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# **Airworthiness Manual**

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**Volume I**  
**Organization and Procedures**

Approved by the Secretary General  
and published under his authority

First Edition — 2001

**International Civil Aviation Organization**

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**AMENDMENTS**

The issue of amendments is announced regularly in the *ICAO Journal* and in the monthly *Supplement to the Catalogue of ICAO Publications and Audio-visual Training Aids*, which holders of this publication should consult. The space below is provided to keep a record of such amendments.

**RECORD OF AMENDMENTS AND CORRIGENDA**

AMENDMENTS		
No.	Date	Entered by

CORRIGENDA		
No.	Date	Entered by

# Foreword to Volume I

1. This volume of the *Airworthiness Manual* outlines the obligations of the State of Registry and the State of the Operator under the Convention on International Civil Aviation on matters related to airworthiness. It provides detailed guidance on the establishment and operation of an airworthiness organization within the State Civil Aviation Authority with emphasis on the aircraft inspection division (AID) and the aircraft engineering division (AED). It also covers the procedures for the issuance, renewal and validation of Certificates of Airworthiness, as well as procedures which may be used to issue Type Certificates for aircraft and aircraft components. Considerable emphasis is placed on the detailed procedures to be utilized by the State of the Operator for the approval of the operator's maintenance and reliability programmes, and on operator maintenance certification, as a requirement for the issuance of an Air Operator Certificate (AOC) and the surveillance of operations following the issuance of the AOC.

2. The major content of this volume was developed from the *Manual of Procedures for an Airworthiness Organization* (Doc 9389). The content of this volume was reviewed by the Continuing Airworthiness Panel during a Working Group meeting in Paris from 15 to 19 March 1999. It was noted that although the material was consistent with the current issues of Annexes 6 and 8 there was a need to further amend the material, particularly the chapters relating to an airworthiness organization, to reflect current practice.

3. With respect to the issuance of an AOC, the content of Chapter 6 is complementary to the *Manual of Procedures for Operations Inspection, Certification and Continued Surveillance* (Doc 8335).

4. Although throughout this manual suggestions are provided concerning the need for various State airworthiness regulations, no attempt has been made to formulate specific regulations. It is recognized, however, that a number of States, particularly those which are still in the early stages of establishing an effective civil aviation organization, do require assistance in developing a body of appropriate airworthiness regulations. In recognition of this need, the *Manual of Model Regulations for National Control of Flight Operations and Continuing Airworthiness*

*of Aircraft* (Doc 9388) has been developed to assist States in the development of regulations suitable for their needs and which, if implemented, would fulfil their obligations under the Convention.

5. In this manual, the term "State" refers to the basic authority which normally establishes a Civil Aviation Authority which has a "Director" with power to exercise authority, under the laws of the State, over civil aviation matters. The term "operator" as used in Chapter 6 is considered to be a civil commercial air transportation organization.

6. It is recognized that in some cases it may not be feasible for a State, due to the limited scale of aviation operations or lack of technical and economic resources, to establish and maintain the full airworthiness organization it needs to meet its international obligations. This problem may be particularly acute for some States in respect of their obligation to assess and approve or disapprove the maintenance programme of an operator utilizing large and complex aircraft. A State finding itself in this position should not in any way diminish the stringency of its regulations; however, it is essential that the State either enter into an agreement with another Contracting State to assist it with the detailed tasks, or obtain the services, on a temporary basis, of qualified inspectors from the State of Manufacture or another State fully experienced in the matter in question. The ICAO Regional Office accredited to the State may be of assistance to the Director in working out cooperative inspection arrangements.

7. Comments on this manual, particularly with regard to its application and usefulness, would be appreciated from all States, safety oversight audit missions and ICAO technical cooperation field missions. These will be taken into consideration in the preparation of subsequent editions. Comments should be addressed to:

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## ABBREVIATIONS

AD	Airworthiness directive	MAC	Mean aerodynamic chord
AED	Aircraft engineering division	MEL	Minimum equipment list
AID	Aircraft inspection division	MMEL	Master minimum equipment list
AME	Aircraft maintenance engineer	MNPS	Minimum navigation performance specifications
AOC	Air operator certificate	MRB	Maintenance review board
ASTM	American Society for Testing and Materials	MSI	Maintenance significant item
ATA	Air Transport Association (United States)	OC	On-condition (maintenance process)
CAA	Civil Aviation Authority	PF	Pre-flight
CG	Centre of gravity	P/N	Part number
CM	Condition monitoring (maintenance process)	RLD	Rijksluchvaartdienst (Department of Civil Aviation of the Kingdom of the Netherlands)
DCA	Director of Civil Aviation	RPM	Revolutions per minute
Doc	Document issued by the International Civil Aviation Organization	SC	Service check
EMCG	Empty mass centre of gravity	SDR	Service difficulty reporting
FAA	Federal Aviation Administration (United States)	SSI	Structural significant item
HF	High frequency	TBO	Time between overhaul
HT	Overhaul time limit or part life time	TCB	Type certification board
IATA	International Air Transport Association	TGT	Turbine gas temperature
ICAO	International Civil Aviation Organization	TOM	Take-off mass
LC	Line inspection and check	TSO	Time since overhaul
		VFR	Visual flight rules
		VHF	Very high frequency

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# Chapter 1

## AIRWORTHINESS RESPONSIBILITIES OF THE STATE

### 1.1 OBLIGATIONS UNDER THE CONVENTION

1.1.1 The Convention on International Civil Aviation provides that every aircraft of a Contracting State, engaged in international navigation, shall carry a certificate of registration and a Certificate of Airworthiness (Article 29). It also provides that the Certificate of Airworthiness shall be issued or rendered valid by the State in which the aircraft is registered (Article 31). Furthermore, the Convention requires that Contracting States recognize as valid the Certificate of Airworthiness issued or rendered valid by the State of Registry provided that the requirements under which the certificate was issued or rendered valid are equal to or above the minimum standards which may be established by ICAO (Article 33).

1.1.2 The minimum airworthiness standards referred to above are contained in Annex 8 to the Convention. As a result of the policy approved by the ICAO Council in 1956, the technical specifications in Annex 8 include only broad standards which define, for application by competent State authorities, the complete international basis for the recognition by States of Certificates of Airworthiness for the purpose of flight of aircraft of other States into or over their territories. The minimum standards contained in Annex 8 are supplemented by guidance material published in Volume II, Part A of this manual.

