buffet for a wide range of mass, altitudes and normal accelerations must be thoroughly under- stood and the trainee must be able to determine the speeds at which buffets are encountered.

3.7.2 Required knowledge, skill and attitude

The aircraft buffet boundaries

- low-speed buffet
- high-speed (Mach) buffet
- variation of buffet speeds with altitude for a given mass
- variation of buffet speeds with mass for a given altitude
- load factor variations due to banked turns and turbulence cause short-term increases in aircraft mass

Examination of buffet boundary curves

- the range of speeds for which flight is possible without buffet (shown for a combination of mass and altitude)
- the reduction of the range of possible speeds at a given mass as altitude is increased
- the possibility for some flights to be planned at mass and altitudes for which there is little safe speed margin

decrease or disappearance of the margin between low- and high-speed buffet as normal acceleration is increased due to turbulence or bank angle

Significance of buffet boundary to the FOO/FD

- flights must not be planned at mass, altitudes or speeds close to buffet boundaries

• flight planning data are normally restricted to the relevant flight manual to ensure that “buffet boundaries” and “coffin corner” altitudes are not approached

• consideration of lower than maximum possible cruising altitudes to avoid possibility of buffet under known turbulent conditions

Practical use of buffet boundary curves

• using flight manual charts and graphs, the trainee should be able to determine the speeds at which low- and high-speed buffet will be encountered for a wide range of mass, altitudes, and normal acceleration

MODULE 4 – NAVIGATION

4.1 Introduction

4.1.1 Air navigation, the science of locating the position and plotting the course of aircraft, governs the act of directing the aircraft to fly from place to place, in the most efficient and safe manner and within a given time. Thus, air navigation knowledge is an essential requirement for persons who aspire to be flight operations officers/flight dispatchers (FOO/FDs).

4.1.2 Air navigation courses are taught to FOO/FDs so that they will acquire knowledge of the basic navigation principles and practices required for flight planning and monitoring. They will also be provided with a general outline of the systems, equipment and procedures used by flight crew from take-off to landing. It is, therefore, very important that this training enable the FOO/FD to provide maximum assistance to the pilot-in-command in order to achieve safe and efficient aircraft operation.

4.1.3 For the trainees to properly follow the course and fully participate in class exercises, it is recommended that, in addition to standard equipment such as pencils and erasers, they be provided with scientific calculators, navi- gation computers, protractors, dividers, compasses and scaled rulers. It is also suggested that the air navigation course be preceded by a refresher course on basic trigon- ometry, quadratic equations and the use of scientific calculators and navigation computers, as required. Actual examples of the different projection charts for all regions (equatorial, mid-latitude and polar) should be used for trainee classroom practice including measuring distances, measuring great circle and rhumb-line tracks, plotting great circle lines and fixes, plotting great circle paths as deter- mined on gnomonic charts and comparing them with the straight lines of charts derived from other methods of projecting (Mercator, Lambert conformal, etc.), measuring grid tracks, and converting grid to true and magnetic directions. Classroom exercises should be completed at the end of each lesson on chart projection, as appropriate.

4.1.4 Courses in air navigation comprise several subjects, each of which may, when delivered separately, require a specific training objective indicating training conditions, performance, and standard of accomplishment. However, as most of the training objectives specify similar conditions (such as the provision of appropriate

and pertinent docu- mentation and training material), a goal rather than a training

objective is given at the beginning of each subject.

4.2 Training objectives

Conditions: Provided with appropriate and pertinent training materials, references, documen- tation, charts including realistic represen- tation of the earth, and instruments (such as airspeed indicators and altimeters), as required,

Performance: The trainee will be able to identify knowledge, skill and attitude requirements indicated in the topic objectives of each subject and to demonstrate an ability to perform the required action identified by the subject in the most efficient and effective manner.

Standard of accomplishment:
Concepts (position, distance, time, etc.), properties such as those of the different navigation charts, ICAO Standards and Recommended Practices (SARPs) relating to air navigation, the provision of charts, etc., as defined in the training subjects must be thoroughly understood, and the trainee must demonstrate an ability both to convert, measure, and determine (time, distance, headings, altitude, airspeed, etc.) as is required by the specific subjects and to use charts, calculators, navigation computers, as appropriate and required to perform the duties of the FOO/FD.

4.3 Required knowledge, skill and attitude

4.3.1 Position and distance

***Goal*:** *To enable the trainee to describe the form of the earth and identify units used in navigation for determining bearings, position and distance.*

Frame of reference for position

- form of the earth
- great circles
- small circles
- earth axis and geographic poles
- equator
- parallels of latitude
- latitude
- meridians and anti-meridians
- convergency of meridians
- prime meridian
- longitude

Measurement of distance

- nautical mile

- practice in calculating distances between places
- distances between places on the same parallel of latitude other than the equator
- general methods of determining distance:

— spherical geometry

— distance tables

— measurement on chart or globe

— navigation computers

Use of model globe of the reduced earth

- great circle tracks
- great circle distances

4.3.2 Time

Goal: *To enable the trainee to identify the need for an accurate time standard and convert local time to co- ordinated universal time (UTC).Change in time zones around the earth*

- need for time zone
- normal extent of time zone
- local variations in time zones
- seasonal variations in daylight saving time
- international date-line

Co-ordinated universal time and dates

- need for universal time standard for aviation
- conversion of standard time and date into UTC
- practical examples and practice

Need for accurate time

- aircraft separation standards
- astronomical navigation

Time signals

- availability
- signal format (date/time group)

4.3.3 True, magnetic and compass directions

Goal: *To enable the trainee to identify the difference between true, magnetic*

and compass directions and describe how they are measured or determined.

Definition

• angle in horizontal plane measured clockwise through 360 degrees relative to:

— true north

— magnetic north

— compass north

— grid north

True direction

• measured relative to meridian on charts and globes

• direct measurement difficulties in flight unless special equipment, such as inertial navigation system (INS) or global navigation satellite system (GNSS), is available on board the aircraft

changes in true direction of a great circle track due to meridian convergency

• difficulty in determining direction in the vicinity of geographic poles due to limitations on the use of a magnetic compass

Rhumb-line

• definition — mid-latitude sailing

• appearance on a globe

Relationship between great circles and rhumb-lines

• the position of rhumb-line track on the equatorial side of a great circle

• difference between initial and final track directions

• comparison of the length of rhumb-line distances *vis-à- vis* great circle distances

• Practical demonstration of rhumb-lines and great circle tracks and their differences using a model terrestrial globe and string

Terrestrial magnetism and direction

• method of measurement by magnet influenced only by the earth's magnetism relative to local direction of magnetic north

• location and movement of magnetic poles

• variation and isogonal

• conversion of magnetic direction to true direction and vice versa

• required change in magnetic direction to follow a:

— great circle

— rhumb-line

- limitations on the use of magnetic direction in the vicinity of magnetic poles

Compass direction

- method of measurement by magnetic compass influ- enced by aircraft and earth magnetic fields
- deviation
- conversion of compass direction to magnetic direction and vice versa
- conversion of compass to true direction and vice versa

Aircraft magnetic compass systems

- direct-reading magnetic compass
- remote-indicating gyro-magnetic compass

4.3.4 Gyro heading reference and grid direction

Goal: *To enable the trainee to describe the method for overcoming navigation problems near the magnetic and geographic poles by the use of gyros and grid headings.*

The simple gyroscope

- description
- properties

Directional gyro

- description
- need for initial alignment with true or magnetic or grid north
- associated errors

Grid navigation

- description

Polar navigation

- description

Grid north

- description

Grivation and isogrivs

- description

4.3.5 Chart projections

4.3.5.1 Introduction

Goal: *To enable the trainee to identify desirable chart properties and describe the general methods used to project a round earth on flat paper.*

The reduced earth

- World geodetic system (WGS84) and Soviet geodetic system (SGS85)
- typical representation of the earth
- scale
- desirable properties
- undesirable navigational properties

Charts

- definition
- problems associated with and the impossibility of correctly representing a sphere on a plane surface
- desired properties for navigation
- the construction of charts to the scale required for a wide range of practical applications
- representation of the earth's features

Chart projections

- definition
- chart development on a plane
- chart development on a cylinder
- chart development on a cone
- the correct portrayal of earth's graticule with departure from point of tangency and standard parallels on all charts
- the progressive distortion of earth's graticule with departure from point of tangency or standard parallels on all charts
- conformalism (orthomorphism)
- the effect of chart graticules on mathematical develop- ment (not a true geometric projection from the centre of the earth)

4.3.5.2 The gnomonic projection

Goal: *To enable the trainee to identify the chart projection on which all great circles are shown as straight lines.*

4.3.5.3 The Mercator projection

Goal: *To enable the trainee to identify the chart projection on which rhumb-lines are shown as straight lines and distortion is small in the equatorial region.*

4.3.5.4 Great circles on Mercator charts

Goal: *To enable the trainee to plot and measure great circle tracks and bearings on Mercator projection.*

4.3.5.5 Other cylindrical projections

Goal: *To enable the trainee to identify other cylindrical chart projections that are commonly used in air navigation.*

4.3.5.6 The Lambert conformal conic projection

Goal: *To enable the trainee to describe a chart projection widely used for mid-latitude navigation.*

4.3.5.7 The polar stereographic projection

Goal: *To enable the trainee to describe a chart projection widely used for high-latitude and polar navigation.*

4.3.6 ICAO chart requirements

Goal: *To enable the trainee to identify charts to be used in the planning and conduct of flights as recommended by ICAO.*

Note.— A full appreciation of the purpose of some charts may not be evident until after the lessons on air traffic control and radio navigation facilities and procedures. The instructor should only emphasize those which are of particular significance to the FOO/FD. However, typical examples of each type of chart should be available to the trainees.

General specifications

- chart symbols
- relief:

— contours
—colouring
— hachures
— spot heights

- units of measurement
- scale and projection
- obstructions
- restricted and danger areas

Airport obstruction charts

- purpose of type A and B charts

Plotting chart

- purpose
- elements
- projection
- scale
- graticules
- isogonal and isogriv
- culture and topography
- navigation grid
- aeronautical data:

— limited

— frequency of revision

- use

Radio navigation chart

- purpose
- elements
- projection
- coverage and scale
- graticules
- culture and topography
- aeronautical data
- use

Terminal area chart

- purpose
- elements
- coverage and scale
- culture and topography
- aeronautical data
- use

Instrument approach chart

- purpose
- elements

- coverage and scale
- colours
- culture and topography
- aeronautical data
- procedural information
- use

World aeronautical charts

- purpose
- elements
- projection
- graticules
- hydrography
- topography
- culture
- aeronautical information
- use

Landing chart

- purpose
- elements
- scale
- culture, hydrography and topography
- aeronautical data
- use

Airport chart

- purpose
- elements
- scale
- airport data
- use

Aeronautical navigation chart (small scale)

- purpose
- elements and colours
- projection and scale
- graticules

- culture, hydrography and topography
- aeronautical information
- use

Precision approach terrain chart

- purpose
- elements
- scale
- use

4.3.7 Charts used by a typical operator

Goal: *To enable the trainee to identify specific charts used and describe the application of ICAO chart recommendations* vis-à-vis *such charts.*

Source of charts

- government agency
- air pilot publications
- private agencies such as Jeppesen & Co.
- airline groups
- individual airlines

Charts normally used for planning flights

- route charts
- radio navigation charts
- small-scale plotting charts

Charts normally used in typical flight sequence

- airport charts
- terminal area charts for standard instrument departure(SID)
- radio navigation charts
- route charts
- small-scale plotting charts
- terminal area charts for standard instrument arrivals(STARs)
- instrument approach charts
- airport charts

Note 1.— The above assumes a normal IFR intercontinental jet flight with a self-contained navigation system such as INS or GNSS.

Note 2.— The trainees must be provided with the opportunity to inspect the

complete ramp-to-ramp sequence of charts normally used by a major international operator. In addition to consolidating trainees' knowledge of the various charts required, this exercise should be used to outline the various phases of flight.

4.3.8 Measurement of true airspeed by airspeed indicator

Goal: *To enable the trainee to accurately calculate true airspeed from direct airspeed indication.*

Principle of the airspeed indicator

- definition of airspeed
- basic construction of airspeed indicator

Aeronautical chart 1: 500 000

- description

Visual approach chart

- purpose
- elements
- scale
- culture and topography
- aeronautical information
- use by pilots

pitot static system

- basic calibration of airspeed indicator

Uses of the airspeed indicator

- navigation
- aircraft performance
- aircraft handling
- aircraft limitations

Airspeed indicator errors

- instrument errors:

— definition

— instrument calibration

— correction:

- correction card
- central air-data computer (CADC) system
- indicated airspeed (IAS)
- pitot static source errors:

— definition

— aircraft calibration

— correction:

- calibration charts and tables in the flight manual
- CADC system

- calibrated airspeed (CAS)

- compressibility effects (error):

— definition

— varies with CAS and pressure altitude

— correction:

- tables
- factor
- airspeed computers
- CADC

- density error:

— calibration of airspeed indicator assumes an air density equivalent to that of mean sea level in the international standard atmosphere (ISA)

— required corrections for any combination of ambient air temperature and pressure that gives non-standard density

— correction normally made by:

- circular slide-rule
- CADC

- true airspeed (TAS)

- use of Dalton-type computer to calculate TAS

- use of Jeppesen-type computer to calculate TAS

- classroom exercises (trainees are encouraged to use both types of computers):

— determination of corrections for pitot static system error for CAS using flight manual data

— finding equivalent airspeed (EAS) using F factors on E-10A-type computer or compressibility correc- tion charts

— calculation of TAS for a wide range of CAS or EAS pressure altitude and temperature

4.3.9 Measurement of true airspeed by other means

Goal: *To enable the trainee to identify additional airspeed-indicating instruments available to pilots and calculate TAS from Mach numbers.*

True airspeed indicator

- general principles

- errors
- accuracy
- application

Central air-data computer

- inputs
- correction and computations
- outputs
- application

Machmeter

- definition of Mach number
- principle of construction
- errors
- corrections
- application

Calculation of true airspeed from true Mach number

- variation in speed of sound in air with ambient temperature
- variation in TAS with Mach number and static air temperature
- calculation of TAS by means of Mach Index using Dalton or Jeppesen computers
- calculation of TAS using Mach number window on Jeppesen
- classroom exercises using:

— true temperatures

— temperature relative to that of standard atmosphere

Relationship between indicated airspeed and Mach number

- varies only with pressure altitude
- temperature considerations cancel out in equation
- enables a specific Mach number to be flown at a specific flight level by maintaining a constant indicated airspeed
- examples

4.3.10 Track and ground speed

Goal: *To enable the trainee to identify components of track and ground speed and identify the method of measuring track and ground speed and the method used to follow tracks in flight.*

Track, ground speed and drift

- velocity of the aircraft relative to the air defined by heading and airspeed
- velocity of the air relative to the ground defined by wind speed and direction
- velocity of the aircraft relative to the ground is the sum of the above velocities
- definition of drift

Outline of methods used in flight to measure track and ground speed

- from inertial navigation system:

— stabilized north-oriented platform
— two accelerometers
— integration of accelerations provides continuous readout of instantaneous true track and ground speed on control and display unit (CDU)
— accuracy
— airline application

- from Doppler navigation system:

— three earth-directed radar beams
— lateral and longitudinal speeds
— readout of instantaneous drift and ground speed
— derivation of track from drift and aircraft heading
— errors
— airline application

- from area navigation systems:

— position automatically determined relative to short- range aids
— computation and direct readout of track and ground speed
— accuracy
— airline application

- from drift meters:

— visual tracking and timing of objects on the earth
— measurement of drift
— calculation of ground speed
— limited application

- from tracking by ground radar
- from fixes determined by the flight crew

Outline of common methods of following desired tracks

- automatically or by direct pilot indication of tracks inserted in or defined by way-points in the CDUs of INS
- automatically or by direct pilot indication of tracks set in doppler navigation computer system
- automatically or by direct pilot indication of tracks defined by:

— VHF omnidirectional radio range (VOR) radials

— instrument landing system (ILS) localizers

• pilot use of automatic direction finders (ADF) in conjunction with non-directional beacons (NDBs)

• radar vectors from ground stations

Pre-computation of heading and ground speed

• use of vectors

• triangle of velocity

• graphical method of estimating heading and ground speed when wind velocity, TAS and required track are known

• limited trainee practice in estimating heading and ground speed

4.3.11 Use of slide-rules, computers and scientific calculators

Goal: *To enable the trainee to use slide-rules, computers and scientific calculators for identifying vector triangle problems, to determine wind components drift and ground speed, and to solve some arithmetical problems by using common air navigation computers.*

4.3.12 Measurement of aircraft altitude

Goal: *To enable the trainee to identify aircraft altimetry systems and their uses, errors, corrections and terminology.*

The absolute altimeter (radio altimeter)

• principles

• provision of true height above surface directly beneath the aircraft

• range and general accuracy

• cockpit instrument indication

• use and limitations for general application

The pressure altimeter

• principles

• construction

• scales and sub-scales

• calibration

• errors

Altimeter settings

• sub-scale set to standard pressure — altimeter reads pressure altitude

• sub-scale set to current airport QNH — altimeter reads correct airport elevation above mean sea level for that airport

- sub-scale set to current airport QFE — altimeter reads zero for that airport
- sub-scale set to QFF — altimeter reads zero at sea level for that location

Correction of pressure altimeter errors

- instrument errors
- static source errors
- non-standard pressure
- non-standard air temperature

Altimeter settings for a low-altitude flight

- QNH set for departure airport
- QNH reset for locations en route
- QNH set for arrival airport

Altitude setting for a high-altitude flight

- QNH set for departure airport
- altitudes used during climb until transition altitude reached
- transition altitude
- standard altimeter setting made at transition altitude
- flight levels used in conjunction with standard altimeter setting until transition level reached on descent
- local QNH and altitudes used below transition level

Precautions taken for terrain clearance

- restrictions on use of lowest flight level with standard pressure
- restrictions on use of lowest flight plan altitude with standard pressure
- flight crew calculations of altitude with sub-standard temperatures

Classroom exercises

- altimeter corrections from the flight manual
- calculation of true altitude above mean sea level and height above terrain for a range of temperatures, pressure altitudes and indicated altitudes
- estimation of altimeter errors due to sub-scale setting errors (use standard atmosphere tables)

4.3.13 Point of no return (PNR)

Goal: *To enable the trainee to understand the signifi- cance of the point of no return in aircraft navigation and to estimate it for all flights.*

Definition and type of PNR

- returning to airport of departure

- proceeding to alternate airport
- all powerplants operating
- powerplants failure

The basic PNR formula

- description

Practical uses of PNR

- flight plan
- en route

Classroom exercises

- for a given true track TAS and endurance, calculate distance to PNR by basic formula for conditions of:

— zero wind
— strong tailwind
— strong beam wind

- establish wind condition for maximum PNR
- simple exercises with all engines operating and with failed engine to demonstrate application of the above principle for cases involving:

— return to departure airport
— proceeding to alternate airport

4.3.14 Critical point (equal time point)

Goal: *To enable the trainee to identify the significance of the critical point or equal time point in aircraft navigation and to estimate it for all flights.*

Definition and type of critical point (CP)

- returning to airport of departure or proceeding to planned destination
- proceeding to alternate airport
- all engines operating
- engine failure

The basic CP formula

- $d = (D * H)/(O + H)$, where: D is distance to critical point O is ground speed outbound
H is ground speed to departure or alternate airport

Classroom exercises

- for a given true track, TAS and D, calculate d using basic formula for conditions of:

— zero wind
— strong headwind
— strong tailwind
— strong beam wind

• establish under what conditions *d* will be farthest along track

Practical shortcomings of a basic formula

• suggests that there is a single important equi-time point along flight plan track

• does not cater to all airports that may be available in an emergency

• does not cater to different wind velocities to various airports

Practical uses of CP

• to assist the pilot-in-command in making in-flight decisions regarding contingencies in the event of rapid depressurization, severe power loss, etc.

A practical method of estimating CP

• description

Classroom exercises

• simple exercises with all engines operating and with failed engine to demonstrate application of the above principle for cases involving:

— return to departure airport
— proceeding to alternate airport

Note.— The route selected should be one for which the presence of alternates established more than one critical point.

4.3.15 General determination of aircraft position

Goal: *To enable the trainee to identify the method used by flight crew to determine aircraft position.*

Inertial navigation system

• description

Global navigation satellite system (GNSS)

• description

Visual navigation system

• description

General position-fixing methods

• depend on intersection of lines of position

- position circles obtained by various means
- hyperbolic lines of position from:

— Loran A or C navigation systems

- great circle bearings
- bearings measured relative to aircraft heading
- fixes which may be obtained by:

— direct readout of latitude and longitude from area navigation systems

— plotting simultaneous range and bearing from single site

— plotting lines of position from multiple origins

— making allowances for aircraft movement between time of position lines

— analysing intersection of multiple position lines to estimate position

Classroom exercises

• plotting fixes on Lambert and polar stereographic charts when bearings plotted relative to same meridian as measured:

— simultaneous ground direction-finding station bearings

— simultaneous range and bearing from ground radar station

— simultaneous magnetic bearing and distance from collocated VOR, DME or TACAN station (few stations in polar regions are true or grid north- oriented)

— position lines that are not simultaneous

• plotting the above fixes on Mercator chart where conversion to rhumb-line bearings by application of conversion angle is required

4.3.16 Introduction to radio navigation

Goal: *To enable the trainee to identify the fundamental principles and properties of radio transmission and to apply them to radio navigation.*

Note.— The theory and principles of radio are covered in greater detail in Chapter 13 — Communications — Radio.

Principles of radio transmission

• the radiation of energy into space at a constant velocity as a result of wire excited by alternating current

- relationship between frequency and wavelength
- interception of some of the radiated power by remote parallel wire
- detector indication of magnitude and frequency of radiated energy

• requirement for antenna sizes proportional to wave- length for efficient transmission

Transmission of signals

- modulation of continuous wave transmissions
- modulation, timing and coding of pulses

- international Morse code

Radio frequency bands and wavelengths

- description

Propagation characteristics at different frequencies

- ground waves
- isopheric layers
- sky waves
- line-of-sight waves

General applications to radio navigation

- measurement of direction of transmitter to determine bearing
- mixing and directing of transmitted signals to define paths in space
- measurement of interval between transmission and reception of signal to determine range
- measurement of interval between reception of synchron- ized signals to determine relative distance from transmitters
- rotating of radar antennas to enable bearing as well as range of targets to be determined and displayed

4.3.17 Ground-based radar and direction-finding stations

Goal: *To enable the trainee to identify those ground stations which are used to directly determine aircraft position or bearing.*

VHF and UHF direction-finding stations

- information provided — great circle bearings
- location and availability of services
- range
- accuracy
- uses

Primary ground radar

- information provided — great circle bearings
- location and availability of services
- range
- accuracy
- uses

Secondary surveillance radar (SSR)

- general principles

- advantages over primary radar
- location and availability of services
- transponder codes
- accuracy
- uses

4.3.18 Relative bearings

Goal: *To enable the trainee to plot position lines from ADF or from weather radar measured bearings.*

Relative bearings

- definition
- method of measurement
- conversion of relative bearings to:

— compass bearings
— magnetic bearings
— true bearings
— grid bearings

- plotting bearings

Aircraft ADF systems and facilities used

- principles
- non-directional beacons (NDBs)
- marine beacons
- caution on use of broadcast stations
- sources and correction of ADF errors
- radio magnetic indicator (RMI)
- general accuracy of ADF position lines

on Mercator, Lambert conformal and polar stereo- graphic charts, practise:

— conversion angle application
— convergency applications
— plotting relative to true north
— plotting relative to grid north

4.3.19 VOR/DME-type radio navigation

Goal: *To enable the trainee to identify the characteristics and uses of those radio navigation systems which provide flight crews with direct indications of range and bearing.*

Principles of VHF omnidirectional radio range (VOR)

- status of VOR
- range and accuracy
- airborne VOR equipment

Principles of aircraft distance measuring equipment (DME)

- status of DME
- range and accuracy
- aircraft DME
- frequency selection paired with VOR

VORTAC

- radial from VOR
- DME range from collocated TACAN

4.3.20 Instrument landing system (ILS)

Goal: *To enable the trainee to identify the components and principles of operation of the radio navigation system widely used for instrument approach and landing.*

Ground equipment

- description

Localizer

- description

Glide path

- description

ILS categories

- category I
- category II
- categories IIIa and IIIb

Aircraft equipment

- localizer receiver
- glide path receiver — frequency paired to localizer
- marker receiver
- cross-pointer indications
- coupling to autopilot

Normal operational minima

- decision height and runway visual range (RVR) minima for each category
- additional requirements for category II and III approaches

4.3.21 Navigation procedures

Goal: *To enable the trainee to identify the radio navigation and instrument flight procedures utilized in flight.*

Standard instrument departures (SIDs)

- purpose
- effect on flight operations
- establishment and designation
- facilities and procedures used to follow SIDs
- transition to airway routes
- trainee inspection of SIDs on charts

Airway and air route navigation

- use of facilities
- radials flown with reference to horizontal situation indicator (HSI) or radio magnetic indicator (RMI)
- principle of ADF tracking using RMI
- use of INS when cleared on airway

Direct and area navigation (RNAV) system routes

- definition of “direct” and “RNAV” routes
- use of INS, GNSS, and area navigation systems

Holding

- ATC reasons for holding instructions
- minimum fuel consumption considerations
- holding patterns
- holding entry patterns
- maintaining aircraft within the pattern
- expected approach time
- descending while holding
- transition to approach control

Transition to terminal area

- standard instrument arrivals (STARs)
- trainee inspection of STARs on charts
- transition to approach control

The instrument approach

- transition to approach facility
- outbound track
- procedure turn
- final track
- descent and landing

The ILS approach

- transition to ILS localizer
- glide path interception
- altitude over markers
- radar monitoring
- pressure and radio altimeters for minimum altitudes and decision height
- transition from instrument indications to visual cues for flare and landing
- manually flown approach
- automatic approach
- automatic landing using automatic approach and auto flare
- trainee inspection of ILS charts

The non-precision approach

- commonly used facilities
- tracking procedures
- descent procedures
- final descent based on calculated rate and time to minimum altitude
- trainee inspection of non-precision approach charts:

— ILS localizer without glide slope
— ILS localizer back course
— VOR approach
— NDB approach

Ground-controlled approach

- VHF direction finder

- airport surveillance radar
- precision approach radar

4.4 The CNS/ATM concept

4.4.1 By the end of the 1980s, ICAO as well as the entire aviation community had recognized the fundamental limitations of the existing air traffic system and the fact that the situation was going to get progressively worse. The characteristics and the capabilities of the present-day systems and of their implementation in various parts of the world revealed the following shortcomings in the present communications, navigation and surveillance (CNS) systems: the propagation limitations of current line-of-sight systems and/or accuracy and reliability limitations imposed by the variability of propagation character- istics of other systems;

b) the difficulty in large parts of the world, for a variety of reasons, in implementing present CNS systems and operating them in a consistent manner; and

c) the limitations of voice communications and the lack of digital air-ground data interchange systems to support modern automated systems in the air and on the ground.

4.4.2 Although the effects of these limitations are not the same for every part of the world, it is evident that one or more of these factors inhibit the further development of air navigation almost everywhere. It was obvious that new CNS systems which would permit the proper development of an improved air traffic control system should be developed.

4.4.3 At the end of 1983, the ICAO Council established the Future Air Navigation Systems (FANS) Committee to study, identify and assess new concepts and new technology in the field of air navigation, including satellite technology, and to make recommendations thereon for the development of air navigation on a global basis.

4.4.4 The FANS Committee completed its task and presented its findings and recommendations to ICAO's Tenth Air Navigation Conference, held in Montreal from 5 to 20 September 1991. It concluded that the exploitation of satellite technology appeared to be the only viable solution to overcome the shortcomings of the existing CNS system and also fulfil the global needs and requirements of the foreseeable future. The committee developed an over- all long-term projection for the co-ordinated evolutionary development of air navigation for international civil aviation over a period of the order of 25 years, in which, complementary to certain terrestrial systems, satellite-based CNS systems will be the key to world-wide improvements.

4.4.5 The main features of the global concept of the new CNS/ATM system are:

Communications

- In the future, aeronautical mobile communication will make extensive use of digital

modulation techniques to permit high-efficiency information flow, optimum use of automation both in the aircraft and on the ground,and economical frequency spectrum utilization. Except for high-density areas within coverage of terrestrial- based communications systems, aeronautical mobile communications services (data and voice) will use satellite relay, operating in the frequency bands allo- cated to the aeronautical mobile satellite service (AMSS). Terrestrial-based air-ground communication will continue to serve in terminal areas and in other high-density airspace.

• VHF will remain in use for voice and certain data communication in many continental and terminal areas. However, steps should be taken to preclude future saturation.

• The SSR Mode S will provide an air-ground data link which will be used for ATS purposes in high-density airspace. Interoperability with other data links will be facilitated through the application of the open systems interconnection (OSI) model.

• The aeronautical communication network (ATN) concept, through the use of an agreed communication protocol structure, will provide for the interchange of digital data packets between end-users of dissimilar air-ground and ground-ground communication sub- networks.

Navigation

• Area navigation (RNAV) capability will be progress- ively introduced in compliance with the required navigation performance criteria. Studying the modern developments in aircraft navigation systems, the committee identified that the method most commonly used at present, i.e. requiring mandatory carriage of certain equipment, constrained the optimum application of modern airborne equipment. Now that new navigation aids (notably satellites) are available, it will be possible for aircraft operators to select, from among competing systems, the one that is most adaptable to their needs. To enable that flexibility and to support the development of more flexible route systems and RNAV environment, the concept of required navigation performance (RNP) has been developed. This concept is very similar, in principle, to the minimum navigation performance specification (MNPS) concept now in use in North Atlantic and northern Canadian airspace. Both concepts enable a required navigational performance to be achieved by a variety of navigation equipment; however, as distinct from MNPS, RNP is primarily intended for application in airspace where adequate surveillance is available to air traffic control (ATC).

Global navigation satellite systems (GNSS) will provide world-wide coverage and will be used for aircraft navigation and for non-precision type approaches. Systems providing independent navigation, where the user performs on-board position determi- nation from information received from broadcast transmissions by a number of satellites, will potentially provide highly reliable and accurate and high-integrity global coverage and could meet the navigation system requirements for sole means of navigation for civil aviation.

• The present radio navigation systems serving en-route navigation and non-

precision approaches will be able to meet the RNP conditions and coexist with satellite navigation systems. However, it is foreseen that satel- lite systems will eventually become the sole means of radio navigation. The timing of withdrawal of the present terrestrial systems will depend on many factors, among which the implementation and quality of the new systems will be prominent.

Surveillance

• Secondary surveillance radar (SSR) will remain in wide use in many parts of the world. By enhancing SSR with Mode S, the selective address and data link capabilities will further enhance the beneficial role of SSR for surveillance purposes.

• Automatic dependent surveillance (ADS) will be used mainly in non-radar coverage areas. ADS is a function in which aircraft automatically transmit, via a data link, data derived from on-board navigation systems. As a minimum, the data include aircraft identification and three-dimensional position. Additional data may be provided as appropriate. The introduction of air-ground data links, together with sufficiently accurate and reliable aircraft navigation systems, presents the opportunity to provide surveillance services in areas which lack such services in the present infrastructure, in particular oceanic areas and other areas where the current systems prove difficult, uneconomical or even impossible to implement. In addition to areas which are at present devoid of traffic position information other than the pilot-provided position reports, ADS will find beneficial application in other areas, including high-density areas, where it may serve as an adjunct to or backup for secondary surveillance radar and thereby reduce the need for primary radar.

Air traffic management (ATM)

• The term air traffic management (ATM) is used to describe the airspace and traffic management activities carried out in a co-operative manner by the aeronautical authorities concerned with pla~~nning and organizing~~ the effective use of the airspace and air traffic flows within their area of responsibility. ATM consists of a ground part and an air part, where both parts are integrated through well defined procedures and interfaces. The ground part of ATM comprises air traffic services (ATS), air traffic flow management (ATFM) and airspace management (ASM). The general objectives of ATM are to enable aircraft operators to meet their planned times of departure and arrival and adhere to their preferred flight profiles with minimum constraints and without compromising the agreed level of safety. The goals of the ATM system are to maintain or increase the existing level of safety, to accommodate different types of equipped aircraft, to increase system capacity and to minimize delays through the realization of an efficient use of the airspace.

4.4.6 The ICAO CNS/ATM systems concept is widely seen as advantageous because it permits the enhancement of safety. Improved reliability of the aeronautical mobile satellite communications system, for example, will mean more complete and less interrupted ATS communications in some parts of the world. In addition, ADS and data communications systems facilitate improved conflict detection and resolution and assist the controller by providing advice on conflict resolution. More rapid and detailed information on weather warnings such as storm alerts will

also contribute to the safety and effectiveness of flight operations. Further, the concept introduces air traffic management improvements which will permit more flexible and efficient use of airspace. A global introduction of the ICAO CNS/ATM concept can, within a short period, achieve a system which is capable of balancing the advantages of both strategical planning and short-term tactical control, thereby enhancing flight safety and efficient airspace utilization world-wide.

MODULE 5 - AIR TRAFFIC MANAGEMENT

5.1 Introduction

Note.— Air traffic management (ATM) and air traffic service (ATS), as used in this chapter, are interchangeable.

5.1.1 Air traffic service is provided by States to ensure a safe, orderly and expeditious flow of air traffic. In addition, it also has several less known objectives such as fuel conservation, noise abatement, minimum environmental disturbance, cost effectiveness, impartiality towards all users within the rules and regulations, and the granting of users' requests whenever possible — objectives that are of importance to a flight operations officer/flight dispatcher (FOO/FD) who is responsible for flight planning, monitoring and co-ordination within the airlines.

5.1.2 As air traffic service is a major element in the operation of an aircraft, FOO/FDs must gain considerable knowledge of what it is, how it operates and how it relates to their responsibilities. This chapter is designed to provide the trainees with a thorough knowledge of the organization and operation of air traffic management and of some of the facilities required for the safe and efficient operation of commercial air transportation services.

5.1.3 To satisfactorily achieve the objective of the training course, it is recommended that a visit to a well- equipped air traffic management unit and an aeronautical information service unit be undertaken in order to allow trainees to observe the provision of the services in real time. Such a visit can be undertaken at the end of the training programme or during the period the specific items are being discussed. Following the examples in Chapter 6, a goal is provided for each subject item in the course. At the end of the training, the trainees will be able to identify the different types of air traffic services provided and describe the relationship between flight dispatch and the air traffic flow in the area of their responsibility.

5.2 Training objectives

Conditions: Provided with pertinent information and reference material on air traffic control, including a series of visits to different types of air traffic control centres,

Performance: The trainee will be able to identify basic principles of air traffic management and apply such principles in planning and monitoring flight operations.

Standard of accomplishment:
Principles of air traffic management must be thoroughly understood and the trainee must be able to apply such knowledge in the planning and monitoring of flight operations.