1.1.3 It was recognized in the development of the ICAO airworthiness policy that the broad standards contained in Annex 6 and Annex 8 would provide the basis for the development of national airworthiness regulations and rules which would specify the scope and detail considered necessary by individual States for the certification and the continuing airworthiness of individual aircraft. Thus, it is necessary that each State develop its own comprehensive airworthiness regulations and rules consistent with the provisions of Annex 6 and Annex 8, or adopt appropriate airworthiness regulations developed by another Contracting State.

1.1.4 In the development of national airworthiness regulations and rules, due account must be taken of the fact that the State of Registry is the sole authority responsible for ensuring that every aircraft on its register conforms in all

essential respects with the type design certificated in accordance with the airworthiness code it has adopted for that class of aircraft. Furthermore, the State of Registry has the responsibility of ensuring that every aircraft on its register is maintained in an airworthy condition throughout its service life. Although the methods of discharging the foregoing State airworthiness responsibilities may vary, and in some cases may involve the transfer of certain tasks to authorized organizations or other States, such arrangements do not relieve the State of Registry from its overall responsibility.

### 1.2 DISCHARGE OF STATE RESPONSIBILITIES

1.2.1 In order to discharge its overall responsibilities under the Convention, the State needs to enact basic legislation which will provide for the development and promulgation of civil air regulations and practices, including airworthiness regulations, consistent with its acceptance of the Annexes. In the development of these regulations, the State has the option of adopting provisions which will govern its role in the implementation of the regulations; this role may range from highly active to passive.

1.2.2 In the active role, a close day-to-day interest would be taken in the direction and control of all airworthiness matters through an inspection organization. In the passive role, the State would intervene only to institute proceedings or investigatory action when a violation of the regulations has occurred. In practice, neither of these extremes would be compatible with the division of responsibility between the State and the aircraft operators, manufacturers and maintenance facilities.

1.2.3 A system of active supervision by the regulatory authority could be so rigorous as to amount to complete domination and dictation of the conduct of all airworthiness activities, leading to an undermining of the morale of airworthiness personnel, lowering of safety and greatly increased cost and time for manufacturing and repairs. Such a system would, in any case, require the establishment of a large inspection and enforcement organization which could hardly be justified.

1.2.4 In the passive role, the State could leave both the interpretation and implementation of the airworthiness regulations to the aircraft operator, manufacturer and maintenance facility, relying upon their technical competence to interpret them correctly, and encouraging compliance through threat of enforcement action. This might place an unreasonable burden of responsibility on those persons involved in interpreting and applying the airworthiness regulations in practice. Further, the State would not be in a position to assess adherence to the regulations other than by knowledge acquired fortuitously or in the course of accident or incident investigation. Such a system would not enable the State to exercise properly the necessary preventive and corrective function; consequently, it could not adequately discharge its responsibility.

1.2.5 The foregoing leads to the conclusion that considerable merit exists in an overall State regulatory system which falls between the active and passive extremes and which will:

- a) represent a well balanced allocation of responsibility between the State and those persons or organizations conducting airworthiness related activities;
- b) be capable of economic justification within the resources of the State;
- c) enable the State to maintain continuing regulation and supervision of the airworthiness activities of the operator, manufacturer and maintenance facility without unduly inhibiting their effective direction and control of their organizations; and
- d) result in the cultivation and maintenance of harmonious relationships between the State and those persons/organizations applying airworthiness regulations in practice.

1.2.6 The essential elements to be covered by an airworthiness regulatory system are:

- a) aircraft type certification;
- b) registration of aircraft;
- c) issuance of Certificates of Airworthiness;
- d) continuing airworthiness;
- e) approval of aircraft maintenance organizations;
- f) certification of operators; and
- g) licensing of personnel.

*Note.— States having a separate licensing organization within the CAA should normally assign the responsibility for the licensing of maintenance personnel to that organization.*

1.2.7 Through the process of registering aircraft and the issuance of the certificates and approvals listed in 1.2.6, the State has the capability of ensuring the protection of the public interest and will be able to exercise indirect influence and control of airworthiness activities without encroaching upon the operator's, manufacturer's and maintenance facility's responsibility for safety.

1.2.8 In those States where the State is not only the airworthiness regulatory authority but also the operator, manufacturer or maintenance facility, the requirements of the Convention on International Civil Aviation will be met and the public interest best served by the separation of authority and responsibility between the State airworthiness operating agency and the State regulatory authority. The approval and certification procedures as detailed herein should be followed as if the airworthiness operating agency were a non-government entity.

1.2.9 A State airworthiness regulatory system as outlined in the foregoing paragraphs is described in the ensuing chapters of this manual.

# Chapter 2

## STATE REGULATORY SYSTEM

### 2.1 INTRODUCTION

#### 2.1.1 General

There are two prerequisites for the introduction of an airworthiness regulatory system:

- a) the provision, in the basic aviation law of the State, for a code of airworthiness regulations and the promulgation thereof; and
- b) the establishment of an appropriate State entity with the necessary authority to ensure compliance with the regulations, hereinafter referred to as the Civil Aviation Authority (CAA).

#### 2.1.2 Basic aviation law

The basic aviation law of the State should:

- a) authorize the establishment of a Civil Aviation Authority to be headed by a Director of Civil Aviation (DCA);
- b) make provision for the adoption of airworthiness regulations based on the provisions of the Annexes to the Convention on International Civil Aviation;
- c) authorize the Director to:
  - 1) register aircraft and maintain a national register;
  - 2) issue or validate Type Certificates;
  - 3) issue, renew or validate Certificates of Airworthiness;
  - 4) issue, amend, cancel and suspend airworthiness approvals, licences and certificates;
  - 5) develop, issue and amend airworthiness directives, bulletins, orders, etc., consistent with the airworthiness regulations; and
  - 6) establish an airworthiness engineering organization and an airworthiness inspection organization to

assist in carrying out the functions and responsibilities of the office.

- d) make provision for the enforcement of the airworthiness regulations; and
- e) make provision for authorized personnel to have the right of access to such places as necessary to carry out airworthiness functions as provided for in the State's regulations.