5.3 Required knowledge, skill and attitude

5.3.1 Introduction to air traffic management

Goal: *To enable the trainee to identify air traffic services and to understand their objectives and when they are provided.*

Air traffic management

- definition (description)

Responsibility for the provision of services

- over sovereign territory
- over the high seas or in airspace of undetermined sovereignty

- objectives of air traffic management

Divisions of air traffic management

- air traffic control (ATC):

— area control
- Aerodrome Control
- High Level
- Jet

alerting service

- units providing air traffic services

Airspace where air traffic services are provided

- flight information regions (FIRs)
- control areas
- control zones
- controlled aerodromes

Trainee examination of charts

- typical FIRs
- control areas
- control zones
- controlled aerodromes

5.3.2 Controlled airspace

Goal: *To enable the trainee to identify airspace in which air traffic control service is available and in which commercial aircraft normally operate.*

Controlled airspace

- definition
- control zone
- terminal control areas
- low-level control areas
- high-level control areas
- restricted airspace
- minimum navigation performance specifications (MNPS)airspace
- RNAV routes

Trainee examination of charts

- terminal control areas
- airways:

— low level

— vector

- high-level control areas
- restricted airspace

5.3.3 Flight rules

Goal: *To enable the trainee to identify VFR and IFR flights and the locations where and the conditions under which they may operate.*

Visual flight rules (VFR)

- definition
- definition of visual meteorological conditions (VMC)
- special VFR flight
- VFR flight restrictions
- requirement to comply with ATC instructions in controlled airspace

Instrument flight rules (IFR)

- definition
- definition of instrument meteorological conditions (IMC)
- minimum flight altitudes
- IFR cruising levels
- requirement to comply with ATC instructions in controlled airspace
- requirements to maintain a listening watch and establish communication with ATS units

- requirement to file a flight plan and make position reports

Table of cruising levels

- standard
- exceptions

5.3.4 Air traffic control clearance

Goal: *To enable the trainee to identify ATC requirements for issuing clearances and specify what minimum separation standards are applied*

air traffic control unit requirements

- ATC clearances
- ATC information display
- separation methods
- separation minima
- outline of clearances for a typical oceanic flight:

— ATC clearance
— start-up clearance
— taxi clearance
— clearance for take-off
— departure instructions
— reclearances en route
— oceanic clearance
— domestic clearance
— descent clearance
— approach instructions
— clearance to land
— ground control clearances
— ramp control clearances

5.3.5 ATC requirements for flight plans

Goal: *To enable the trainee to identify flight planning requirements to be met prior to ATC issuing IFR clearance.*

- purpose of the flight plan
- responsibility for filing the flight plan
- contents and format
- description of ICAO flight plan form

- practice in completing ATC flight plans
- filing of revised flight plans in flight
- responsibility for closing flight plan

5.3.6 Aircraft reports

Goal: *To enable the trainee to identify the value and the content of aircraft reports.*

- types of aircraft reports
- value of aircraft reports
- position reports
- air reports (AIREPs)

5.3.7 Flight information service (FIS)

Goal: *To enable the trainee to identify the type of information available to pilots in flight from the flight information service.*

- definition of flight information service
- responsibility for providing service
- services provided
- method by which pilots obtain services
- an outline of the information services available to flight crew on a typical long oceanic flight

5.3.8 Alerting service and search and rescue

Goal: *To enable the trainee to identify the organization, procedures and facilities used to assist aircraft in distress.*

- definition of alerting service
- responsibility for providing service
- air traffic services that provide alerting service
- flights for which alerting service is provided
- rescue co-ordination centres
- procedures for notifying rescue co-ordination centres:

— by air traffic services

— by the operator

- action taken during emergency phases:

— by rescue co-ordination centres

— by air traffic services

— by the operator

— by the pilot-in-command of the aircraft in distress during:

- uncertainty phase
- alert phase
- distress phase
- emergency signals:

— radiotelephony procedures:

- distress signal (MAYDAY)
- urgency signal (PAN, PAN)

— Morse code (SOS "... --- ...")

— SSR transponder codes:

- code 7700

code 7600

- code 7500

— radar-alerting manoeuvres by aircraft

— emergency locator transmitter (ELT)

- search and rescue signals
- procedures for pilots-in-command
- aircraft bomb warnings:

— analysis of threat by operator and security personnel

— notifying pilot-in-command

— after-landing action

- FOO/FD's responsibility during emergency phase

5.3.9 Communications services — mobile

Goal: *To introduce the various communications services and enable the trainee to identify the means and pro- cedures used to communicate with aircraft.*

- communications services
- types of messages
- mobile services

Classroom exercises

- exchange of a wide variety of messages emphasizing:

— need for preparation before transmission

— clarity and brevity

— use of correct call signs

— correct message format

— use of phonetic alphabet

— correct pronunciation of numbers

— acknowledgement and sign-off

Note.— The class should be divided into groups to simulate the role of the flight crew and communicator at various ground facilities.

5.3.10 Communications services — fixed

Goal: *To introduce the fixed telecommunications net- works used by air traffic services and operators.*

- definition of aeronautical fixed service (AFS)
- responsibility for providing services
- purpose of aeronautical fixed telecommunication net- work (AFTN)
- AFTN facilities
- operator's access to AFTN

5.3.11 Aeronautical information service (AIS)

Goal: *To enable the trainee to identify the types and the sources of aeronautical information available to the FOO/FD.*

- definition of aeronautical information service
- responsibility for providing AIS
- function of AIS
- exchange of aeronautical information:

— international notices to airmen (NOTAM) offices

— communication methods

- general specifications:

— language

— place names

— units of measurement

— abbreviations

— identification and delineation of prohibited, restricted and danger areas

— nationality letters

- aeronautical information publication (AIP):

— standard format and contents

— amendments and supplements to AIP

— parts of the AIP designated for flight operational use

- other government and commercial publications:

— publications produced by private companies, e.g.Jepppesen

— publications produced by operators

- NOTAM
- aeronautical information regulation and control (AIRAC) NOTAM
- aeronautical information circulars
- aeronautical information units (flight service station)
- classroom exercises:

— inspection of typical AIP and air pilot publications

— decoding NOTAM

5.3.12 Aerodrome and airport services

Goal: *To enable the trainee to identify airport features and facilities of significance to the FOO/FD.*

Aerodrome administration

- aerodrome operators
- aerodrome certification

Airport data

- reference positions
- elevations
- international designators

Airport design criteria

- runway dimensions and related information
- graded areas
- displaced thresholds
- stopways
- clearways
- declared distances
- control of obstacles
- bearing strength of pavement

Measuring and expressing runway friction

- variation in braking action on wet, snowy or icy runways
- measurement of runway friction
- expression of estimated braking action

- variations in measurements and their effects on different aircraft
- runway surface variations (grooved/porous)

Airport visual aids

- runway markings
- closed markings
- taxiway exit and holding markings
- guidance signs
- wind direction indicator
- obstruction markings
- airport beacon
- visual approach slope indicator systems

Airport lighting

- approach lighting
- runway identification lights
- runway lighting
- displaced threshold lights
- centre line lights
- touchdown zone lights
- high-speed runway exit lights
- taxiway lighting
- airport emergency lighting
- change-over time requirement for instrument approach runways

Airport emergency services

- airport emergency planning
- responsibility for planning and co-ordination
- rescue and fire fighting services:

— classification of airports

— removal of disabled aircraft

Classroom exercises

- extraction of airport data of significance to FOO/FDs from airport charts published by:

— the State

— private companies such as Jeppesen

— international operators

MODULE 6 – METEOROLOGY

6.1 Introduction

6.1.1 While all transport is subject to weather conditions which vary from benign to vicious, it can be argued that aviation is the most sensitive to weather conditions. An international or small local airport can be equally affected by weather conditions. Even relatively low-speed cross- winds combined with wet runway conditions can effec- tively close an airport, and conditions of poor visibility can cause major disruptions to aviation schedules.

6.1.2 It is most important, therefore, that the flight oper- ations officers/flight dispatchers (FOO/FDs) have sufficient skill and knowledge to interpret meteorological infor- mation, reports, forecasts and warnings correctly and efficiently. They must be able to use this information when preparing or amending flight schedules, when preparing flight plans or briefing flight crew, and during flight watch when important weather data must be quickly interpreted and passed to the flight crew.

6.1.3 In order to ensure that the trainee fully understands the role that the local meteorological office plays in the preparation, coding and dissemination of weather data, it is strongly recommended that he be taken on a guided tour of the nearest meteorological office, where questions and discussion should be encouraged. The maintenance of good co-ordination between the aerodrome meteorological office and flight dispatch has a major positive impact on the quality of the work of both units.

6.1.4 The following syllabus outlines the minimum knowledge and skill that is necessary if the FOO/FDs are to perform their job efficiently and productively. While it may be necessary for authorities to enhance some part(s) of the outlined syllabus, it must not be at the expense of other parts.

6.2 Training objectives

Conditions: The trainee must be provided with alL relevant documentation, examples of actual reports and forecasts, and copies of all the

appropriate charts and publications currently in use and relevant to flight operations. At least one visit to an aerodrome meteoro- logical office is strongly recommended.

Performance: In addition to demonstrating theoretical knowledge, trainees will also be able to demonstrate practical application at every opportunity using actual weather folders in conjunction with simulated or actual aviation situations and/or problems.

Standard of accomplishment:
The basic physical principles of meteor- ology, an understanding of meteorological observations as well as their interpretation, dissemination, and use in making forecasts must be thoroughly understood. The trainee must have a broad understanding of the general circulation and world climate, and a thorough basis for understanding weather

conditions at specific locations and along specific routes. The trainee must be able to understand weather conditions and make intelligent deductions therefrom.

63 Required knowledge, skill and attitude

6.3.1 Atmosphere

Goal: *To outline the composition and structure of the atmosphere and the definition of the international standard atmosphere (ISA).*[1]

- composition of the atmosphere
- structure of the atmosphere:

— troposphere
— tropopause
— stratosphere
— mesosphere
— thermosphere

- international standard atmosphere (ISA):

— purpose of a standard atmosphere
— definition
— description

- classroom exercise:

— use of international standard atmosphere

6.3.2 Atmospheric temperature and humidity

Goal: *To identify the physical processes related to the transfer of heat and moisture in the atmosphere and to outline the reasons for temperature and humidity variations both horizontally and vertically.*

- units of measurement for temperature
- heat transfer in the atmosphere:

— mechanisms:
  - conduction
  - convection
  - advection
  - radiation

— actual heating of the atmosphere:
  - short-wave radiation
  - long-wave radiation
  - absorption

- temperature at the earth's surface:

— definition

— standard method of measurement

— factors that influence surface temperature

— diurnal variation (over land and water)

- atmospheric humidity:

— variables used:

- measurement
- water vapour content
- dew-point temperature
- relative humidity

— evaporation, condensation and sublimation

- adiabatic processes:

— definition

— unsaturated air

— saturated air

- stability of the atmosphere:

— definition

— stable equilibrium

— neutral equilibrium

— unstable equilibrium

— absolute stability

- vertical distribution of temperature (lapse rate):

— thermodynamic charts (e.g. tephigrams):

- description
- principal uses

— lapse rate

— convection

— diurnal variations of lapse rate in the lower layers:

- low-level inversions/jets and take-off performance

— trade wind inversions

6.3.3 Atmospheric pressure

Goal: *To identify horizontal and vertical variations in atmospheric pressure and how pressure distributions are shown on meteorological charts.*

- definition and measurement:

— definition of pressure
— measurement of pressure
— units of measurement

• pressure at sea level:
— common reference
— surface synoptic chart
— corrections
— lines of equal pressure (isobars)
— pressure patterns (highs, lows, troughs and ridges)
— pressure gradient
— surface pressure changes (diurnal and synoptic)

Variation of pressure with height

• reduction of pressure to aerodrome and mean sea level

• altimetry:
— height, altitude, flight level
— altimetry, QNH (altimeter setting), QFE
— calculation of terrain clearance, lowest usable flight level, regional QNH

Constant pressure charts

• common constant pressure levels and their standard altitudes

• lines of equal height (contours or isohypses)

• slope of the constant pressure (isobaric) surface and its relation to pressure gradient

• construction of constant pressure charts

• production of constant pressure charts by the two world area forecast centres (WAFCs):
— WAFC London, U.K
— WAFC Washington, U.S.A

Classroom exercise

• inspection of actual and forecast charts:
— identification of pressure patterns on surface and upper-air charts
— identification of pressure gradients

6.3.4 Pressure-wind relationships

Goal: *To identify the physical factors that determine wind velocity.*

Definitions and measurement of wind

- definitions:

— wind

— wind direction

— wind speed

— wind velocity

— wind shear

— veering

— backing

- units of measurement
- methods of measuring wind velocity

Horizontal forces acting on the air

- pressure gradient force
- Coriolis force
- centripetal force
- surface friction
- geostrophic wind
- cyclostrophic wind
- gradient wind

6.3.5 Winds near the Earth's surface

Goal: *To identify the principal reasons why surface winds deviate from those expected from surface pressure distributions.*

Effects of surface friction

- gusts:

— winds reported averaged over 2 or 10 minutes

- squalls
- diurnal variations in wind
- topographical effects

Local wind systems

- anabatic and katabatic winds
- land and sea breezes
- chinook (foehn) winds

6.3.6 Wind in the free atmosphere

Goal: *To provide an understanding of upper winds and enable the trainee to estimate winds and temperatures from upper-air charts.*

Relationship between wind and isobars/contours

- geostrophic approximation:

— northern hemisphere

— southern hemisphere

cyclostrophic approximation:

— tropical regions

Behaviour of the wind with increasing height

- thermal wind concept:

— relationship between temperature distribution and upper winds

- jet streams:

— definition

— cause

— major areas and orientation

— maximum wind speeds

— cross-section of a typical jet stream

— low-level jet streams and associated wind shear

Classroom exercise

- estimation of winds and temperatures:

— at flight levels corresponding to upper-air charts

— at intermediate flight levels

- interpretation of tropopause and maximum wind charts

6.3.7 Turbulence

Goal: *To identify the characteristics of atmospheric turbulence and its effect on aircraft operations.*

- types of atmospheric turbulence

Clear air turbulence (CAT)

- occurrence
- role of jet streams
- aircraft response
- ICAO criteria for reporting turbulence:

— light
— moderate
— severe

Mountain waves (rotors)

- occurrence
- ICAO criteria for reporting mountain waves:

— moderate
— severe

6.3.8 Vertical motion in the atmosphere

Goal: *To identify the causes of vertical motion and outline in general terms its influence on aircraft operations.*

Localized vertical motion

- produced by:

— topography
— convection

Widespread vertical motion

- role of convergence/divergence

6.3.9 Formation of clouds and precipitation

Goal: *To identify the processes involved in the formation of clouds and precipitation and to classify clouds.*

Processes involved

- condensation and related warming due to latent heat release
- evaporation and related cooling due to latent heat stored
- cloud constituents:

— water droplets
— ice crystals
— supercooled water droplets

- cloud formation:

— cooling by conduction, radiation and adiabatic ascent
— adiabatic ascent predominant

- precipitation

Role of upward motion in cloud formation and precipitation

- turbulence:

— stratus/stratocumulus clouds

- convection:

— fair-weather cumulus
— cumulonimbus and associated showers

- orographic ascent:

— orographic clouds and associated precipitation

- slow, widespread (frontal) ascent:

— layer clouds and associated continuous precipi- tation

- classification of clouds
- low clouds (Stratus, Stratocumulus)
- medium-level clouds (Altostratus, Nimbostratus, Altocumulus)
- high-level clouds (Cirrus, Cirrostratus, Cirrocumulus)
- convective clouds (Cumulus, Cumulonimbus)
- subdivided into species based upon their:

— form
— structure
— physical formation process
— examples (lenticularis, castellanus, fractus, congestus)

Formation of various types of precipitation

(including associated cloud type)

- drizzle (including freezing drizzle)
- rain (including freezing rain)
- snow (including blowing snow)
- snow grains
- ice pellets
- ice crystals
- hail
- small hail and snow pellets

8.3.10 Thunderstorms

Goal: *To identify the characteristics of thunderstorms and their effects on surface weather and flight conditions.*

Conditions for formation

- deep layer of unstable air
- high relative humidity
- mechanism to initiate the uplift of the air

Types

- air mass thunderstorms
- severe thunderstorms:

— gust front and microburst
— supercell storm
— squall line

Development stages

- cumulus stage
- mature stage
- dissipating stage

Characteristics

- vertical extent
- circulation within the cloud
- precipitation within the cloud

- funnel cloud (tornado or waterspout)

Surface weather associated with thunderstorms

- gusty, turbulent winds:

— wind shifts

- wind shear (including gust fronts and dry and wet microbursts)
- heavy precipitation (rain and/or hail)
- changes in temperature and pressure
- lightning

Effects on aircraft operations

- aircraft operations in thunderstorms to be avoided:

— often impossible to get above or around the storm due to its great extent

— severe turbulence (also above the storm)

— severe icing

aircraft take-off and landing affected by:

— gusty, turbulent winds

— wind shear

— reduced visibility due to heavy precipitation

- effects of lightning

Detection

- use of radar systems:

— airborne weather radar

— ground-based radar

— doppler Radar to detect wind shear

- use of satellite imagery
- use of lightning detection systems

8.3.11 Aircraft icing

Goal: *To identify the factors that cause icing and the problems associated with the different classifications of aircraft icing, and to provide an outline of the operation of various icing protection systems.*

Definitions

- static air temperature
- total air temperature
- occurrence of aircraft icing:

— sublimation (of water vapour)

— freezing (of supercooled water droplets) —predominant

- icing in temperatures above 0°C:

— cold-soak effect

Factors affecting the intensity of icing

- temperature
- humidity
- cloud liquid water content
- drop-size distribution
- aircraft type

Forms of icing

- hoar-frost
- rime ice
- clear ice
- mixed ice

Operational problems associated with icing

- reduced aerodynamic, propeller and engine efficiency:

— loss of aircraft performance

- impaired controllability due to contaminated aerofoil and asymmetric deposition of ice
- impaired cockpit vision
- air data instrument error
- loss of performance due to increased mass
- damage to airframe and engines

Common forms of ice protection

- heating
- pneumatic de-icer boots
- de-icing and anti-icing sprays:

— type I fluid

— type II fluid
— inspection
— hold-over/endurance times

Icing intensity

• in various cloud types
• ICAO criteria for reporting icing:
— light
— moderate
— severe

8.3.12 Visibility and runway visual range (RVR)

Goal: *To define visibility and identify the processes and conditions that result in significant visibility reductions.*

Types of visibility used in aviation

• visibility:
— minimum and prevailing visibility
— observation

runway visual range (RVR):
— definition
— use
— assessment
— reporting
— impact on aircraft operations
— slant visual range (SVR)
• vertical visibility
• meteorological components of aerodrome operating minima (visibility and RVR)

Causes of reduced visibility

• fog and mist
• haze
• smoke
• sand and dust (widespread)

- volcanic ash
- precipitation
- sunrise/sunset effect:

— not accounted for in meteorological visibility measurements

Fog types

- radiation fog
- advection fog
- upslope fog
- steaming fog
- frontal fog

8.3.13 Volcanic ash

Goal: *To identify the problems caused by volcanic ash.*

- impact on flight operations
- detection
- reporting of volcanic ash including colour code
- forecasting movement of volcanic ash “clouds”
- ICAO International Airways Volcano Watch (IAVW):

— volcanic ash advisory information

— volcanic ash advisory centres (VAACs)

8.3.14 Surface observations

Goal: *To identify types and contents of surface observations and the units, terms and equipment used.*

Requirements for aviation

- routine and special observations
- regional/global networks

Elements of observations

- wind direction
- wind speed
- visibility
- RVR

- present weather
- cloud
- air temperature
- dew-point temperature
- pressure
- supplementary information

- differences filed by States

Automated weather observing system (AWOS)

- current limitations and related issues

Synoptic stations

- land and maritime stations

- ground-based radar observations

8.3.15 Upper-air observations

Goal: *To outline the methods of making upper-air observations and the elements that are routinely measured.*

Upper wind and upper-air temperature observations

- radiosondes:

— pressure, temperature, humidity (by radiosonde)
— wind finding (by radar, radio or navigation aid)

- pilot balloons

Aircraft observations and reports (AIREPs and special AIREPs)

- routine AIREPs
- special AIREPs
- other aircraft observations (aircraft communications addressing and reporting system (ACARS), aircraft to satellite data relay (ASDAR), aircraft meteorological data relay (AMDAR))

Observations from meteorological satellites

- types of meteorological satellites
- types of satellite images and their interpretation
- parameters measured

8.3.16 Station model

Goal: *To describe the plotting of surface and upper-air synoptic charts.*

Collecting observations

- observations made at fixed times
- need for weather analysis and forecasting:

— limited value of a single observation

- Analysis done by computers for the entire earth:

— available to States and operators in digital or chart form

Presentation of surface observations on charts

- parameters reported (in SYNOPs)
- station model

Presentation of upper-air observations on charts

- parameters reported (in TEMPs)
- station model for upper-air charts

Classroom exercise

- interpretation of weather observations plotted in standard format on synoptic charts

8.3.17 Air masses and fronts

Goal: *To identify air masses, their transition zones and the general weather characteristics associated with each type.*

Concept of air masses

- troposphere can be divided into air masses:

— with different characteristics

— do not readily mix

— separated by narrow transition zones, fronts

- definition of an air mass
- air masses — source regions

Classification of air masses

- main air masses (arctic, polar, tropical)
- transition zones:

— arctic front
— polar front
— inter-tropical convergence zone (ITCZ)
— Mediterranean front

- subdivisions of air masses on basis of moisture content:

— continental
— maritime

- classification:

— maritime tropical
— continental tropical
— maritime polar
— continental polar
— maritime arctic
— continental arctic

Characteristics of air masses

- initial characteristics
- air mass modification

General properties of fronts

- definitions
- slope
- wind shift
- movement

8.3.18 Frontal depressions

Goal: *To describe the formation and life cycle of a frontal depression.*

- formation
- life cycle
- characteristics
- families of frontal depressions

8.3.19 Weather at fronts and at other parts of the frontal depression

Goal: *To identify the surface weather and flying problems associated with fronts and other parts of the frontal depression.*

Warm front

- structure
- factors determining weather at warm fronts
- surface weather changes
- flight problems associated with warm fronts

Cold front

- structure
- factors determining weather at cold fronts
- surface weather changes
- flight problems associated with cold fronts

Occluded front

- structure
- factors determining weather at occluded fronts
- surface weather changes
- flight problems associated with occluded fronts

Stationary front

- structure
- factors determining weather at stationary fronts
- surface weather changes
- flight problems associated with stationary fronts

Other parts of the frontal depression

- warm sector characteristics
- cold air mass characteristics
- upper fronts:

— definitions

— depiction on surface charts

— vertical structure

— associated weather conditions

- weather in the final stages of a frontal depression

Upper winds over frontal depressions

- general circulation
- location of the jet stream relative to frontal depression

8.3.20 Other types of pressure systems

Goal: *To identify the weather characteristics of depressions not associated with polar/arctic fronts or anticyclones.*

Non-frontal depressions

- thermal depressions
- orographic depressions
- secondary depressions
- tropical cyclones[1]
- troughs of low pressure (without fronts)

Anticyclones

- description
- general properties
- types
- ridge of high pressure
- col

8.3.21 General climatology

Goal: *To describe the characteristic weather patterns in regions for which the FOO/FD will eventually assume responsibilities.*

Idealized general circulation

- assumption of uniform surface of the Earth
- variation of heating with latitude
- circulation to transfer heat from the equator to the poles:

— to maintain average global temperature

- one-cell model
- modification of circulation due to Earth's rotation
- resultant pressure distribution and air circulation:

— horizontal cross-sections
— vertical cross-sections

• identification of prevailing winds, pressure systems, fronts and tropopause

Modifications to idealized climatic zones

• due to climatic controls:
— intensity of sunshine and its variation with latitude
— distribution of land and water
— ocean currents
— prevailing winds
— mountain barriers
— position of main high- and low-pressure areas

Distribution of weather elements

• global temperatures:
— surface temperature
— upper-air temperature

• global pressure patterns

• global circulation:
— surface wind systems
— upper winds

• global cloudiness and precipitation:
— occurrence of thunderstorms
— occurrence of fog
— occurrence of duststorms/sandstorms

• comparison of idealized model with actual values:
— role of climatic controls
— using values for both summer and winter

• deviations from average on a particular day:
— particularly over land masses
— absence of some phenomena (e.g. jet streams):

• because of wide variations in their day-to-day locations

Climatic classification

• Köppen's classification

• general characteristics of:
— polar climates (E)

— moist mid-latitude climates with severe winters (D)
— moist mid-latitude climates with mild winters (C)
— dry climates (B)
— tropical moist climates (A)

Classroom exercise

• aeronautical climatology of a specific route:
— a long route of general interest to the group should be selected
— each trainee should be assigned a project related to the route and be expected to prepare a brief report
— assignments should include the following:
• prevailing distribution of surface pressure and corresponding wind pattern
• positions of main frontal zones
• cause and frequency of poor surface visibility
• variations in surface and upper-air temperatures
• variations in upper winds
• average cloudiness of the route
• frequency and intensity of precipitation and thunderstorms
• frequency and severity of conditions favourable to aircraft icing
• frequency and severity of conditions favourable to clear air turbulence
• conditions at terminal airports and alternates

8.3.22 Weather in the Tropics

Goal: *To identify the significant features of the weather in the Tropics.*

General weather features

• small temperature contrasts (no frontal depressions):
— precipitation and wind systems as the main changing weather elements
• dry weather associated with subtropical anticyclones
• widespread precipitation (thunderstorms) associated with:
— active portions of ITCZ
— easterly waves
— tropical cyclones
• factors to be considered:
— diurnal effects
— seasonal effects
— orographic effects

- easterly waves

Tropical cyclones

- classification
- structure
- occurrence of tropical cyclones:

— regions exposed

— seasons

- impact on flight operations

8.3.23 Aeronautical meteorological reports

Goal: *To identify aeronautical meteorological reports and describe their decoding and interpretation.*

Types of reports

- aviation routine weather report (METAR)
- aviation selected special weather report (SPECI)
- air-report (AIREP):

— routine air-report

— special air-report

Aviation routine weather report (METAR)

- reporting times:

— reasons for greater frequency than for synoptic observations

- issued in two forms:

— coded (METAR) — disseminated beyond the aerodrome

— abbreviated plain language — disseminated locally at the aerodrome

- METAR code:

— format

— abbreviations and terminology

— use of CAVOK

— may be supplemented by trend forecast

— may be supplemented by runway state groups (EUR and NAT Regions)

Aviation selected special weather report (SPECI)

- criteria
- ASHTAM and SNOWTAM

Use of aviation weather reports in air traffic services

- automatic terminal information service (ATIS)
- meteorological information for aircraft in flight (VOLMET)

Classroom exercise

- decoding aviation weather reports (coded and in abbreviated plain language)
- analysing a series of reports from the same station to:

— observe trend in weather

— estimate frontal passage

- analysing a sequence of simultaneous reports for adjacent stations to identify the air masses involved and the location of fronts
- analysing a series of sequences of simultaneous reports to forecast conditions at specific stations

Note.— This course is designed to enable the trainee to understand weather and make intelligent deductions from available information. The FOO/FD is not responsible for making any weather forecasts or observations

8.3.24 Analysis of surface and upper-air charts

Goal: *To outline the procedures used to analyse observations in order to obtain a three-dimensional view of weather.*

Analysis methods

- computer:

— increasing use

- manual

Surface chart analysis

- locating fronts
- drawing isobars
- fixed times for surface chart analysis

Sequence of analysing surface charts manually

- plot surface observations using station model
- refer to previous chart for earlier position of pressure centres, fronts and isobars (continuity)
- draw in and identify types of surface fronts
- draw isobars

Analysis of upper-air charts

- fixed times for upper-air chart analysis
- upper-air charts complete the weather picture in the vertical dimension by indicating:

— upper winds

— upper-air temperatures

- interrelation of surface and upper-air charts

Synoptic charts in the Tropics

- no temperature contrasts:

— no “classical” fronts

- three well-organized systems:

— tropical cyclones

— ITCZ

— easterly waves

- outside the well-organized systems:

— weak pressure gradients

— no regular isobaric patterns

— irregular movement

- geostrophic wind formula fails and winds frequently at variance with isobars:

— upper contours of limited assistance

— use of streamlines and isotachs

- synoptic chart does not describe the over-all weather situation well:

— local (exposure, orography etc.), diurnal and seasonal effects dominant

Classroom exercise

- examination of actual surface and upper-air charts:

— in mid-latitude areas

— in tropical regions

• thorough examination and discussion of weather situation in various latitudes using actual charts:

— a few minutes at the beginning of each day

• drawing vertical cross-sections (including frontal surfaces) along various routes

8.3.25 Prognostic charts

Goal: *To outline the procedures used for the preparation and interpretation of prognostic charts.*

Methods of preparing prognostic charts

• mostly numerical methods (computer models)

• subjective methods:

— decreasing use

— in aeronautical meteorology: preparation of significant weather (SIGWX) charts

Aeronautical prognostic charts

• prepared and issued as part of the world area forecast system (WAFS) by:

— WAFC London

— WAFC Washington

— regional area forecast centres (RAFCs) (gradually being phased out)

upper wind and upper-air temperature charts

•significant weather (SIGWX) charts:

— depiction of SIGWX phenomena

Classroom exercise

•examination of synoptic and aeronautical prognostic charts

•preparation of a subjective “forecast” related to a pressure system and its fronts:

— movement

— time evolution (development)

8.3.26 Aeronautical forecasts

Goal: *To identify and interpret all types of aeronautical weather forecasts.*

Take-off forecasts

•required to plan maximum permissible take-off mass

•parameters included

•formats established by local arrangement

•required to ensure compliance with operating minima

En-route forecasts for flight planning

•required for flight planning at least two hours before ETD

•basic requirements:

— upper winds and upper-air temperatures

— significant en-route weather

— valid for time and route of flight

•methods of meeting the requirements:

— fixed time WAFS prognostic charts

•upper wind and upper-air temperature charts:

— WAFS grid point forecasts in digital format (GRIB code)

•SIGWX charts

•SIGMET information:

— in particular those related to tropical cyclones and volcanic ash

•specific issues related to ETOPS

Forecasts for landing at destination/alternate

•en-route alternates:

— oceanic equal time point (critical point) alternates

— drift down alternates

•trend-type landing forecast:

— METAR or SPECI + a two-hour trend forecast

— change indicators in the trend forecast

•aerodrome forecast:

— TAF format

Warnings

•SIGMET information:

— en route

— role of SIGMET information related to tropical cyclones and volcanic ash

•aerodrome warnings:

— terminal area

•wind shear warnings:

— terminal area

•wake turbulence

Classroom exercise

•examination of typical charts and forecasts for flight planning:

— practice in decoding aerodrome and trend-type landing forecasts

Note.— The models given in the Appendix to Annex 3 and the Manual of Aeronautical Meteorological Practice *(Doc 8896) are well suited for this purpose*.

8.3.27 Meteorological service for international air navigation

Goal: *To outline the international organization of aero- nautical meteorological services and to list the responsibilities of the centres.*

Role of international organizations

•role of the World Meteorological Organization (WMO):

— international Standards related to basic meteoro- logical data:

•observations

telecommunications

•data processing

- role of ICAO:

— international Standards related to aeronautical meteorology

— main components:

•world area forecast system (WAFS)

•international airways volcano watch (IAVW)

•tropical cyclone warning system

•meteorological offices

•meteorological watch offices (MWOs)

•aeronautical meteorological stations

World area forecast system (WAFS)

- centralization of en-route forecasting at two world area forecast centres (WAFCs)

in the final phase of the system:

— WAFC London

— WAFC Washington

— RAFCs (gradually being phased out)

- role of WAFCs (and RAFCs)
- products and data issued
- means of communication used
- institutional issues:

— authorized access

International airways volcano watch (IAVW) and tropical cyclone warning system

- centralization of services concerning volcanic ash and tropical cyclones:

— 9 volcanic ash advisory centres (VAACs)

— 6 tropical cyclone advisory centres (TCACs)

- role of VAACs and TCACs
- advisory information issued

Organization of aeronautical meteorological services within States

- role of the Meteorological Authority

— (Aerodrome) meteorological office:

- role (including designation of the Meteoro- logical Authority by Contracting States)
- products and services provided:

— terminal forecasts (TAF, TREND)

— aerodrome warnings

— wind shear warnings

•reliance on WAFS for en-route information for flight planning and flight documentation

— Meteorological watch office (MWO):

- role (in particular, in relation to FIRs)
- products and services provided:

— SIGMET (and AIRMET) information for the en-route phase

— Aeronautical meteorological station:

- role
- products issued:

— routine and special reports (METAR, SPECI)

•responsibilities assigned to States:

— provision of pre-flight meteorological documen- tation

— provision of meteorological briefing and consul- tation facilities

— provision of flight documentation

— details included in ICAO Annexes and Procedures for Air Navigation Services

— reference to aeronautical publications, identifying relevant chapters:

• ICAO Annex 3 — *Meteorological Service for International Air Navigation*[2]

• ICAO *Manual of Aeronautical Meteorological Practice* (Doc 8896)

•ICAO Air Navigation Plans (ANPs) (Part IV — Meteorology)

• States' Aeronautical Information Publications (AIPs)

Meteorological telecommunications

•detailed exchange requirements included in ANP:

— role of MET tables

satellite broadcasts:

— satellite distribution system (SADIS)

— international satellite communications system(ISCS)

• AFTN:

— Meteorological Operational Telecommunications Network Europe (MOTNE)

— AFI MET bulletin exchange (AMBEX) scheme

— regional OPMET bulletin exchange (ROBEX)scheme

• WMO global telecommunication system (GTS)

Operator's responsibilities to the Meteorological Authority

• consultation on additional criteria for issuance of special reports

• routine and special aircraft observations (AIREPs and special AIREPs):

— frequency required

— parameters to be reported

— means of reporting

• provide adequate notification of requirements of individual flights:

— scheduled operations on new routes may require about two months' advance notice

— notice required for ad hoc non-scheduled flights

8.3.28 Field trip to local meteorological office

Goal: *To give a practical illustration of the services and products provided to aviation by a meteorological office.*

Introduction

- visit to the local (aerodrome) meteorological office
- division into small groups
- allocation of assignments to the meteorological staff during the visit
- copies of reports, charts and other flight documentation to be given to trainees

Objectives of the visit

- see the equipment and methods used to make observations
- witness the issuance of METAR/SPECI reports
- see the communications equipment
- see examples of reports from other aeronautical meteorological stations
- see examples of preparation of flight documentation
- witness preparation of surface charts and issuance of aerodrome and landing forecasts
- see briefing facilities and witness briefing and debriefing of crews
- gain insight into the role of the local meteorological office in the global context

Classroom exercise

- practical experience in using meteorological data when preparing flight plans:

— assessing whether conditions are within aircraft limits

— calculating maximum payloads

- Examples

1. Given all the necessary weather and operational data and in conjunction with the flight planning and the air navigation sections of the course, complete a minimum time track flight plan from Schiphol, Amsterdam (Kingdom of the Netherlands) to Washington Dulles International (U.S.A.).

2. Given the latest METAR information (including crosswinds), runway lengths and aircraft data, determine whether different airports are within landing limits for three different aircraft types, using company data for visibility minima and aircraft crosswind maximum limitations for at least two different aircraft types.

3. Given the latest METAR information and in conjunction with the aircraft performance section of the course, determine whether different aircraft types may take off at specific mass under differing weather conditions at various airports.

4. Given a series of METARs for aerodromes in a given area, establish the prevalent trend and outline the weather conditions to be expected over the next six hours for a selected destination. Identify suitable alternates for periods of below minimum weather at destination.

MODULE 7 - MASS (WEIGHT) AND BALANCE CONTROL

Note.— It should be noted that the term "weight" is used in place of "mass" in some States. Mass as used in this manual is interchangeable with "weight" and the abbreviation "W" for weight is also used to indicate mass in several places.