#### 2.1.3 Airworthiness regulations

The airworthiness regulations developed/adopted or accepted by the State should include provisions for:

- a) mandatory registration of all aircraft;
- b) implementation of the airworthiness provisions meeting the requirements of the Convention and the Annexes;
- c) all aircraft on the State's register to meet relevant airworthiness criteria adopted by the State;
- d) the issuance or validation of the Type Certificate of aircraft intended to be entered on the State's register for the first time;
- e) the issuance, renewal and validation of Certificates of Airworthiness;
- f) the issuance of airworthiness directives, bulletins, orders, etc., consistent with the airworthiness regulations;
- g) the issuance, amendment, cancellation and suspension of airworthiness approvals, licences and certificates;
- h) all persons or organizations performing specified functions in relation to the design, construction and maintenance of aircraft, components and parts to be holders of State approvals, licences and certificates as required;

- i) authorized personnel to inspect and test aircraft, aircraft components, standard parts, materials or processes and systems for the purpose of ascertaining whether the processes and activities covered by an approval, licence or certificate have been carried out in a satisfactory manner; and
- j) the imposition of penalties for a contravention of, or failure to comply with, a provision of the State's civil aviation laws, regulations or directives, or conditions issued, given, made or imposed under, or in force by virtue of, the State laws or regulations or directives.

*Note.— See ICAO's Manual of Model Regulations for National Control of Flight Operations and Continuing Airworthiness of Aircraft (Doc 9388) for guidance on the development of airworthiness regulations.*

## 2.2 STRUCTURE OF THE CAA

2.2.1 Pursuant to delegated authority, the CAA Director should establish an effective organization and employ the necessary qualified staff personnel to carry out the various functions for which he is responsible. Although the scope of the Director's responsibilities should not vary substantially from State to State, the structure and size of the CAA airworthiness organization will vary considerably depending on the number, size and complexity of civil air operations in the State and on the size and scope of the State's aviation manufacturing industry.

2.2.2 In deciding upon the required airworthiness organizational structure, the Director should review the requirements for certification and surveillance of operators as outlined in Volume I, Chapters 6 and 7 of this manual and also in the *Manual of Procedures for Operations Inspection, Certification and Continued Surveillance* (Doc 8335) in light of the number and size of potential air operators in the State, the level of civil aviation activity and the size of the State's aviation manufacturing industry. In

those States where there are both extensive aviation operations and manufacturing, it will generally be necessary to establish within the CAA airworthiness organization an aircraft engineering division (AED) and an aircraft inspection division (AID). The establishment and functioning of the AED and AID are discussed in Chapters 3 and 4, respectively.

2.2.3 In those States which do not have an aviation manufacturing industry, the airworthiness organization within the CAA will be mainly concerned with inspection and authorization functions and accordingly will not normally require a separate AED. Furthermore, in some States which do not have an aviation manufacturing industry and the size and number of commercial and general aviation operations is relatively small, the Director may be able to fulfil his responsibilities in a more cost-effective manner through cooperative inspection arrangements with neighbouring States or regional inspection organizations. Where the frequency of certain airworthiness inspection or examination activities is low, such as the activity associated with the validation of Type Certificates and Certificates of Airworthiness, it may be advantageous to obtain the service on a temporary basis of a qualified inspector from another State rather than under-employing full-time staff. (The ICAO Regional Office accredited to the State may be of assistance to the Director in working out cooperative inspection arrangements.)

2.2.4 In any event, the Director will need to consider carefully the public interest when establishing the airworthiness inspection organization. The Director must ensure that a proper system of checks and balances is maintained, and that the CAA retains effective control of important inspection functions so that such functions are not delegated in such a way that commercial operators, aircraft manufacturers, maintenance facilities and general aviation aircraft owners, in effect, regulate themselves in airworthiness matters. Regardless of the organizational arrangements employed, the Director must bear in mind that the obligations of each State to comply with the requirements of Annex 6 and Annex 8 remain unchanged.

# Chapter 3

## AIRWORTHINESS ORGANIZATION – ENGINEERING DIVISION

### 3.1 ORGANIZATION

3.1.1 In those States with a significant aviation manufacturing industry it will be necessary to establish an aircraft engineering division (AED) within the CAA airworthiness organization. The size and structure of the AED will need to be scaled to the aviation manufacturing industry and the various types of aircraft on the State's register. The primary emphasis of the AED's activity will normally be directed to manufacturing and type certification, although some additional engineering work will inevitably be required in other areas such as the evaluation of repairs (engineering fixes) proposed by manufacturers or operators to correct deficiencies in aircraft already in service.

3.1.2 In most cases it will be convenient to organize the AED along functional lines by dividing it into two branches: Aeronautical Engineering and Manufacturing. Each branch should normally be organized into sections dealing with specific technical specialities, such as airframes, powerplants, avionics, performance, etc. When the physical size of the State is large and the level of aviation activity is relatively high, it may be necessary to establish regional offices or resident units at the larger manufacturing facilities. In such cases, it is essential that proper lines of communication be established between headquarters and field offices.

### 3.2 FUNCTION

The major function of the AED is to provide technical advice to the Director, CAA on all aeronautical engineering matters affecting airworthiness. This includes advice on the issuance of various approvals based on the AED assessment of aircraft, components, systems, powerplants, instruments and equipment produced in the State or of foreign manufactured aircraft intended to be placed on the register of the State. The specific tasks and responsibilities assigned to the AED will vary somewhat depending upon the scope of the aviation industry in the State, but should normally include at least the following:

a) development of standards and procedures for the type certification of an aircraft including its components,

powerplants, systems, instruments and equipment in conformity with Annex 8;

- b) reviewing and processing of an application for issuance of a Type Certificate for an aircraft or a powerplant designed or manufactured domestically;
- c) validation of aircraft and powerplant Type Certificates issued by another State;
- d) participation in and management of the activities of the type certification board (TCB) (guidelines for the establishment and operation of a TCB are given in Volume II of this manual, Part A, Appendix A to Chapter 2);
- e) maintenance of a record of type data of aircraft on the register of the State;
- f) issuance of a design approval for an aircraft system, equipment or instrument;
- g) issuance of a production certificate for an aircraft or a powerplant manufactured domestically;
- h) approval of manufacturing organizations to ensure the adequacy of manufacturing and test facilities, competence of skilled personnel and existence of satisfactory quality control systems;
- i) approval of design organizations to ensure that they are adequately staffed to conduct the work involved in showing compliance of the design with the requirements, and that they have adequate facilities to ensure that the type design records are maintained properly and there is a proper correlation between drawings and design records;
- j) evaluation and survey of an aircraft for issuance or validation of a Type Certificate and maintenance of type data of aircraft on the register of the State;
- k) examination of current and new national and foreign airworthiness design standards and determination of the need for adoption of critical features of the foreign design standards in national requirements, as necessary;

- l) under delegated authority of the Director, approval and issuance of airworthiness directives in respect of aircraft and powerplants certificated in the State and the establishment of a system whereby all operators and airworthiness authorities in the State of the Operator are informed in conformity with the provisions of Annex 8;
- m) monitoring of continued structural integrity of aircraft in service with a view to determining the need for supplemental inspection to maintain the aircraft in airworthy condition (guidelines on the assessment of the continued structural integrity of aeroplanes and the resulting supplemental inspection document are contained in Volume II of this manual, Part B, Chapter 6);
- n) monitoring of service bulletins from the manufacturer to determine likely effects on the design and continuing airworthiness of the aircraft and powerplant and to decide steps to be taken to avoid or correct difficulties. If as a result of this activity, it is decided that an inspection or modification is necessary to assure continuing airworthiness of the aircraft, a firm and positive direction (in the form of an airworthiness directive) should be published and directed to all operators and, where the aircraft has been exported to other States, to the airworthiness authorities in those States;
- o) participation in maintenance review board (MRB) activity related to the development and approval of initial maintenance and inspection requirements for newly type certificated aircraft and powerplants being introduced into service for the first time (general guidelines for the establishment of an MRB are contained in Volume II of this manual, Part A, Appendix B to Chapter 2);
- p) preparation and recommendation of regulatory changes and amendments to the national aviation legislation concerning all matters of airworthiness within the scope of the functions and responsibilities of the AED;
- q) identification and resolution of regulatory problems associated with airworthiness engineering, establishing general and technical policies and procedures on which future airworthiness requirements can be based, and formulation of changes in airworthiness policies and requirements which have a severe economic impact on the aviation industry;
- r) provision of advice on technical matters relating to flight operations and airworthiness as may be required;
- s) determination of the need for and making recommendations for new or amended policies and procedures dealing with aeronautical engineering matters and for associated research and development projects;
- t) establishment of a liaison with the manufacturers of imported aircraft on the State's register and with type certification authorities in the State of Design; and
- u) investigation, in coordination with the AID, of major defects discovered in aircraft and determination of corrective action to be taken where airworthiness may be affected.

### 3.3 STAFFING

3.3.1 In order to meet its responsibilities, the AED must be staffed with qualified and experienced engineering personnel capable of successfully undertaking the wide variety of required tasks. Thus, it is essential that staff engineers be selected with considerable care and properly trained. Furthermore, in order to benefit from their experience on the job and to maintain the necessary continuity in the AED, it is important to ensure that staff members are provided with conditions of service and remuneration consistent with their technical knowledge and experience and the responsibilities of their post.

3.3.2 As important as the proper selection of staff is the need for the engineering staff to keep abreast of new developments in the design, construction and maintenance of aircraft and associated equipment. A programme should be developed which provides for the staff, at regular intervals, to visit appropriate manufacturers and attend technical symposia to gain first-hand knowledge of new developments. As a general policy, it is not desirable for the engineering staff to obtain technical qualifications from those entities under their direct regulatory jurisdiction.

### 3.4 DUTIES AND RESPONSIBILITIES OF AN AED ENGINEER

3.4.1 The duties and responsibilities of the AED staff include a broad spectrum of functional areas concerning design, manufacture, maintenance, repair, and operation of the aircraft and its installed systems.

3.4.2 In most cases the detailed duties of an AED engineer should include as a minimum those listed below which relate to his speciality:

- a) assistance in the development of national airworthiness criteria, including procedures for the certification of aircraft, engines, propellers, equipment and instruments;
- b) development and evaluation of changes in engineering standards, procedures and practices to reflect current requirements and limitations and to keep up with the continuously changing state of the art;
- c) review, coordination and recommendation of final action on requests for issuance, validation or amendment of a type certificate or type approval;
- d) evaluation of engineering and airworthiness of new aircraft designs with regard to structures, applied air and ground loads, dynamics, stress analysis, structural testing and materials. This includes:
  - 1) determination of compliance of an aircraft design with applicable airworthiness standards and good design practices;
  - 2) advising the manufacturer of the extent of structural substantiation required and the acceptable methods for showing compliance with regulations; and
  - 3) maintenance of a continuous liaison with the design organization to evaluate and advise on acceptability of design criteria, test proposals and design data as the work progresses;
- e) analysis of aerodynamic performance, flying qualities and systems functioning during the certification process to determine compliance with the applicable airworthiness standards;
- f) monitoring of the manufacturer's engineering work for the design and testing of aircraft engines, propellers, equipment and instruments to ensure compliance with airworthiness requirements and related manufacturing specifications. This includes:
  - 1) approval of production drawings;
  - 2) coordination of manufacturer's requests for deviations from specifications;
  - 3) analyses of engineering change proposals and evaluation of the necessity for the change and reasonableness of the cost estimate;
- 4) follow-through to ensure that the manufacturer submits complete modification drawings, design data and maintenance information for use by the operator, maintenance and overhaul organizations;
- 5) witnessing of critical tests performed by the manufacturer (qualification, certification, static and dynamic tests) and approval of testing methods and test reports;
- 6) reporting on problems which threaten timely and satisfactory achievement of the objectives with recommendations for corrective action;
- g) evaluation of proposals pertinent to engineering aspects of the design, repair and modification of an aircraft powerplant;
- h) evaluation of equipment and materials to be used in aircraft construction and modifications to ensure their conformity with CAA specifications;
- i) investigation of unsatisfactory occurrences to identify and prepare the necessary design, maintenance and operational corrections;
- j) evaluation of proposals pertinent to the design and modification of systems, instruments and equipment, including their installations;
- k) planning, coordination and evaluation of complex and major modifications for the airframe portion of an aircraft. This should include:
  - 1) preparation of engineering feasibility studies for overall major airframe modifications to improve performance and to correct unsatisfactory conditions;
  - 2) analysis of system performance and characteristics;
  - 3) development of the required operational constraints and purposes of proposed modifications;
  - 4) initiation of meetings with users, systems managers, other engineering divisions, etc., to develop a modification programme based on the feasibility requirements, design capability, costs and lead time;
  - 5) determination of the nature and extent of problems and actions needed to resolve conflicting requirements and constraints; and