7.1 Introduction

7.1.1 Mass and balance control affects aircraft handling and safety as well as optimization of payload and economy of fuel. An overloaded aircraft is extremely dangerous, and many accidents and incidents have been attributed to overloading. A badly loaded aircraft, though perhaps not actually overloaded, can be equally dangerous and can adversely affect aircraft handling and safety. Accidents have been caused by unclear loading instructions and careless loading.

7.1.2 An aircraft with its centre of gravity (CG) located outside aircraft limits will be difficult, if not impossible, to control. Centre of gravity location can be changed dramatically by movement of an insufficiently secured load. Incorrect fuel management can also adversely affect the CG. Although fuel management is not a prime responsibility of the FOO/FD, nonetheless an understand- ing of the effects of fuel mismanagement is necessary to underline the importance of correct use of fuel index sheets and fuel graphs when completing loadsheets/trimsheets. The aircraft load must be planned and completed in such a manner as to ensure that the CG stays within aircraft limits at all stages of flight, that all zone and compartment limits are respected and that none of the structural aircraft mass are exceeded at any time, i.e. maximum zero-fuel mass, maximum ramp mass or taxi mass, maximum take-off mass (either structural or conditionally restricted) or maximum landing mass.

7.1.3 Mass and balance and load planning are not just about the correct load distribution of mass in order to achieve the optimum CG location. Structural limits such as floor strengths, as well as zone load and compartment load maxima, must also be considered. Secure tie-down must be ensured. Some compartments are better equipped than others with tie-down equipment, and loads must be planned accordingly. Dimensional statistics of cargo pieces must be compared to compartment door (the door through which the load has to enter the aircraft) limits during load planning. Compatibility of substances with dangerous goods must also be considered. There are obvious examples of this such as not positioning live animals near food, sensitive films near radioactive material, or videotape near magnetic material. There are many other less obvious examples of incompatibility. Potential damage to or interference with aircraft equipment by substances or materials must be considered; for example, magnetic

material may interfere with aircraft compasses if loaded in the wrong area or if its strength exceeds limits. Radioactive material must be correctly located and must not exceed limits either by actual amounts or accumulative effects. Incorrectly handled or loaded, it can constitute a hazard to passengers, crew and ground personnel. Load planning must also consider loading and unloading sequences. An aircraft with en-route stops must be loaded to minimize unloading and reloading at the intermediate stops. It should not be necessary to completely unload and then reload an aircraft at an inter- mediate airport in order to access air freight or baggage destined for that airport.

7.2 Training objectives

Conditions: The trainee will be provided with all the necessary documentation, blank loadsheets as well as moment and arms data from more than one aircraft. The use of a calculator is mandatory for basic exercises.

Performance: The principles of moments and arms must be clearly understood before the trainee is shown how to complete an index- or graph- based loadsheet. It is recommended that a loading exercise be completed, initially by using moment and arms data and finally by using the appropriate loadsheet as utilized by a typical carrier. This will serve to clearly demonstrate the mathematical logic of mass and balance. It must be demonstrated that the principles and logic of CG location apply equally to all aircraft whether one is referring to a large wide- body commercial jet or to a single-engined aircraft used for training pilots.

Supervised classroom discussions are to be encouraged regarding the possible multiple solutions to loading problems, and the class should be guided to the optimum solution with explanations regarding practical load- ing considerations as well as fuel savings. A guided visit to the load planning and cargo departments of a carrier would be beneficial.

Standard of accomplishment:

The trainee is expected to demonstrate adequate knowledge of load planning, calcu- lation of payload, including the optimum use of available payload space, loadsheet preparation, aircraft balance and longitudinal stability, calculation of centre of gravity, structural aspects of aircraft loading, and the issuing of loading instructions within laid- down restrictions and limitations, including those imposed by dangerous goods considerations.

7.3 Required knowledge, skill and attitude

7.3.1 Introduction to mass and balance

Goal: To identify the reasons for mass and balance control and methods for its accomplishment and to outline typical organizations.

Mass and balance control

•definitions:

— basic operating mass (BOW)

— dry operating mass (DOW)

— zero-fuel mass (ZFW)

• ramp mass or taxi mass:

— take-off mass (TOW)

— landing mass

• mass control

• balance control

• terminology

Objectives

• to ensure that all mass limitations are observed during flight preparation

• to ensure that minimum fuel is always boarded

• to carry extra fuel when desired without affecting payload

• to carry maximum amount of available payload

• to ensure that the aircraft centre of gravity is within aircraft limits and that its position is established for take-off, for flight and for economic fuel usage

• to minimize ground handling of baggage, cargo and mail by efficient planning of load distribution

Organization of mass and balance control responsibilities

•for some small aircraft, data and instruction in the approved flight manual permit an individual to assume complete responsibility.

• in the operator's organization, technical departments are normally required to:

— maintain a current record of the basic operating mass and centre of gravity for each aircraft;

— periodically revise the basic operating mass and centre of gravity on the basis of actual measure- ments carried out; and

— produce the basic data methods from which the mass and CG for each flight are determined.

• the responsibility for load planning, controlling mass and balance, and calculating take-off mass and CG varies between operators.

• no commercial flight can be legally dispatched without a load clearance from the authorized department or individual.

• procedures must be developed to guard against the possibility of communications error, particularly when radio is used.

Mass and balance calculation methods

• computer systems which may be completely integrated with flight planning and load control systems

• graphical

• arithmetical

• mass × arm = moment

total moments total mass

= arm of centre of gravity (CG)

7.3.2 Load planning

Goal: *To introduce load planning procedures and to*

$$\text{MAC\%} = \frac{(\text{CG}) - (\text{Leading edge MAC})}{\text{MAC}} \times 100$$

• automated — using the carrier's electronic data processing (EDP) system to produce a load plan allied to the final loadsheet/trimsheet. Trainees should be proficient in all aspects of arithmetical systems before being introduced to or allowed to use an EDP system. Computer skills should be developed but only after the trainee has attained thorough knowledge and under- standing of the principles that form the basis of mass and balance.

The load clearance (loadsheet)

• form, content and methods vary considerably between operators. The essential elements include certification that the aircraft is correctly loaded in accordance with the

certified mass and CG limitations.

• a more comprehensive load clearance would include:

— flight number

— aircraft number/registration

— dry operating mass and dry operating CG

— zero-fuel mass

— zero-fuel mass CG (may be shown as Index value)

— take-off mass

— take-off mass CG (may be shown as Index value and MAC% value, or as MAC% value only)

— landing mass

— landing mass CG (may be shown as Index value and MAC% value, or as MAC% value only)

— passenger distribution

— deadload distribution — baggage, cargo, mail

— details of dangerous goods as defined by the relevant authority and clearly itemized on an approved pilot-in-command's traffic alert or notification to the Captain (NOTAC)

— details of live, perishable or any other sensitive cargo on board requiring special care and handling.

• the pilot-in-command must be satisfied that the aircraft is loaded in accordance with the load clearance, that no mass limits are or will be exceeded at any time during the flight and that the aircraft CG is and will remain within limits at all times during the flight.

explain how payload space is determined in advance and how problems are dealt with during actual flight preparation.

Three aspects of load planning

• to make reasonable commitments to the traffic depart- ment on payload space available for advance sales

• to carry maximum possible payload when flight plan details are known

• to plan optimum distribution and segregation of cargo, mail and baggage at down-line and originating stations with respect to:

— volumetric limitations

— floor loading and running load limitations

— minimizing time and effort to unload/reload at intermediate stations

— centre of gravity limits

— dangerous goods requirements and limitations

Advance allotment of maximum payload

• for some route and aircraft combinations, fuel required and take-off and landing limitations do not restrict payload under any operating conditions.

• these combinations may be identified by analytical or statistical methods.

• maximum payload is then limited by:

— differences between aircraft dry operating and maximum zero-fuel mass

— volumetric or floor loading or running load limitations of cargo holds

— passenger capacity

— a combination of any or all of the above.

Tables of advance allotment of payload

• these are generally required to restrict advance sales to the maximum payload that the operator can be reasonably certain of carrying.

• tables may be produced by the FOO/FD after analysis of the probable mass limitations and fuel minima and may vary between seasons tables normally provide breakdown by payload categories such as:

— number of passengers

— cargo

— mail.

• tables assume standard passenger and baggage mass which may be established by:

— State regulations

— statistical analysis.

• under some conditions, the FOO/FD may be able to release additional payload details prior to completing flight plan details.

• under unusual conditions, the payload sold in accord- ance with the advance allotment may exceed that which can be carried. The FOO/FD's options then include:

— assigning larger capacity aircraft to the flight

— originating a section flight

— planning an en-route landing

— flight delay until conditions allow all committed payload to be carried

— leaving payload behind.

• the FOO/FD should fully appreciate the potential problems associated with:

— denied boarding of confirmed passengers

— failure to meet contractual commitments for mail and cargo.

— failure to load shipments of live animals or perishable cargo.

• the operator normally establishes a list of priorities for FOO/FD guidance in the situations outlined above.

• recognized numbering system (e.g. IATA) for compart- ments, positions, etc.

Classroom exercise

• examination of an operator's tables of advance allotment of payload (or similar data) to determine typical values for various routes and aircraft types

• simulated situations in which the flight is oversold for actual flight planned conditions and the trainee must decide on the most appropriate operating plan

• ample time should be allowed for instructor-directed discussion and analysis of the individual trainees' operating plans in order to obtain a consensus on the best operating plan

7.3.3 Payload calculation and loadsheet preparation

Goal: *To enable the trainee to accurately compute the maximum permissible payload and gain proficiency in completing loadsheets.*

Review of aircraft design mass

• maximum design taxi mass

• maximum design take-off mass

• maximum design landing mass

• maximum design zero-fuel mass

Review of operational factors that may restrict mass

• take-off and landing runway limitations

• take-off and landing performance (mass/altitude/tem- perature) limitations

• en-route climb performance requirements

• take-off mass limited to maximum permissible landing mass for that flight + mass of fuel consumed en route

• abnormal fuel loading or fuel management schedule may reduce maximum zero-fuel mass

• aircraft powerplant or equipment deviation from standard

Summary of operating mass

- basic operating mass (BOW)
- BOW + crew, crew baggage, catering supplies and standard flight spares = dry operating mass (DOW)
- DOW + payload/traffic load = zero-fuel mass (ZFW)
- DOW + take-off fuel = operating mass (OW)
- OW + payload/traffic load = take-off mass (TOW)
- ZFW + take-off fuel = take-off mass (TOW)
- TOW + taxi fuel = taxi mass
- TOW – fuel consumed en route = landing mass
- TOW – take-off fuel = zero-fuel mass (ZFW)

Passenger mass

- standard mass assumed based on:

— State regulations
— approved statistical analyses
— seasonal variations
— variation by destination (based on analyses)

Review of mass of minimum fuel

- minimum fuel normally calculated during flight planning before payload is known
- minimum fuel usually based upon an operating mass assumption such as ZFW
- if the assumed mass is too low, the minimum fuel must be increased
- minimum fuel is normally calculated in kilograms
- generally assumed that heat content per mass unit (kilogram) of fuel is constant for the fuel types approved for that aircraft type
- fuel may be boarded in terms of litres or gallons (US or Imperial) provided the conversion from mass to volume is made using the specific gravity appropriate for the fuel type and its temperature

Determining available payload

- the FOO/FD determines the following for the specific conditions affecting each flight:

— maximum permissible take-off operating mass (MPTOW) and regulated take-off weight (RTOW)
— minimum fuel (MF)

— taxi fuel (TF).

• the MPTOW and the MF are used by the FOO/FD, or the operator's department responsible for mass and balance control, to calculate maximum permissible payload for the flight:

— MPTOW – MF = ZFW

— ZFW compared with maximum design (or restricted) ZFW gives maximum permitted ZFW, i.e. MPZFW

— MPZFW – DOW = maximum permissible payload.

• the calculations may be made:

— by computerized load planning system

— manually.

Manual preparation of loadsheets

• loadsheets are normally used by operators without computerized systems to:

— record the actual location and amount of each type of payload

— calculate operational mass including last-minute changes (LMCs)

— provide a basis for calculating take-off and landing centre of gravity.

Classroom exercises

• further practice in calculating maximum permissible payload when limited by each of the many factors

• practice in completing typical loadsheets

7.3.4 Aircraft balance and longitudinal stability

Goal: *To provide the trainee with an understanding of the principles of aircraft balance and longitudinal stability.*

Introduction

• definition of balance

• definition of centre of gravity

• aircraft balance on the ground

Longitudinal stability in flight

• aircraft supported principally by lift produced by the wings

• lift considered to be located at wings' centre of pressure

• aircraft CG must be located at centre of pressure for balance without other forces

• definition of mean aerodynamic chord (MAC) and percent MAC (%MAC)

- functions of horizontal stabilizer and elevators
- aircraft with fixed horizontal stabilizers
- aircraft with variable stabilizers

Variations in aircraft centres of gravity

- the CG for the empty aircraft is recorded
- the amount of CG change depends on where the mass is added

7.3.5 Moments and balance

Goal: *To familiarize the trainee with the principles of calculating the point of balance using basic data provided by the aircraft manufacturer.*

Definition of a "moment"

- the product of mass × distance or "arm" from an arbitrary datum
- any units may be used in CG calculations provided they are used consistently, e.g.:

— inch pounds
— metre kilograms

- a moment that tends to produce a clockwise rotation about the datum is "positive"
- a moment that tends to produce anticlockwise rotation about the datum is "negative"

Conditions for balance

- positive and negative moments about the same datum must be equal
- beam weigher example with equi-length arms
- beam weigher example of balance achieved with dissimilar mass

Classroom exercises

- given the unequal lengths of arm of a beam balance and the mass of one pan, calculate the mass required in the other pan for balance
- given unequal mass in the pans of a beam balance and the total length of the beam, calculate the point of suspension for balance
- the trainee should also identify the CG in each example
- moments about an aircraft in flight
- in this example consider nose of aircraft pointing left as datum
- the basic operating mass of the aircraft may be considered concentrated at its CG, a known distance from the nose and creating a positive moment
- each additional mass creates a further positive moment

• for balance, an equal and opposite moment must be produced by the lift of the wing and the horizontal stabilizer

• net lift equals total mass of the loaded aircraft

• since total moment and mass are known, the distance of the balancing point CG from the nose may be calculated

Simplifying assumptions

• although the precise location of each item is theoreti- cally required to calculate CG, practical assumptions can be made:

— passenger and cargo sections are divided into compartments and specific loads assigned to each

— within a compartment or section, the load is assumed to be uniformly distributed throughout

— since the location of the centre of the section (the centroid) is known in relation to the datum, the total moment created by the load in that section can be quickly determined

Classroom exercises

• calculate CG of a fully loaded aircraft with several passenger and cargo compartments.

• repeat same exercise using a different datum to prove that datum selection is arbitrary.

• assume aircraft in same exercise is completely loaded except for rear cargo compartment provide CG limits and determine:

— how much load could be carried in the rear cargo compartment without exceeding CG aft limits

— course of action if an acceptable CG cannot be obtained by loading the rear cargo department.

• prepare load plan and calculate CG after determining final locations for individual mass within predeter- mined limits.

Practical methods of calculating CG

• the index method in which the moments are calculated arithmetically using established station numbers and loads as in previous examples

• graphical methods devised specifically for a given aircraft type which basically do the same

Practical methods of ensuring CG is within acceptable range

• in some aircraft types for which a specific value is not required, CG may be

controlled within acceptable limits by simple limitations and tables

with a single cargo compartment, for example, its load limits may ensure an acceptable CG

- with multiple cargo holds, it may be possible to devise cargo tables showing, for example, the range of accept- able mass in the rear compartment for a given traffic load
- tables and procedures are developed by most operators to decide how to distribute the load even if a specific CG value must subsequently be calculated
- trainee inspection of operator load planning and distribution tables

Classroom exercises

- for a given load, calculate CG using datum and arm data, as provided by an operator's technical department, for a given aircraft with multiple compartments and sections.
- calculate CG for the same load on the same aircraft using the operator's graphical method.

9.3.6 The structural aspects of aircraft loading

Goal: *To identify the structural limitations that must be observed when loading an aircraft and to explain the need to keep the load from moving.*

Fuselage strength

- the achievement of a satisfactory balance does not ensure that the aircraft is safely loaded.
- the load must also be distributed so that neither the over-all fuselage strength nor the local strengths of the floors are exceeded.
- loads must always be properly restrained to prevent harm to passengers, crew, load or aircraft structure.

Fuselage structure

- cabin and cargo hold floors rely on a network of supporting beams attached to the fuselage frame.
- the fuselage structure transmits loads to the wings and undercarriage.
- fuselage loads furthest from the wings create greatest bending moment and strain on the structure.
- the cargo section is normally divided into loading bays or compartments forward and aft of the wing.
- the bays nearer the wing can normally carry heavier loads.

• the combined load in each cargo bay and the area directly above it must not exceed the mass limitation for that fuselage section.

• load planners have tables for controlling the load in each zone or area and these must be rigidly followed.

Permissible loading illustrations

• the instructor should use a diagram that divides the fuselage into upper and lower and fore and aft compart- ments.

• the maximum permissible load in each compartment and vertical column should be shown.

• examples of actual loads in each compartment should illustrate situations for which:

— loading is possible but outside stress limits

— stress on fuselage is minimal

— problems are unlikely to be experienced in ensuring the CG will be within limits.

Local floor strength

• the floor of each cargo hold is designed for a maximum load per unit area to prevent damage to the floor.

• the floor is also limited to load per unit length to ensure support by a sufficient number of floor beams.

• spreaders are used to further distribute the mass of heavy items and meet the limitations of unit area and unit length.

Note.— Provided that spreaders of standard dimensions are used, tables can be prepared for quick calculation of the minimum number of spreaders required for specific mass at specific dimensions. Particular note should be taken of sharp-edged objects and their potential for damage to aircraft floors, bulkheads, etc.