- 6) forecasting of the investigation, engineering, tests and production effort required to accomplish the modification;
- l) evaluation of the effects of specific engineering changes on aerodynamics, flight dynamics, performance, and stability and control of an aircraft;
- m) evaluation of the proposals for major repairs to aircraft and its components, powerplants, propellers, etc.;
- n) processing of all airworthiness directives initiated by the manufacturers and operators in the State and review of airworthiness directives issued by the manufacturers of imported aircraft, and recommending implementation action thereon, in coordination with the AID;
- o) investigation of major problems relating to structural defects;
- p) evaluation of reports of accidents, incidents and malfunctions with a view to determining trends for possible unsatisfactory design features. Identification of those cases affecting safety in operations. Determination, in coordination with AID, of the need for airworthiness directives outlining mandatory corrective actions and compliance periods;
- q) monitoring of aerodynamic performance, structural integrity and system functioning of aircraft in service and surveillance of failures and service difficulties to initiate improvement and corrective programmes;
- r) serving as technical specialist on matters related to design, construction and certification of aircraft, engines, propellers, instruments and equipment. This includes:
  - 1) serving on type certification and maintenance review boards;
  - 2) evaluating a wide variety of factors which affect aircraft flying characteristics, including the aircraft's flight controls, the inherent characteristics of the structure (size, shape, flexibility), the propulsion system and the environment in which the aircraft flies;
  - 3) keeping abreast with technological developments in aircraft design and certification through contacts with persons involved in research work in the field;
  - 4) coordinating different phases of investigation, analysis and design for correction and improvement of flight characteristics; and
  - 5) evaluating the possible overall effect of the more critical changes in equipment, operation, flight profile, repairs to structure, etc.;
- s) serving as the focal point on matters concerning import and export airworthiness certificates and approval of civil aeronautical products; and
- t) providing administrative support and assisting in the discharge of other functions related to airworthiness.



# Chapter 4

## AIRWORTHINESS ORGANIZATION – INSPECTION DIVISION

### 4.1 ORGANIZATION

In all States it will be necessary to establish some form of airworthiness inspection organization to meet the requirements set forth in the Convention and in Annexes 6 and 8. The organizational structure of the airworthiness inspection organization within the CAA, hereinafter referred to as the aircraft inspection division (AID), will vary depending upon the level and scope of aviation activity within the State and whether an aircraft engineering division (AED) has also been established. The primary responsibilities of the AID should cover all matters concerning the registration of aircraft, continuing airworthiness, approval of maintenance organizations, maintenance certification of operators and the licensing of aircraft maintenance personnel. In those States where an AED is not established it will normally be necessary for the AID to also be responsible for those engineering tasks associated with continuing airworthiness.

### 4.2 FUNCTION

The tasks and responsibilities assigned to the AID should normally include at least the following:

- a) recording, reviewing and processing applications for registration of aircraft, registering and de-registering aircraft as appropriate, and issuing certificates of registration;
- b) keeping the national register of civil aircraft and making information from the register available as and when required;
- c) recording, reviewing and processing applications for Certificates of Airworthiness, renewals of such certificates and validations of foreign Certificates of Airworthiness;
- d) surveying aircraft for issuance, renewal and validation of Certificates of Airworthiness and the subsequent execution of such documents as appropriate;
- e) recording, reviewing and processing applications from aircraft maintenance personnel for issuance, renewal,

validation and extension of licences and ratings for same\*;

- f) organizing and conducting examinations of applicants for aircraft maintenance licences as above, assessing results, maintaining examination security, keeping past and current licence records and records of the issuance, renewal or validation as appropriate of each licence, extension or rating\*;
- g) recording the collection of fees for aircraft registration, Certificates of Airworthiness, aircraft maintenance personnel licences, and any other airworthiness services performed for which charges may be prescribed\*;
- h) periodically reviewing the airworthiness condition and records of aircraft on the register in order to assess the adequacy of their maintenance and to assess the competence and diligence of the persons who perform the maintenance;
- i) investigating, in coordination with the AED, major defects discovered in aircraft and determining corrective action to be taken where airworthiness may be affected. Analysing defect experience to detect and correct any trends and to reveal areas most in need of airworthiness improvement, and establishing a service difficulty reporting (SDR) system (for guidance on SDR systems, see Volume II of this manual, Part B, Appendix B to Chapter 8);
- j) reviewing aircraft and component manufacturers' service bulletins and airworthiness directives issued by foreign airworthiness authorities to determine their applicability to the national aircraft, and directing corrective action where airworthiness may be affected, in coordination with the AED (guidance on the implementation of airworthiness directives is provided in Volume II of this manual, Part B, Appendix C to Chapter 8);

\* In some States, the functions related to the issuance and renewal of licences for all personnel are entrusted to a separate directorate under the CAA. In such cases all responsibilities associated with the issuance and renewal of licences for aircraft maintenance personnel should be discharged by that directorate, in cooperation with the AID.

- k) examining current and new international and foreign airworthiness standards related to continuing airworthiness and determining the need for adoption of critical features of those foreign standards into national requirements;
- l) surveying the maintenance facilities including training provisions, organization and quality control procedures of applicants for issuance and renewal of air operator certificates (AOCs), and making recommendations as appropriate with regard to the applications;
- m) surveying the facilities and procedures of applicants for issuance and renewal of certificates of approval to conduct activities bearing on the airworthiness of aircraft, making such issuance or renewal, as appropriate, and maintaining records of same;
- n) conducting periodic surveillance of the facilities, procedures and work of holders of AOCs, making appropriate directions and recommendations and approving amendments to the operator's AOC and to his maintenance and quality control manuals as appropriate;
- o) assessing the qualifications of persons for designation as approved persons, and of others as alternates, to perform certain airworthiness functions, and monitoring of the activities of these persons from time to time;
- p) assessing assistance in the design and suitability of aircraft components and equipment and their approval for use in aircraft, and assessing and approving the installation of aircraft components and equipment in aircraft;
- q) developing aircraft and component reliability programmes and approving maintenance systems for aircraft, aircraft components and equipment;
- r) giving advice and recommendations in other areas of CAA responsibility, such as shipment of airworthiness-related dangerous goods, certification of operators and on other technical matters relating to aviation techniques, flight operations and aeronautical engineering as may be required;
- s) providing loan of staff experts to assist in the investigation of aircraft accidents as and when required;
- t) recommending and, where necessary, issuing directives concerning the maintenance, overhaul and repair standards to be met by aircraft and aircraft components and equipment, and procedures to be followed by the aviation industry to comply with the national air law and regulations related to airworthiness;
- u) participating in type certification board activities to resolve problems of significance, and to establish overall accomplishment of the type certification programme;
- v) participation in maintenance review board activities toward the development and approval of initial maintenance inspection requirements for newly type certificated aircraft and powerplants being introduced in service for the first time;
- w) preparing and distributing advisory material to the aviation industry concerning airworthiness practices and procedures, where such advice does not warrant mandatory action but may still make a significant contribution to flight safety;
- x) preparing and recommending amendments to the national air law concerning all matters of airworthiness within the scope of the functions and responsibilities of the AID;
- y) conferring at national and international levels on matters relating to the regulation of airworthiness;
- z) identifying and resolving regulatory problems associated with continuing airworthiness, establishing general and technical policies and procedures on which future airworthiness requirements can be based, and formulating changes in airworthiness policies and requirements which have a severe economic impact on the aviation industry;
- aa) investigating possible violations of the national air law or regulations in regard to airworthiness and initiating legal or other corrective action where necessary;
- bb) preparing and distributing to the aviation industry a series of documents, available to the public, containing all airworthiness directives specified for general compliance by the aviation industry; and
- cc) issuing approvals for inspection, overhaul, maintenance and repair organizations.