Maximum package tables

• aircraft manufacturers provide tables that give the maximum width, height and length combinations for acceptable pieces of cargo.

• tables take into consideration both hold dimensions and compartment door size

Load restraints

• all loaded items must be secured:

— to prevent injury to passengers and crew

— to prevent damage to the cargo and aircraft

— to prevent a possibly catastrophic shift of the CG

• principle of inertia and forces developed by the load during:

— take-off acceleration
— landing or abandoned take-off deceleration
— yawing, rolling and pitching in turbulence

• methods of securing bulk cargo in passenger and cargo compartments

Cargo pallets

• description and advantages over bulk loading
• limitations and requirement for specialized ground- handling equipment
• methods of securing cargo to pallets and pallets to the aircraft

Cargo containers

• certified containers and non-certified containers
• description and advantages over bulk loading
• limitations and requirement for specialized ground- handling equipment
• methods of securing

77.3.7 Loading instructions

Goal: *To familiarize the FOO/FD with the main components and importance of clear, concise and correct loading instructions for loading staff and to provide practice in preparing loading instructions.*

Introduction

• the person responsible for issuing loading instructions, whether specialist load control agent or FOO/FD, is governed by the following limitations and special requirements:

— aircraft mass limitations
— hold and compartment limitations
— floor loading limitations
— balance limitations
— regulations concerning the carriage of dangerous goods
— loads for which specific temperature and ventilation conditions must be set.

• it must be ensured that cargo in close proximity is compatible.
• the location and loading sequence of cargo and baggage must be planned to:

— minimize ground handling at down-line stations
— give priority to accessibility of baggage as well as urgent or perishable cargo.

Loading instructions

• issued to those responsible for the actual loading when all of the foregoing considerations have been taken into account by the load planner

• a special form is normally used, containing:

— very explicit instructions from the load planner

— an area for deviations to be entered by the loading supervisor

— an area for certification by loading supervisor that instructions have been followed and that the load has been correctly secured

• when this special form is issued by computer, the instructions must be in full agreement with the prepared loadsheet. Areas of “Free Text” should be treated with extreme caution as they are error-prone because they were prepared manually and therefore independent of loadsheet structure and logic

• trainee inspection of typical loading instruction form

• trainee practice in completing loading instruction form

Last-minute changes (LMCs)

• limits within which LMC is allowed:

— standard loadsheet and trimsheet for several aircraft types

— mathematical formulae (based on datum and arms)

Load clearance (loadsheet)

• issued to pilot-in-command after:

— actual amount and location of total load are positively established

— load is repositioned in aircraft (if required)

— any LMC has been annotated

— all mass and balance limitations have been met

— take-off mass, CG, etc., have been recalculated as required

• trainee load clearance practice — ideally on-the-job training under supervision both in the load control centre and at the aircraft

Classroom exercises

• comparative use of graph-type trimsheet and moments and arms systems for same load on same aircraft

• use of “Index” system to determine CG (e.g. DC8-63F)

• exercises using as many different types of aircraft loadsheets and trimsheets

as
possible. These (together with relevant data concerning mass and indices) can normally be obtained from different carriers but should never be used without permission.

Sample exercise. Given: an aircraft with the following dimensions:

Location(inches from datum)	Arm (Inches from datum)
Nose wheel	220
Main landing gear	500
LEMAC	420
TEMAC (Trailing edge MAC)	570
Centrum for Hold-A	290
Centrum for Hold-B	360
Centrum for Hold-C	570
Centrum for Hold-D	640

Main cargo deck extends from 230 to 734 inches aft of datum.

Load details: 5 igloos, 84 inches long, are to be loaded on the main cargo deck. 14 inches between each igloo. Also 14 inches between each end igloo and the adjacent aircraft structure.

3 igloos @ 2 000 kg each
1 igloo @ 1 500 kg
1 igloo @ 1 400 kg
4 equal size cartons @ 300 kg each, to be loaded in lower holds
Maximum 2 cartons per hold
CG limits are from 26.0% to 28.0% MAC

a) State how cargo is to be loaded.
b) Give the CG as MAC% after the aircraft has been loaded.

7.3.8 Dangerous goods and other special cargo

Goal: *To familiarize the FOO/FD with cargo requiring special handling during loading and storage. To emphasize the importance of correct labelling and handling of dangerous goods as well as the importance of full crew briefing concerning dangerous goods and any other special cargo that is loaded on a given flight.*

Dangerous Goods (see also Chapter 10 — Transport of Dangerous Goods by Air)

• type, amount, and location of dangerous goods must be controlled:

— to ensure the safety of the aircraft, passengers, crew and other cargo if leakage or breakage occurs

— to ensure no harmful effects on passengers, crew or photographic film due to radiation

— to ensure that the aircraft compass systems are not affected by magnetic materials

dangerous goods must be packed, labelled, handled and loaded in accordance with the relevant handling in-

structions: e.g. dangerous goods bearing the "Cargo Aircraft Only" label must be loaded only on an all- cargo aircraft. Packages containing liquids must be loaded and stored according to the orientation markings.

•dangerous goods must be loaded so that incompatible substances are kept apart and so that the correct separ- ation distances between radioactive materials, human beings and animals, and undeveloped films are ensured.

• the required distances between individual radioactive packages must also be ensured in order to avoid undue buildup and concentration of radiation. Loading must also be carried out in such a way as to ensure required accessibility in flight (where applicable).

• packages of dangerous goods must be inspected for signs of damage or leaking before loading, incidents reported immediately and reports prepared as necessary.

• Before departure, the pilot-in-command must be provided with the required information concerning any dangerous goods on board. A Notification to the Captain (NOTAC) must be prepared giving the type, a full description as given in the ICAO *Technical Instructions for the Safe Transport of Dangerous Goods by Air* and/or the IATA Dangerous Goods Regulations, labelling, quantity, UN number, classification, location on aircraft and (if applicable) details of accessibility in flight.

Note.— It is recommended that a photocopy of the relevant page(s) from the ICAO and/or IATA Danger- ous Goods Manual be attached to the NOTAC for examination by the pilot-in-command.

Live cargo (AVI)

• requirements for temperature, ventilation and protec- tion of the aircraft, passengers, crew and the live cargo must be observed.

• requirements for ground handling and treatment (including during any intermediate stops) must be considered and followed.

IATA numbering scheme for cargo holds, etc.

• most carriers use a common numbering system for holds, compartments, sections, and pallet/container positions.

• these numbers must be used in the loading instructions issued by the load control agent.

MODULE 8 - TRANSPORT OF DANGEROUS GOODS BY AIR

8.1 Introduction

8.1.1 Air freight is classified as dangerous goods if it is listed in ICAO Doc 9284 — *The Technical Instructions for the Safe Transport of Dangerous Goods by Air.* This does not mean that this document is all embracing and that a dangerous substance, if not listed there, can be loaded on an aircraft. The Technical Instructions provide detailed instructions which must be followed. Other obviously dangerous materials must be referred to the appropriate company and State authorities for instructions regarding packing, labelling and loading. Remember, new materials (some of which are dangerous) are constantly emerging onto the market and some items of dangerous goods are completely forbidden for transport by air.

8.1.2 Annex 18 — *The Safe Transport of Dangerous Goods by Air,* adopted by the ICAO Council in 1981, contains the broad Standards and Recommended Practices governing the transport of dangerous goods by air; the detailed provisions are contained in the Technical Instruc- tions. This document is binding on all States and has been recognized as the primary authority on dangerous goods. IATA also publishes Dangerous Goods Regulations which are widely used by operators and shippers. However, it should be remembered that the IATA manual is based on the requirements of Annex 18 and ICAO Doc 9284, and that it is the latter which contains the legally binding provisions for the transport of dangerous goods by air.

8.2 Training objectives

Conditions: Each trainee must be provided, in the classroom, with a copy of the current issue of the ICAO Technical Instructions and/or IATA Dangerous Goods Regulations. Prac- tical problems must be used to illustrate the application of the regulations. Samples of cartons, correct and incorrect, should also be shown to the trainee and all relevant safety practices should be observed.

Performance: The trainee will be able to recognize that dangerous goods are on a given flight and that they require checking by qualified people. The FOO/FD will be able to brief the pilot-in-command accordingly. For personnel who actually handle, store and load dangerous goods as part of their duties, a more comprehensive dangerous goods course lasting several days is required.
Standard of accomplishment:
A broad outline of the rules governing dangerous goods will be given to the trainee. He must have an understanding of the classification of dangerous goods and the listings in the ICAO Technical Instruc- tions and/or IATA Dangerous Goods Regulations.

8.3 Required knowledge, skill and attitude

8.3.1 Dangerous goods, emergency and abnormal situations

Goal: *To provide the FOO/FD with basic knowledge of the requirements for the handling, labelling, transport by air and stowage of dangerous goods as defined by ICAO and as listed in Annex 18, the associated ICAO Technical Instructions and the IATA Dangerous Goods Regulations.*

- class content and suggested schedule

Limitations on aircraft

- OK for both passenger and cargo aircraft
- OK for cargo aircraft only
- forbidden substances

definitions, units of measurement and conversion factors

Classification of dangerous goods

- shipper's responsibilities
- operator's responsibilities

- use of documentation

8.3.2 Source documents

Goal*: To familiarize the FOO/FD with the official documents that specify whether commodities are accept- able or not for transport by commercial airlines and, if acceptable, under what conditions (e.g. labelling, packing, quantity limitations, loading and handling).*

While it is normal for airlines to employ trained specialists in the Air Cargo Department who control acceptance, handling, storage and loading procedures for dangerous goods, the FOO/FD should be familiar with the following:

- Annex 18 and the associated Technical Instructions (Doc 9284) are the sole authentic legal source material for the transport of dangerous goods by air. Doc 9284 is published every two years.

- The IATA Dangerous Goods Regulations, published annually by IATA, is a commercial document used by the industry for practical reference. It is based on the requirements of Annex 18 and the associated ICAO Technical Instructions.

- ICAO Doc 9481, *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods*, is published every two years.

Limitations of dangerous goods on aircraft

- OK for both passenger and cargo aircraft

- OK for cargo aircraft only
- forbidden substances
- risk categories
- definitions, units of measurement and conversion factors

Classification of dangerous goods

- Class 1

— Explosives

- Class 2

— Gases

- Class 3

— Flammable liquids

- Class 4

— Flammable solids

— Substances liable to spontaneously combust

— Substances which, in contact with water, emit flammable gases

- Class 5

— Oxidizing substances

— Organic peroxides

- Class 6

— Toxic substances

— Infectious substances

- Class 7

— Radioactive material

- Class 8

— Corrosives

- Class 9

— Miscellaneous dangerous goods

8.3.3 Responsibilities

Goal: *To clarify the responsibilities relating to dangerous goods as they apply to the different parties concerned.*

Shipper's responsibilities

- packing

- labelling
- documentation

Operator's responsibilities

- passenger briefing and check-in procedures
- staff training
- acceptance procedures
- storage and loading

inspection and decontamination

- provision of information to pilot-in-command and employees
- information by pilot-in-command in case of in-flight emergency
- reporting of dangerous goods accidents and incidents
- information by operator in case of aircraft accident or incident

8.3.4 Emergency procedures

Goal: *To outline the FOO/FD's responsibilities in the event of an emergency involving dangerous goods.*

- procedures to be carried out in the event of:

— aircraft accident where there are dangerous goods on board

— incident due to dangerous goods on board an aircraft:

- in flight
- on board an aircraft on the ground

— dangerous goods incident when air freight has been accepted by the operator

Note.— In the event of the FOO/FD being responsible for the actual acceptance, handling, storage and loading of dangerous goods, a far more comprehensive and detailed dangerous goods training course shall apply

MODULE 9 - FLIGHT PLANNING

9.1 Introduction

The purpose of good flight planning is to produce a flight plan that gives minimum time allied with minimum fuel, on the best possible route, avoiding bad weather conditions and following all safety procedures, and air law and air traffic management requirements. In order to perform flight planning, the FOO/FD must use all the skills learned and knowledge gained from the other parts of this course, including air navigation, aircraft performance, meteor- ology, air law, mass and balance and air traffic manage- ment (services). Checking security matters and for the presence of dangerous goods will play a part, as will the application of human resource management in the dispatch department. In addition, communications skills and tech- nology will be used to file the flight plan and advise all down line of scheduled departure and arrival times, load on board, etc. It is important to note that flight watch/oper- ational control cannot be conducted without access to flight plan details.

9.2 Training objectives

Conditions: Trainees must be provided with copies of climb, cruise and descent tables, route maps as well as approach and departure charts, with access to applicable performance data, mass and balance information and any other information deemed necessary for com- pletion of a flight plan. Trainees must be equipped with a scientific calculator, Dalton- type navigation computer and a notebook with a supply of pens, pencils, etc.

Performance: Given the appropriate data and access to the appropriate sections of the operations manual, the trainee will be able to complete an operational flight plan in accordance with laid-down rules and standards.

Standard of accomplishment:
All requirements for flight planning will be readily identified by the trainee. He will be an asset to any flight dispatch department, knowing “what questions to ask”, what procedures are imperative, what flight plan information is most important, how to file a flight plan and how to monitor the progress of the flight in accordance with the flight plan.

9.3 Required knowledge, skill and attitude

Goal: *To provide the trainee with detailed knowledge of flight planning methods and procedures, practice in the use of charts and tables to determine flight time and fuel, and practice in making operational decisions and in the preparation of flight plans and flight clearances.*

9.3.1 Introduction to flight planning

Goal: *To introduce flight planning procedures and to explain the need for flight plans and the FOO/FD's function in flight planning.*

The operator's flight planning objectives

- to co-ordinate and integrate all essential pre-flight activities
- to ensure safety of flight
- to provide a maximum of comfort and convenience to passengers
- to avoid forecast severe weather
- to schedule so as to avoid times of known adverse weather
- to operate on time
- to carry all available payload
- to operate economically
- to estimate:

— fuel requirements
— flight time
— payload

Conflicting flight planning objectives

- safety is always the prime objective.
- it is seldom possible to plan a flight to simultaneously:

— carry all available payload
— operate on schedule
— operate at minimum cost
— provide the smoothest possible flight
— conform with crew time limitations.

Operating costs

- Direct operating costs (DOC) which vary with flight duration and over which the FOO/FD has some measure of control such as:

— fuel
— direct maintenance labour and material costs that are time-dependent
— flight and cabin staff salaries based on time- dependent formulae
— alternate selection — landing and handling fees

Flight planning for different objectives

• maximum speed requires use of maximum thrust or power within airframe limits at altitude that produces maximum ground speed.

• minimum fuel consumption requires use of most fuel- efficient cruise control procedure, route and altitude.

• minimum cost requires analysis of both fuel and other time-dependent direct operating costs.

• since fuel costs dominate other time-dependent direct operating costs, minimum cost cruise control pro- cedures, routes and altitudes are generally close to those for minimum fuel consumption.

The value of the flight plan to the flight crew

• establishes the optimum route, altitudes, and cruise control procedure based on careful analysis of the best available information

• predetermines or estimates:

— tracks and distances

— speeds and headings

— flight times between reporting points

— fuel consumption and reserve fuel

• plans for contingencies such as:

— terminal weather below operating minima

— situations for which point of no return or critical point estimates would be valuable

— drift down after engine failure

The value of the flight plan to air traffic services

• co-ordination and integration of flight plans and traffic flows by ATC

• co-ordination with other ATS units

• assistance in the prompt issue of a clearance that most closely meets the operator's request

Role of the FOO/FD in
the flight planning process

• determine that the appropriate State and operator depart- mental authorizations have been obtained to operate special flights such as:

— extra sections of scheduled flights

— charters

— publicity flights

— ferry flights

— ferry flights with inoperative engine or system test flight
— training flights
— choice of call signs

• analyse weather to determine if flight can operate
• establish aircraft availability
• establish availability of flight crew and cabin staff
• determine available payload
• make operational decisions:

— departure time:
• on schedule
• delayed
• early
— aircraft type:
• normal type as scheduled
• smaller
• larger
— cancel scheduled flight
— originate new flight

— consolidate flights
— omit scheduled stop(s)
— add unscheduled stop(s)
(in accordance with State regulations and operator's policies)

• analyse weather, route and performance data to deter- mine optimum flight trajectory using operator's criteria
• select alternate airports
• prepare the flight plan
• distribute relevant flight plan details to other depart- ments
• brief flight crew
• reach agreement with pilot-in-command on final flight plan
• issue flight release
• file flight plan with ATC

ATC flight plan

• integration of performance data, route data and meteoro- logical information

- requirement for judgement as well as proficiency in mechanical processes
- types of flights for which flight plans are required
- flight plan formats:

— VFR
— IFR
— ICAO form
— operator's forms to meet flight crew requirements

- filing of flight plans:

— time before estimated time of departure
— agency
— communication method
— normally an FOO/FD responsibility

- repetitive flight plan:

— purpose
— format
— amendments prior to departure
— amendments after take-off

- differences between flight plans:

— reciprocating engine aircraft
— turboprop aircraft
— jet aircraft
— with respect to:

- cruise control methods
- routes and altitudes
- speeds and Mach number
- identification
- fuel reserve requirements

11.3.2 Turbo-jet aircraft cruise control methods

Goal: *To review turbo-jet aircraft performance and explain cruise control procedures used in commercial aviation.*

- review of turbo-jet principles
- jet aircraft performance graphs
- jet aircraft cruise control methods
- jet aircraft performance variations

11.3.3 Flight planning charts and tables for turbo-jet aircraft

Goal: *To familiarize the trainee with cruise control and flight planning charts and to enable him to become proficient at extracting usable data from them.*

- climb and descent charts and tables
- constant Mach number flight planning tables
- constant Mach number flight planning charts
- long-range cruise flight planning charts and tables

11.3.4 Calculation of flight time and minimum fuel for turbo-jet aircraft

Goal: *To enable the trainee to become proficient in calculating flight time and minimum fuel for turbo-jet aircraft.*

- principles and procedures
- taxi fuel
- optimum altitude
- use of charts
- fuel reserves

critical point fuel

- trainee practice calculating flight time and minimum fuel including at least one example where CP fuel is required

11.3.5 Route selection

Goal*: To identify factors to be considered in the selection of optimum tracks and to provide practice in the selection and application of same.*

- selection of optimum track
- the great circle in relation to minimum time track (MTT)
- general appearance of MTT on upper-air charts
- selecting the MTT from limited alternatives
- modifications to theoretical MTTs
- trainee practice in estimating MTTs:

— from limited alternative routes

— by time front analysis:

- modification to time front analysis MTT

11.3.6 Flight planning situations

Goal: *To outline fuel-tankering principles and to provide practice in their application.*
Introduction

- flights are normally planned on the basis of the mini- mum fuel that allows for all reasonable contingencies.
- more than minimum fuel should be considered when:

— weather conditions are marginal and greater operational flexibility is desirable

— fuel shortages exist at down-line airports

— fuel costs considerably more at down-line airports.