#### 4.3 DETAILED INSPECTION OF AIRCRAFT

4.3.1 It should be noted in 4.2 above that the detailed inspection of aircraft is not listed as a specific task of the

AID. Extensive experience over the years has shown that it is very difficult, if not impossible, for States to successfully undertake such a task in view of the size and complexity of many modern aircraft as well as the large number of aircraft on the register of many States. Furthermore, even if the State had the resources to accomplish the task, it could work to its disadvantage by encouraging the aircraft owner or operator to use the AID inspection as a broad screening authority, thereby avoiding his own maintenance and inspection responsibilities and thus creating a potentially hazardous situation. It should, however, be recognized that it will be necessary for AID inspectors to conduct periodic inspections of selected aircraft in order to sample the work standards of approved maintenance and repair facilities.

4.3.2 Although the AID should not be expected to conduct routine detailed inspections of privately owned aircraft, it will be necessary for it to maintain close surveillance of all such aircraft to ensure that they are properly maintained. If an aircraft is suspected of not being airworthy, it should be regarded as such and its Certificate of Airworthiness should be revoked and the aircraft withdrawn from service. Prior to revalidation of the Certificate of Airworthiness, the aircraft must be given a detailed inspection and any deficiencies corrected by an approved maintenance organization or qualified licensed maintenance personnel.

#### 4.4 STAFFING

4.4.1 The success or failure of a State to maintain a satisfactory level of airworthiness in compliance with the Convention and to protect the public interest depends to a very large extent on the competence of the AID inspectors. To effectively fulfil its responsibilities, the AID must be properly organized and staffed with qualified personnel capable of accomplishing the required wide range of technical inspection activities. To adequately perform their duties, it is important that AID inspectors have educational and technical experience that compare favourably with those maintenance personnel they will inspect or regulate. Furthermore, they should also enjoy conditions of service and remuneration consistent with their education, technical knowledge and experience and comparable to those personnel of the maintenance organization they will inspect and supervise.

4.4.2 Individuals seeking positions as AID inspectors should have extensive academic and technical education and have progressed through positions of increased technical and supervisory responsibility in the aviation industry or the military services. At least five years of such

comparable technical employment is normally required to obtain the minimum qualifications and experience needed to perform the duties of a basic starting position as an AID inspector in the maintenance or avionics field. Applicants should also possess aeronautical licences, certificates or academic degrees commensurate with their job responsibilities (e.g flight engineer certificate, technician/engineer/mechanic certificate with airframe and powerplant ratings, electronics technician, etc.).

4.4.3 The satisfactory execution of the various functions of the AID depends to a large extent on the qualifications, experience, competence and dedication of individual inspectors. In addition to the vital importance of technical competency in performing airworthiness inspections and the surveillance of certificated operators and approved maintenance organizations, it is likewise critical that AID inspectors possess a high degree of integrity, be impartial in carrying out their tasks, be tactful, have a good understanding of human nature and possess the ability to get along well with people. Persons subject to surveillance by inspectors are often apprehensive and sensitive to perceived intrusions into what they consider their own domain. Such apprehension or resentment can usually be reduced or overcome when inspectors take care to explain that their objective is to assist rather than hinder, and that their inspection and surveillance activities are undertaken in the interest of enhancing safety. Considering the specialized and sensitive nature of the AID inspector's mission, it is vitally important that the qualifications, experience and personal characteristics of each person employed to perform surveillance duties be verified and carefully evaluated before selections are made.

#### 4.5 DUTIES AND RESPONSIBILITIES OF AN AID INSPECTOR

4.5.1 The specific duties and responsibilities of individual AID inspectors will vary somewhat depending on their technical speciality (e.g. powerplants, avionics, airframes, etc.), but in general terms should include at least the following:

- a) conduct inspections and carry out surveillance functions;
- b) prepare detailed reports on inspections and surveillance activities;
- c) promote compliance with airworthiness regulations and directives;

- d) report breaches of regulations and directives to the appropriate authority within the CAA;
- e) report defects noted to aircraft operators/owners and approved airworthiness organizations for remedial action;
- f) conduct, in cooperation with members of the CAA operations inspectorate, operator certification inspections;
- g) conduct routine surveillance of work being performed in the hangars, workshops and repair facilities of approved airworthiness organizations;
- h) inspect aviation fuelling equipment and procedures;
- i) monitor airworthiness certifications, ensuring that they are carried out by persons who are properly authorized, and that the certifications made are for the purpose and in accordance with the requirements of the applicable airworthiness regulations;
- j) monitor the implementation of the relevant airworthiness regulations issued by the AID;
- k) become familiar with the content of all airworthiness directives, service bulletins and similar documents in respect of the aircraft (including powerplants) and equipment and monitor the extent of implementation;
- l) review maintenance manuals, making recommendations in respect of amendments which may be required by the AID prior to approval of the manuals;
- m) undertake liaison with other inspectors regarding recommendations in respect of issuance and renewal of Certificates of Airworthiness, checking all documents associated with the above including the flight manual amendment status and airframe and engine log books. Check that all relevant requirements have been met, including correct certification of work carried out, and authorize release for test flight of aircraft and avionic installations, ensuring that the resulting reports are satisfactory and in accordance with the AID requirements;
- n) approve major alterations and preventive maintenance programmes;
- o) monitor certificated operator maintenance training programmes; and
- p) conduct inspections of operator's route station facilities.