- decisions to carry additional fuel should take into consideration the cost of "tankering".
- a simple graph can be prepared showing the costs involved, taking into account the purchase prices at both airports and the cost of "tankering".

Classroom exercise

- using the simplest available method, calculate flight time and fuel for a typical long flight.

- recalculate with take-off mass 10 000 pounds/kilos heavier.
- calculate fuel consumed when carrying 10 000 pounds/
kilos extra fuel.

11.3.7 Reclearance

Goal: *To outline reclearance technique and to provide practice in its application.*

Reclearance technique flight planning

- an alternative to planning an unscheduled landing or deplaning payload when minimum fuel to destination is restrictive
- fuel-saving technique valid under favourable weather conditions
- principle involves planning the flight to an alternate airport short of final destination:

— along optimum route to final destination up to reclearance point

— minimum fuel based on flight to alternate

— additional fuel may be carried if mass is available

- prior to clearance point, fuel to destination is calculated using normal criteria and latest meteorological data
- flight is recleared to final destination if fuel on board at the reclearance point is adequate

from reclearance point to destination plus alternate, hold and en-route reserve

• probability of being recleared is enhanced by reduced fuel reserve requirement for shorter remaining route segments

Classroom exercise

• using the simplest available method, calculate normal minimum fuel for a typical long flight to destination with a 300-mile alternate.

• recalculate minimum fuel for same flight to an airport
300 miles short of destination and using destination as the alternate. Then calculate the additional payload that could be carried.

• estimate how much fuel could be saved by good flight planning.

11.3.8 The final phases

Goal: *To identify the final phases of the flight planning process and the FOO/FD's role in their completion.*

The flight release (where applicable)

• issued by FOO/FD when satisfied that all conditions for safe operation, in accordance with all limitations and regulations, have been met

• if based on a computer-generated flight plan, the clearance should not be given until a gross error check has been made

• normally includes items such as:

— flight designator

— points between which cleared

— aircraft registration

— minimum fuel

— maximum permissible take-off mass

— taxi fuel

— alternate(s) when required

— fuel over destination

— wind component and temperature

— route

— name of FOO/FD

• the FOO/FD may issue a series of releases for each of the legs of a pilot's cycle subject to time constraint

• revised releases may be transmitted directly to the pilot-in-command or made available on his arrival at down-line stations

The flight crew briefing

- flight crew briefing includes:

— meteorological information

— status of airports, navigation aids and communi- cations facilities (NOTAM)

— aircraft equipment deviations

— reasons for the recommended flight plan

Filing the flight plan

- normally done by the FOO/FD at a time specified by ATC
- normal format for international flights is as specified by ICAO
- exceptions include domestic flight plan formats accept- able to that State
- the importance of filing a flight plan strictly in accord- ance with the prescribed format should be emphasized
- repetitive flight plans
- company departure message

11.3.9 Documents to be carried on flights

Goal: *To explain the purpose and establish the responsibility for ensuring that all essential documents are on board the aircraft.*

Flight crew and cabin staff documents

- valid flight crew licences, passports and visas
- current NOTAM and amendments
- special instructions and documentation for charter flights
- flight permit for special circumstances where CofA or CofR is void such as for test, ferry, or demonstration flight

Aircraft library

- aircraft flight operating manual
- sections of the operations manual applicable to flight crews
- aeronautical information publications
- aircraft journey log book

Aircraft documents pouch

- certificate of airworthiness
- certificate of registration
- aircraft radio licence (see Chapter 13 — Communi- cations — Radio)
- fuel supplier carnet for purchase at off-line stations
- emergency en-route charts for emergencies
- sabotage checklist

Customs and immigration clearance forms

- general declaration (GD) form — required by some States
- declaration of health form (may be combined with GD)
- passenger manifest
- crew manifest

Note.— Requirements for many of these documents vary from State to State.

11.3.10 Flight planning exercises

Goal: *To enable the trainee to practice making operational decisions and preparing flight plans, thereby developing proficiency and confidence.*

Purpose and objective

- the purpose is to simulate typical operational situations in which the trainee is required to exercise judgement and apply and integrate knowledge and skills for efficient flight planning.
- the objective is to provide proficiency in operational decision making and in the detailed preparation of flight clearances and flight plans, using information only normally available to the FOO/FD.

Availability of information

- the exercises should be based on aircraft types for which the appropriate sections of a flight operating manual are available.
- the airports and routes selected should be those for which appropriate aeronautical information is available. Meteorological information should be varied for each exercise and provided in standard format.
- the available payload and aircraft are to be specified by the instructor.
- at least one exercise should include an aircraft equip- ment deviation that constrains

the flight plan.

Exercise objectives

- to decide on the best operational plan which should include situations in which:
  - a flight can be cancelled, delayed, consolidated
  - all available payload cannot be carried
  - all available payload can only be carried by use of a feasible reclearance technique operation
  - normal operation is possible
- for each flight actually operated, the trainee should prepare a flight clearance and a flight plan in standard format

11.3.11 Threats and hijacking
(see also Chapter 15 on a related subject)

Goal: *To ensure that the FOO/FD is aware of his responsibilities, knows what to do and how to do it quickly and efficiently, knows how and where to get assistance without delay and can assist company and State authorities, where appropriate.*

The FOO/FD must:

a) have general knowledge of what actions he must take when information is received concerning threats or hijacking;

b) have general knowledge of his carrier and local authority policy and procedures as well as his responsibilities in the event of information being received concerning threats or hijacking; and

c) be familiar with the operator's safety and emergency procedures manual.

11.3.12 ETOPS

Goal: *The FOO/FD must, sooner or later, expect to be involved in flight planning, crew briefing and operational control concerning extended range operations by aeroplanes with two turbine power-units (ETOPS).*

Terminology and application

- adequate airport:
  - An airport sufficiently equipped to support the aircraft operation. This includes runway length, lighting, approach facilities, fire fighting, and a sufficient number of hotel rooms for accommo- dating passengers from diverted, delayed or cancelled flights. This concept of adequate airport is included in the definition of the area of operation.
- suitable airport:

— An adequate airport with weather reports or forecasts, indicating that the weather conditions are at or above operating minima, and the field conditions at that airport indicate that a safe landing

can be made at the time of intended operation. As opposed to the concept of adequate airport, this suitable airport definition is actually used in the dispatch phase and in actual flight with specific weather requirements.

- auxiliary power unit
- ETOPS configuration maintenance and procedures
- engine
- extended range operations
- extended range entry point
- fail-safe
- In-flight shutdown
- system:

— airframe

— propulsion

- airworthiness standards
- operational in-service experience requirements for:

— 75-minute operation

— 120-minute operation

— 180-minute operation

Flight dispatch considerations

- 75-minute operation:

— master minimum equipment list (MMEL)

— weather

— fuel

— operational control practices and procedures

— flight planning

- 120-minute operation:

— MMEL

— weather

— fuel

— operational control practices and procedures

— flight planning

• 180-minute operation:

— MMEL

— weather

— fuel

— operational control practices and procedures

— flight planning

Dispatch considerations in addition to normal dispatch requirements

• MMEL

• communication and navigation facilities

• fuel and oil supply

• alternate airport requirements:

— suitable airport parameters

— airport services and facilities

— meteorological forecast requirements

• operational control (flight watch)

• aeroplane one-engine inoperative performance data covering:

— drift down (includes net performance)

— cruise altitude coverage including 10 000 feet

— holding

— altitude capability (includes net performance)

— missed approach

• all-engines operating performance data for standard and non-standard atmospheric conditions covering:

— cruise

— holding

• details of any other conditions relevant to extended range operations that can cause significant deterioration of performance

Operational limitations

• authorized area of operation

• flight dispatch limitation specifying maximum diver- sion time from a suitable airport

• use of maximum diversion time to ensure that extended range operation is limited to routes where the approved maximum diversion time to suitable airports can be met

• contingency procedures are not to be interpreted in any way that prejudices the

responsibility and the final authority of the pilot-in-command

En-route alternate airports

- adequate airport
- suitable airport
- standard en-route alternate weather minima:

— a single precision approach

two or more separate precision approach-equipped runways

— non-precision approach(es)

Note.— Lower than standard en-route alternate airport weather minima may be considered for approval for certain operations on an individual basis by the relevant Civil Aviation Authority depending on the facilities at the airport(s) concerned.

- en-route alternate suitability in flight

APPENDIX III
APPLIED PRACTICAL TRAINING
FLIGHT OPERATIONS OFFICER LICENCE

III-1 Introduction

III-1.1 Phase two of the course takes the form of a series of supervised exercises in which trainees are given the opportunity to develop decision-making abilities by apply- ing knowledge gained in earlier parts of the course. The exercises consist of operational flight planning based on weather analysis, fuel and load calculations, selection of navaids, and compliance with regulations, procedures and amendments thereto. If on-the-job training can be arranged, then this part of the curriculum should be omitted at the training school and given in a convenient dispatch office where the trainee can receive the required practical training under the guidance and supervision of an FOO/FD instructor. In the latter case, however, it will expedite the trainee's training if, in addition to "real" flights, hypo- thetical situations are set up as exercises when time allows.

16.1.2 The simulated or assumed operating conditions for each exercise must be clearly specified by the instructor. The exercises should be made as realistic as possible. Past flight records, meteorological forecasts, charts, weather observations, etc., can be used to advantage, and answers arrived at by the trainees compared to what actually took place. A group discussion after each exercise will prove beneficial in eliminating possible misconceptions.

Note.— Exercises provided in this phase of the training are additional to the class exercises carried out as part of the training covered in phase one.

III-2 Applied practical flight operations

Goal: *To provide the trainee with practical experience in aircraft dispatch and the associated duties and responsibilities of the FOO/FD.*

III-2.1 Materials and publications required:

a) specimen meteorological surface and upper-air charts; forecasts and meteorological folders;
specimen NOTAM;

c) flight manual, including cruise control charts and performance limitation tables (may be included in the operations manual);

d) route guide and operations manual; and
e) flight operation forms including flight plan and message forms.
f) III-2.2 In defining the operating conditions for the exercise, the instructor should include the following, as applicable for each case:

a) the flight programme showing scheduled departure and arrival times at terminals including type of aircraft to be used;

b) load available at each terminal; destination of such loads;

c) commercial considerations having any possible effect upon operational decisions, e.g. availability of passenger accommodation in the event of an enforced diversion;

d) aircraft and flight crew routing if more than one flight is involved;

e) meteorological charts and forecasts;

f) in-flight reports from other flights;

a) status of navigation aids
(aeronautical information publication and NOTAM);

h) status of aerodrome serviceability (aeronautical information publication and NOTAM);

i) the ATC situation; and

J) passenger and cargo-handling facilities at terminals and at alternates

III-2.3 Exercises should be designed to give the trainees practice in the following:

a) making decisions as to scheduled operation, delayed operation, re-routing or cancellation of flights;

Note.— In this group of exercises, it will be necessary to give instruction on the application of the operator's procedures relevant to the FOO/FD's actions in cases of delayed, cancelled or diverted flights, handling of passengers and freight, and repositioning of aircraft.

b) flight crew briefing, including the preparation of briefs for the use of pilots-in-command, on changes in Regional Procedures, on States' Regulations or on subjects referred to in NOTAM and which may affect the planned flight;

c) flight planning including selection of routes, tracks, altitudes, cruise procedures, and alternates and cal- culation of fuel requirements;

d) compilation of ICAO and operator's operation messages;

e) provision of flight plan information to ATC;

f) provision of flight progress information to company offices;

g) calculation of maximum permissible take-off and landing weights;

h) calculation of payload;

i) preparation of flight documents;

) information to flights en route;

k) revisions to flight plans, including recalculation of fuel requirements en route;

l) plotting of position reports and of flight progress;

m) unreported flights;

n) emergency situations. (Special emphasis should be given to the operator's emergency procedures, including the alerting of State, company and private agencies.); and

O) any of the above using a hand-held digital computer and/or digital computer terminal if computerized flight planning is available in the operational control system used in the State.

III-3 Simulator LOFT observation and synthetic flight training

Goal: *To provide trainees with a better understanding and awareness of the working environment in the cockpit of a commercial air transport aircraft and the practical duties of the flight crew under normal, abnormal and emergency operational situations.*

III-3.1 When FOO/FDs have been recruited from one of the operational disciplines such as pilots, their background of active experience has proven invaluable in equipping them with an appreciation of the operational effect of their work as FOO/FDs. A large number of FOO/FD trainees, however, are recruited from other sources and may lack a factual appreciation of the duties and responsibilities of flight crew members in a commercial air transport aircraft under normal, abnormal and emergency operational situations.

III-3.2 To enable FOO/FDs to gain an understanding and practical knowledge of the operational environment in the cockpit of a commercial air transport aircraft, it is essential that they spend some time observing a representative training session of flight crew members undertaken in an appropriate synthetic trainer. It is recommended that this training include participation in pre-simulator CRM briefing and observation of at least one full line-oriented flight training (LOFT) which includes simulated exercises under normal, abnormal and emergency flight conditions.

III-3.3 If practicable, an effort must also be made to give an FOO/FD trainee practical synthetic (link) training to enable him to appreciate the "feel" of the time element involved in the handling of aircraft and to allow him to compare the

difficulties of flying characteristic patterns using specific aids to navigation, and performing aerodrome procedures. Such exercises, if undertaken, should be conducted with the aim of teaching an understanding of the procedures rather than their faultless execution.

III-4 Flight dispatch practices(on-the-job training)

Goal: *To develop trainee confidence by providing him with an opportunity to apply his newly acquired knowledge in an actual operational control environment*

III-4.1 After the completion of the classroom training and the training on applied practical flight operations including LOFT training observation and synthetic (link) flight exercise, it is essential that the trainee be assigned to actual operational control duties under supervision. The provision of on-the-job training will enable the trainee to develop the necessary confidence to perform the duties and responsi- bilities of a full-fledged FOO/FD. In addition, on-the-job training will enable him to have first-hand experience on the exigencies of the profession as it is performed by experienced dispatchers under an actual operational environment.

III-4.2 On-the-job training must be provided for at least
90 days (thirteen weeks) to allow the trainee a reasonable opportunity to acquire adequate experience and to comply with the requirements of 4.5.1.3 of Annex 1 — *Personnel Licensing*.

III-5 Route familiarization

Goal: *To allow the trainee to appreciate the route characteristics in the selected area of operation and familiarize himself with the different procedures and services available over different route sectors.*

III-5.1 Route familiarization is considered an essential and integral part of the training of FOO/FDs since it supplements that part of the appreciation of pilot work which cannot be learned in a flight simulator. It also allows a realistic appreciation by the trainee of route character- istics in the selected area of operation, such as the differences in procedure and services available over different route sectors and at different aerodromes, of the effects of prevailing meteorological conditions and topo- graphical features, and of the handling of in-flight difficulties occasioned by environmental conditions. Such practical experience will assist the FOO/FD in the perform- ance of his duties to the highest possible standards. For the trainee to derive the maximum benefit from each flight, the following should be observed:

a) The co-operation of the pilot-in-command must be secured.

b) Arrangements must be made with the pilot-in- command for the position(s) that the trainee is to occupy during the various stages of the flight to enable him to observe and monitor proceedings as far as is practicable. The planned workload

of the trainee must be realistic and not overly demanding.

c) The trainee must participate with the crew through all the operational phases of pre-flight preparations.

The trainee should prepare a complete "dummy" dispatch for the flight. This "dummy" dispatch should be compared at some convenient time with the actual dispatch sequence adopted for the flight.

e) At the end of the flight, the trainee must again accompany the crew in its ground activities until the flight is closed and the aircraft handed over, including all company procedures.

III-5.2 The contents of the trainee's plan for the flight will necessarily vary depending on the character of the flight. The following are points of primary interest and should be included if possible:

a) pre-flight check-compliance with safety standards; loading, load distribution, carriage of dangerous goods, amount of fuel, aircraft instrumentation, operational equipment and rescue equipment, "go/no go" check-off system;

b) pre-flight check-crew; composition, flight and duty time limitation, licences and other documents, summary of NOTAM;

c) pre-flight meteorological briefing; MET folder;

d) flight briefing; flight plan, flight documents, flight kit, company orders;

e) derivation of take-off data in the environmental runway conditions;

f) ATC clearances;

g) in-flight procedures, position reporting, weather reporting, altimeter setting changes, etc.;

h) comparison of forecast to actual flight and weather conditions;

i) communications with ATS along route and reason for such communication;

j) performance of navigation aids and facilities;

k) derivation of landing data in the environmental conditions;

l) landing sequence, holding time, taxiing time;

m) test flight arrival report, including snag reports; and n) intermediate stop, refuelling, handling of passengers, reclearing the flight, meteorological briefing.

III-5.3 After the flight, a step-by-step analysis of the data collected should be made.