#### 4.6 AID TECHNICAL LIBRARY AND RECORDS

4.6.1 To enable the AID personnel to keep up to date with the maintenance and overhaul practices and with the regulations of States of Design, it is essential to establish a properly organized and administered technical library. Arrangements should be made with each State of Design for an automatic supply of the documents related to the airworthiness of aircraft on the State's register. The library should also be provided with all the documents issued by ICAO relating to operations and airworthiness of aircraft. It is important that all documents in the library be promptly amended and kept up to date. This assists the inspectors in determining whether or not mandatory modifications, inspections and repairs approved by the State of Design are carried out before the work is certified by the authorized personnel of the operator, or of an approved organization, or by licensed maintenance personnel.

4.6.2 The AID will need to keep files for each aircraft registered in the State. The files should contain records detailing applications for the certificates of registration and airworthiness, copies of supporting documentation, copies of certificates issued, the maintenance programme approved for the aircraft, together with any other information relevant to the airworthiness of aircraft.

# Chapter 5

## AIRCRAFT REGISTRATION, CERTIFICATES OF AIRWORTHINESS AND APPROVALS

### 5.1 REGISTRATION OF AIRCRAFT

5.1.1 The proper registration of aircraft is fundamental to the safety of international air operations and is therefore accorded considerable attention in Chapter III of the Convention on International Civil Aviation. Further details on the registration and marking of aircraft are contained in Annex 7 to the Convention.

5.1.2 In accordance with international provisions, each aircraft must be registered in a State and each State must maintain a registry of aircraft. An aircraft cannot be validly registered in more than one State, but its registration may be changed from one State to another. The Convention does not provide for an aircraft to be registered by an international organization such as an agency of the United Nations; however, Article 77 of the Convention does provide for two or more Contracting States to establish joint air transport operating agencies subject to ICAO Council determination as to how the provisions of the Convention will apply concerning the registration and nationality of the aircraft operated by such agencies. To date no such agencies have been formed. Subject to any future action the Council might take in respect of joint operating agencies, each aircraft must have only one State of Registry and that State has, among a number of responsibilities in respect of each aircraft on its register, a fundamental responsibility to ensure that the aircraft is operated in an airworthy condition.

5.1.3 Under Article 19 of the Convention, the registration or transfer of registration of aircraft in any Contracting State shall be made in accordance with its laws and regulations. Accordingly, the Director, CAA will need to ensure that the State adopts detailed regulations covering all aspects of registration including such matters as the basic requirement for aircraft to be registered with the State's application procedures, data required, display of the registration certificate and fees (if any). The Director will also need to issue internal CAA administrative instructions on the maintenance of the register within the CAA.

5.1.4 Annex 7 requires that the register of each State shall show, for each aircraft registered, the information

recorded in the certificate of registration. It further requires that the certificate of registration shall be carried in the aircraft at all times and shall in wording and arrangement be a replica of the form shown in Figure I-5-1.

### 5.2 CERTIFICATE OF AIRWORTHINESS

*Note.—For the purpose of the procedures described in this section, the term "aircraft" is intended to include its engines, propellers, instruments and equipment.*

#### 5.2.1 General

5.2.1.1 All aircraft engaged in flight operations must have a valid Certificate of Airworthiness issued or rendered valid by the State in which the aircraft is registered. The basic requirements to be met in issuing Certificates of Airworthiness are stated in Annex 8, Part II. The recommended procedures to be followed in issuing or rendering valid Certificates of Airworthiness follow in this chapter.

5.2.1.2 Normally, the responsibility for developing the procedures for, and the issuing of, Certificates of Airworthiness should be assigned to the AID.

5.2.1.3 In the development of procedures and directives concerning Certificates of Airworthiness, the AID will need to consider three basic situations:

- a) the issuance of a new Certificate of Airworthiness when an aircraft is first registered in the State (this can be a newly manufactured aircraft or an aircraft coming from a foreign State);
- b) the renewal of a Certificate of Airworthiness issued by the State; and
- c) the validation of a Certificate of Airworthiness issued by a foreign State for an aircraft to be entered on the State register.

*	State or Common Mark Registering Authority Ministry Department or Service	*
<b>CERTIFICATE OF REGISTRATION</b>		
1. Nationality or Common Mark and Registration Mark  ..... .....	2. Manufacturer and Manufacturer's Designation of Aircraft  ..... .....	3. Aircraft Serial No.  ..... .....
4. Name of owner ..... 5. Address of owner .....		
6. It is hereby certified that the above described aircraft has been duly entered on the ..... (name of register)  in accordance with the Convention on International Civil Aviation dated 7 December 1944 and with the (†) .....		
(Signature) .....  Date of issue .....		
(†) Insert reference to applicable regulations.  •		

\* For use by the State of Registry or common mark registering authority.

**Figure I-5-1. Model of certificate of registration**

### 5.2.2 Issuance of a Certificate of Airworthiness

*Note.— An example of an application form for the issuance of a Certificate of Airworthiness is given in Appendix A to this chapter.*

5.2.2.1 The issuance of a Certificate of Airworthiness for an aircraft should be dependent upon the aircraft being registered in the State.

5.2.2.2 The procedures and directives developed by the AID for the issuance of a Certificate of Airworthiness should cover the following requirements:

- a) an application should be completed and submitted to the AID;
- b) the applicant should specify the design standards and airworthiness requirements according to which the aircraft type was certificated;

*Note.— The AID may, from time to time, stipulate special requirements to be met before a Certificate of Airworthiness is issued. These should be listed as special conditions and communicated to the applicant.*

- c) the applicant should make the aircraft available, at a time and place acceptable to the AID, for such checks and inspections considered necessary by the AID;
- d) it should be the responsibility of the applicant to provide personnel and equipment so that these checks and inspections may be satisfactorily carried out;
- e) all relevant records of previously completed inspections, maintenance, flight tests and calibrations should be made available for inspection by the AID;
- f) all work required to be done on the aircraft for the issuance of a Certificate of Airworthiness should be carried out under the supervision of an organization approved by, or acceptable to, the AID and should be carried out in a proper manner and in conformity with the requirements, specifications, drawings and instructions relating to the approved design of the subject aircraft;
- g) full particulars of the work done should be entered in the appropriate log book and a maintenance release should be issued;
- h) when the particulars of the work done occupy so much space that it is not practical to record all details in the

space provided in the log book, the details should be entered in a separate maintenance record which should be numbered for identification purposes, and certified in the same manner as that required for the relevant entry in the log book. The reference number of such record should be entered in the log book, together with a brief description of the work to which the record relates;

- i) the applicant should carry out a flight test to prove satisfactory functioning of the avionics;
- j) the performance and handling qualities of the aircraft should be tested in flight, if required, to schedules approved by the AID; and
- k) the organization referred to in f) should provide a certification that the aircraft is fit to fly as far as can be reasonably determined from inspections of the aircraft and its records and manuals, and that all applicable airworthiness directives and mandatory modifications and inspections of the State of Design and the AID have been carried out or certified to have been carried out.