This analysis should be carried out with a group of trainees to allow the widest use to be made of the flight information collected and to illustrate the practical application of the classroom subjects.

III-6 OJT LESSON PLAN

APPENDIX IV
PANEL OF DESIGNATED EXAMINERS
FLIGHT OPERATIONS OFFICER LICENCE

IV-1 Designated Examiners for Practical Test

1. Mr. Dilantha Weeraratne
2. Mr. Hiran Kurukulasuriya
3. Mr. Nishanth Handapangoda
4. Mr, Gopitha Ransinghe

IV-2 Designated Panel of Examiners for Knowledge Examiners

1. Dilantha Weeraratne - Course Induction
2. Duncan Jayawardena - Civil Air Law and Regulation
3. Dilantha Weeraratne - Regulatory – MEL
4. Prasanna Wickramarachchi- Aircraft propulsion system
5. Chinthaka Guruge- Aircraft propulsion system
6. Duncan Jayawardena – Aviation Terminology
7. B.U.N. Crooy – Rir Traffic Management
8. Thereka Thilakawardena – Mass and Balance Control
9. Namal Rajanayake – Navigation
10. Kishantha Nimalaratne – Air Traffic Management, Aerodrome Services
10. L .Felix – Dangerous Goods by Air
11. Dilantha Weeraratne – Meteorology
12. Dave De Visser – Aircraft Mass and Performance
13. Devinda Abayagunawardana – Radio communication
14. Denesh Chakrawarthi – ATS
15. Harsha Priyadarshana – Human Factors
16. Gopitha Ranasinghe – Flight Planning
17. Indika Gunasekara – Flight Monitoring
18. G.H.A.Jayah – Safety Equipment on board
19. Manjula Rathnayake – Security
20. Sumith Nawaratne – Calculation of crew duty time
21. Himali Sethunge – ERP

APPENDIX V – PROCEDURE FOR ISSUANCE OF ASO LICENCE

1.1.0 General Provisions

1.1.1 An Aeronautical Communication Station (Aero Mobile Communication Center) in Sri Lanka shall be operated by personnel licenced by DGCA Sri Lanka with effect from 15th October 2010. Unlicenced individuals shall not operate as Aeronautical Station Operators after 15th of October 2011 unless they meet the requirements at 1.2.0 of this document.

1.1.2 DGCA Sri Lanka shall issue continuing type (non-expiry type) of Aeronautical Station Operator Licence.

1.1.3 An applicant shall before being issued with an Aeronautical Station Operator Licence meet such requirements in respect of age, knowledge, experience and skill as are specified at para 1.2.0 of this document.

1.1.4 An Applicant for an Aeronautical Station Operator Licence shall demonstrate in the manner approved by DGCA Sri Lanka as per Manual SLCAP 3100, such requirements in respect of knowledge and skill.

1.1.5 A holder of Aeronautical Station Operator Licence shall not exercise the privileges of the licence unless he/she maintains competency and meets the requirements for recent experience at paragraph 1.4.0 and 1.5.0 of this document.

Knowledge

The applicant shall have demonstrated a level of knowledge appropriate to the holder of an aeronautical station operator, in at least the following subjects:

General knowledge
a) air traffic services provided within the State;

Operational procedures
b) radiotelephony procedures; phraseology; telecommunication network;

Rules and regulations
c) rules and regulations applicable to the aeronautical station operator; and

Telecommunication equipment
d) principles, use and limitations of telecommunication equipment in an aeronautical station.

Experience
The applicant shall have:
a) satisfactorily completed an approved training course within the 12-month period immediately preceding application, and have served satisfactorily under a qualified aeronautical station operator for not less than two months; or

b) satisfactorily served under a qualified aeronautical station operator for not less than six months during the 12-month period immediately preceding application.

Skill

The applicant shall demonstrate, or have demonstrated, competency in:

a) operating the telecommunication equipment in use; and

b) transmitting and receiving radiotelephony messages with efficiency and accuracy.

Aeronautical Mobile Communication section compromise;

1. Aero Com Manager Grade 3
2. Aero Com Supervisor
3. Aero Comm Officer Grade 1

1. Issuance of Licence for Aero Com Manager Grade 3/ Aero Com Supervisor/Aero Comm Officer Grade 1.

A. Issuance of Licence for Aero Com Manager Grade 3.

A.1 Requirements

a) Aero Com Manager Grade 3 have been working at Aeronautical Mobile Service Centre (AMSC) fulfilling the Annex 1 requirement.

Licence shall be granted on a recommendation made by Head of Air Navigation Services (HANS).

b) Aero Com Manager Grade 3 have not been working at AMSC fulfilling the Annex 1 requirement.

Regain currency working at the AMSC for two months. Licence shall be granted on recommendation made by HANS after regaining currency.

A.2 Procedure

a) Submit the duly filled application form CAA/PL/I/25 to CAASL signed by the applicant and recommended by the HANS.

b) Make the relevant fee

c) Appear for the ELPC test conducted by CAASL

d) Issue the Licence

B. Issuance of licence for current Supervisor and Aero Comm Officer Grade

B.1 Requirements

a) Supervisor and Aero Comm Officer Grade 1 having currency

Licence shall be granted after completing following requirements.

- Minimum 01 year working experience at Aeronautical Mobile Service Centre
- Knowledge test conducted by AASL for the subjects in Annex 1

Composition of the QP - i) Number of questions-20
ii) Duration-40 minutes

- A panel of skill test examiners as in 5 appointed by the DGCA, shall conduct a skill test at the AMSC.
- Appear for the ELPC test conducted by CAASL.

b) Aero Comm Officer Grade 1 not having currency

- Regain currency according to the recent experience plan as Per 4 b.2 Procedure

a) Submit the duly filled application form CAA/PL/I/25 to CAASL signed by the applicant and recommended by the HANS.
b) Make the relevant fee
c) Appear for the ELPC test conducted by CAASL
d) Issue the Licence

2. Issuance of Licence to new applicants of Aero Comm Officer Grade 1.

Requirements and procedure

The applicant shall have completed all requirements set out in IS 048 issued by DGCA Sri
Lanka and shall have followed the following procedure to grant the ASO Licence.

i. Inform CAASL regarding commencement of training course, AASL shall inform CAASL prior to start of the training course with following details
   a) Name of the applicants
   b) Title of the course
   c) Date of commencement
   d) Duration of the course
   e) Instructors

ii. Conduct of knowledge examination and Forward examination results to the CAASL

iii. After completing the course, submit the following details in respect of each trainee, along with the notification of commencement of their OJT programme.

   a) Title of the course
   b) Date of commencement & completion
   c) Subjects followed
   d) Results of the theoretical examination

iv. Conduct of OJT

Subsequent to an OJT, forward following details to CAASL.

a) Date of actual commencement of OJT
b) Date of completion of OJT
c) OJT observation report
d) Summary of OJT

v. Submit duly filled completed application form CAA/PL/I/25 to the CAASL signed by the applicant & recommended by HANS.

vi. Make the relevant fee

vii. Appear for the ELPC test conducted by CAASL

viii. Conduct skill test Assessment

HANS shall submit the OJT overall performance record to CAASL & a request to conduct skill test at the AMSC.

- A panel of skill test examiners as in 5 appointed by the DGCA, shall conduct a skill test at the AMSC.
- Forward skill test reports to DGCA signed by the examiners.

3. Recency & competency

i. Recency

- A holder of an Aeronautical Station Operator Licence shall work at the Aeronautical Mobile Service Centre Ratmalana not exceeding 06 months to consider having licence recency during this period, 2 months should be the minimum requirement.

ii. Competency

- A holder of an Aeronautical Station Operator Licence shall not exercise the privileges of the Licence if not been successful at the competency check within the proceeding period of one year.

  - Recency & competency shall be maintained by AASL and competency assessment shall be done by AASL annually & reports shall be forwarded to CAASL.
  - Competency elements are according to Assessment Form CAA/PL/M/16.

4. Loss of recent Experience

If the license holder failed to fulfill the above recency requirement specified in 3 will be treated as loss for having ASO licence recency & competency .Hence following requirements need to be completed to regain licence recency & competency.

i. Report for work at the AMSC Ratmalana within 30days

- Shall work under supervision of a licence holder nominated by Head of ANS for 03 subsequent working days. Satisfactory work performance will be considered having licence recency & competency

ii. Report for work at the AMSC Ratmalana within 08 weeks

- Shall follow 06 On-The-Job Sessions under supervision of licence holder nominated by the Head of ANS within 10 working days immediately after reporting for duty. Satisfactory report forwarded to the Head of ANS will be considered having licence recency & competency

iii. Report for work at the AMSC Ratmalana within 20 weeks.

- Shall follow 12 On-The-Job Sessions under supervision of licence holder nominated by the Head of ANS within 18 working days immediately after reporting for duty. Satisfactory report forwarded to the Head of ANS will be considered having licence recency & competency

iv. Report for work at the AMSC Ratmalana after 06 months or more

- Consider as a new applicant. The details of non-performance duties at the AMSC will be forwarded to DGCA Sri Lanka for his concurrence.

5. Skill Test Panel

Skill test examiners panel appointed by DGCA shall consists of following members.

- DDG(FSR)- Head of the panel
- D(A&NS)
- D(TOPL)
- HANS
- Two of following Aero Com Managers designated by DGCA
    - Manager Grade 2 – Aero Com
    - Manager Grade 3 – AMS
    - Manager Grade 3 – RMA
    - Manager Grade 3 – BIA

APPENDIX VI
FINAL ASSESSMENT REPORT

1. Final Assessment Report for FOO Licence;

Civil Aviation Authority of Sri Lanka

Flight Operation Officer License

Final Assessment Report

Name :		Date :
Examiner:		
Grade :	Time: to hrs	Location

01. FAMILIARIZATION	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
1.1 Flight Dispatch Back Office			
1.2 Other sections at Flight Operations			
1.3 Srilankan IT policy and reporting structure			

02. FAMILIARIZATION	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
2.1 Airline Operations Control Centre (AOCC)			
2.2 Flight Dispatch Centre (FDC)			
2.3 Air Navigational Service Units			
2.4 Aircraft and Airport Services			

03.TRANSFERENCE OF DUTIES AND RESPONSIBILITIES	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
3.1 Taking Over Duties and Responsibilities			
3.2 Equipment and Serviceability Check			
3.3 Handing Over Duties and Responsibilities			

04. DOCUMENTATION	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
4.1 Company Procedures			
4.2 Documentation Reference			
4.3 Digital Library			

05. COMPUTER FLIGHT PLAN	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
5.1 Flight Planning system			
5.2 Performance Calculation (Manual and EFB)			
5.3 Flight plan Description			
5.4 Navigation Charts (Jeppesen e-link and iPad)			

06. ATC FLIGHT PLAN	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
6.1 ICAO Flight Plan Form			
6.2 Visit to AIS			

07. FUEL SHEET	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
7.1 Description of a Fuel Sheet			
7.2 Filing the Fuel Sheet			
7.3 Distribution of a Fuel Sheet			

08.METEOROLOGICAL AND NOTAM INFORMATION	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
8.1 Collection of Meteorological Information			
8.2 The Meteorology Folder(Using Local MET reports and LIDO reports)			
8.3 NOTAM Bulleting and Requesting Procedure			
8.4 WSI System and weather monitoring (WSI user Manual)			

09. CARGO RESTRICTIONS AND EMERGENCY DUTIES	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
9.1 Cargo Restrictions			
9.2 Emergency Duties			

10. FLIGHT DELAYS	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
10.1 Delay Co-ordination			
10.2 Re-scheduling and Re-routing			
10.3 Slot Coordination (CFMU application)			

11. HANDLING OTHER AIRLINE FLIGHTS	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
11.1 Ad-hoc Flights			

11.2 Scheduled Flights			
12. COMMUNICATION	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
12.1 Methods of Communication			
12.2 Radio Communication (VHF/SATCOM)			
12.3 SITA Text, email			
12.4 Amadeus / Altea Reservation System			

13. FLIGHT BRIEFING	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
13.1 Collection of Data			
13.2 Pre-Flight Briefing (ETOPS, Non-ETOPS and Re-Dispatch Flights)			
13.3 Post Flight Briefing			

14. FLIGHT MONITORING	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
14.1 Introduction to the Flight Monitoring			
14.2 Flight Monitoring tool (AIMS)			
14.3 Monitoring a Normal Schedule Flight and ETOPS Flight			
14.4 Monitoring a Delayed Flight			

15. SPECIAL AIRPORTS	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
15.1 Introduction to Special airports			
15.2 Airport categories			
15.3 Special Operating Procedures			

16. CREW SCHEDULING	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
1 Introduction to Crew Scheduling and Crew Web			
16.2 Reading Crew Rosters (On the System)			
16.3 Preparation of Crew Lists from the Roster			
16.4 Introduction to Crew General Declaration (GD)			
16.5 Flight Time Limitations			

17. OVER FLYING CLEARANCE	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**

17.1 Reading Charts			
17.2 Requesting Over Flying Clearance			
17.3 Receiving Over Flying Clearance			
	OVERALL GRADING		

18. FURTHER OBSERVATION ON TRAINEE'S PERFORMANCE (IF ANY)	
(a) Anticipation	
(b) Planning	
(c) Adapting to Changing Situations	
(d) Recovery from Situation	

19. RECOMMENDATION(S):

The applicant has demonstrated the ability to:

a) make an accurate and operationally acceptable weather analysis from a series of daily weather maps and weather reports; provide an operationally valid briefing on weather conditions prevailing in the general neighborhood of a specific air route; forecast weather trends pertinent to air transportation with particular reference to destination and alternates;

b) determine the optimum flight path for a given segment, and create accurate manual and/or computer generated flight plans;

c) provide operating supervision and all other assistance to a flight in actual or simulated adverse weather conditions, as appropriate to the duties of the holder of a flight operations officer licence; and

d) Recognize and manage threats and errors.

20. OTHER COMMENTS

NAMES OF EXAMINERS, SIGNATURES & DATE

NAME	**SIGNATURE**	**DATE**
(i)		
(ii)		
(iii)		
(iv)		

2. Final Assessment Report for ASO Licence;

Civil Aviation Authority of Sri Lanka

Aeronautical Station Operator License

Final Assessment Report

Name :		**Date :**
Grade :	**Time :** to hrs	**Inspector :**
Category of Rating : Aero. Mobile Services Operations		**Location :** *Ratmalana*

01. PROCEDURES	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
(a) Frequency Assessment : Level / Noise / Gain & Technique			
(b) Delivery of ATC Clearance & Met Info.			
(c) Transfer of Control of Aircraft			
(d) Establish Com. With ACFT / PSN			
(e) SELCAL Procedure			
(f) Allocation & PRI / SRY Frequencies & Network Coordination			

02. TRAFFIC MANAGEMENT / EXPEDITION	**Grading Pass / Fail**	**Marks/ 100**	**Remarks**
(a) Maintaining / Testing use or available Frequencies			
(b) Maintaining an Efficient Communication Courage			
(c) Level Req / Relay FL to Climb & Descent ACFT			
(d) Other Network / ACFT STNS			
(e) Judgment / Select Proper Frequencies			
(f) Req assistance from Other Network / ACFT STNS			
(g) Attitude towards Efficiency			

03. PHRAESEOLOGY	**Grading Pass / Fail**	**Marks / 100**	**Remarks**
(a) Use of Standard Phraseology on R/T			
(b) Use of Standard Phraseology in Communication			
(c) Use of Standard & Appropriate Phraseology during Emergencies			

(d) Speech Rate, Pronunciation & Voice Clarity – Language Proficiency			

04. CO-ORDINATION	**Grading Pass / Fail**	**Marks / 100**	**Remarks**
(a) Safety of Releases			
(b) Composition of Releases			
(c) Timeliness of Releases			
(d) Coordination with Adjacent Network Stations			
(e) Coordination with FIC VCCC			
(f) Coordination with other ATS Units			
(g) Coordination with non-ATS Units (Ex. MET / TECH)			

05. STRIP MARKING	**Grading Pass / Fail**	**Marks / 100**	**Remarks**
(a) Use of Correct Colour Code			
(b) Correctness in Updating			
(c) Timeliness in Updating			
(d) Strip board Management & Completeness			
(e) Removal of Dead Strips / CNL Strips			

06. SAFETY OF OPERATION	**Grading Pass / Fail**	**Marks / 100**	**Remarks**
(a) Continuous Situational Awareness			
(b) MNTN listening watch on All Frequencies			
(c) Prompt Action Correcting Errors when required			
(d) Ability to work without Supervision			

07. EQUIPMENT	**Grading Pass / Fail**	**Marks / 100**	**Remarks**
(a) Checks for Serviceability			
(b) Adjustments & Handling			
(c) Reporting Faults			

08. KNOWLEDGE	**Grading Pass / Fail**	**Marks / 100**	**Remarks**
(a) Current NOTAMS			
(b) Local Instructions in-force, National ICAO AMS Procedure awareness adopt			
(c) Maps & Charts, ATS Route Structure within & adjacent FIRs			

09. EMERGENSIES	**Grading Pass / Fail**	**Marks / 100**	**Remarks**
(a) Recognition of Nature & Gravity of Emergency			
(b) Application of appropriate Emergency Procedures including Coordination with other units			
(c) Assistance to Aircraft in Emergency			

(d) Maintenance / Resumption of Normal Traffic Flow			
(e) Expedite Data with Relevant Praties			

10. PSYCHOMETRY ASPECTS	**Grading Pass / Fail**	**Marks / 100**	**Remarks**
(a) Interest / Commitment			
(b) Willingness to improve (learn / change)			
(c) Acceptance of Instructions from superiors			
(d) Attitude towards work			
(e) Temperament & Staff Relationship			

OVERALL GRADING	

11. RECOMMENDATION(S) :

NAMES OF EXAMINERS, SIGNATURES & DATE		
NAME	**SIGNATURE**	**DATE**
(i)		
(ii)		
(iii)		
(iv)		
(v)		