5.2.2.3 *Documents for examination.* The applicant should be required, in respect of every aircraft to be issued a Certificate of Airworthiness, to provide the log books or equivalent records for examination by the AID. In addition, depending upon the State's assessment of the adequacy of the previous State of Registry's airworthiness code, the applicant may be required to submit a statement from the airworthiness authority of the State of Design certifying such departures from the national certification requirements as may have been authorized and the aircraft flight manual or acceptable equivalent document relating to the aircraft.

5.2.2.4 *Documents for retention.* The applicant should be required to provide the following documents for examination and retention by the AID:

- a) a copy of the Type Certificate and the Type Certificate technical data sheets or acceptable equivalent documents;
- b) a copy of the Export Certificate of Airworthiness issued by the State of Manufacture, and the current Certificate of Airworthiness;
- c) a copy of the flight manual or acceptable equivalent document;
- d) a copy each of the manufacturer's maintenance, overhaul and repair manuals and illustrated parts catalogues;

- e) a complete set of all manufacturer's service bulletins or equivalent documents issued in respect of the aircraft;
- f) a copy of the crew operations manual;
- g) a copy of the mass and balance report;
- h) a flight test report for the avionics systems;
- i) a flight test report for the aircraft;
- j) a copy of the maintenance review board report for the aircraft type;
- k) an electrical load analysis covering all services;
- l) unless held by the applicant and available for examination, a complete set of wiring diagrams covering all electrical and radio installations; and
- m) where applicable, a copy of the master minimum equipment list (MMEL).

5.2.2.5 The applicant should be required to make the necessary arrangements with aircraft and engine manufacturers for the provision to the AID of amendments to the manuals in 5.2.2.4, together with any service bulletins that may be issued from time to time.

### 5.2.3 Renewal of a Certificate of Airworthiness

*Note 1.— Annex 8, Part II, 3.2.3 states that the Certificate of Airworthiness shall be renewed or remain valid subject to the laws of the State of Registry, and subject to conditions set out in the subject paragraph. The following paragraphs set out a process for renewal of a Certificate of Airworthiness. Some States do not require renewal, the Certificate of Airworthiness remaining valid subject to a system of inspection approved by the State. Recommended procedures for maintaining the validity of the Certificate of Airworthiness are contained in Volume II of this manual, Part B, Chapter 4.*

*Note 2.— An example of an application form for the renewal of a Certificate of Airworthiness is given in Appendix B to this chapter.*

5.2.3.1 An application for renewal of a Certificate of Airworthiness should be completed and submitted to the AID at least 15 days prior to the expiry of the certificate.

5.2.3.2 The procedures and directives developed by the AID for the renewal of a Certificate of Airworthiness should cover the following requirements:

- a) the applicant should be required to make the aircraft available, at a time and place acceptable to the AID, for such checks and inspections required by the AID;
- b) the applicant should be required to provide the necessary personnel and equipment so that required checks and inspections may be satisfactorily carried out;
- c) all relevant records of previously completed inspection, maintenance, flight test and calibration should be made available for inspection by the AID;
- d) all work for the maintenance of airworthiness of the aircraft should be carried out under the supervision of appropriately licensed aircraft maintenance personnel or of an organization approved by, or acceptable to, the AID and should be carried out in a proper manner and in conformity with the requirements, specifications, drawings and instructions relating to the approved design of the subject aircraft;
- e) full particulars of the work accomplished should be entered in the appropriate log book and a maintenance release should be issued;
- f) in those cases where it is not practical to record all details of work accomplished in the space provided in the log book, the details should be entered in a separate maintenance record which should be numbered for identification purposes, and certified in the same manner as that required for the relevant entry in the log book. The reference number of such a record should be entered in the log book, together with a brief description of the work to which the record relates;
- g) the mass of the aircraft should be determined as required by the AID;
- h) the applicant should carry out a flight test to prove satisfactory functioning of the avionics; and
- i) the performance and handling qualities of the aircraft should be tested in flight to schedules approved by the AID.

5.2.3.3 The applicant for renewal of a Certificate of Airworthiness should be required to provide the following documents for AID examination:



- a) a copy of an inspection report giving brief details of the work done since the last renewal of the Certificate of Airworthiness. This report should be in the form of a schedule and should include the following documents:
- 1) a record of the work accomplished since the last renewal of the certificate;
  - 2) a record showing details of major checks carried out since the last renewal of the certificate;
  - 3) a record of airframe, engine and propeller flying hours as follows:
    - the total flying hours for the airframe since new and the flying hours since the last renewal;
    - the total flying hours for the engine(s) since new and the flying hours since the last overhaul;
    - the total flying hours for the propeller(s) since new and the flying hours since the last overhaul;
  - 4) a record showing compliance with service bulletins, modifications and airworthiness directives or their equivalent; and
  - 5) a record of major component changes;
- b) a mass and balance report, which should include a copy of the mass determination record, the mass and centre of gravity schedule and a list of the basic equipment (example State instructions are provided in Appendix C to this chapter);
- c) a flight test report for the avionics system; and
- d) a flight test report for the aircraft.

#### 5.2.4 Validation of a Certificate of Airworthiness

5.2.4.1 Annex 8 requires that when a State of Registry renders valid a Certificate of Airworthiness issued by another Contracting State it shall provide a suitable statement of authorization to be carried with the original certificate. The validity of the authorization shall not extend beyond the period of validity of the original certificate; however, whenever the period of validity of the certificate is renewed, the authorization may be renewed or another

authorization issued by the State of Registry for a period not exceeding the period of validity of the original certificate.

5.2.4.2 The validation procedures described in 5.2.4.1 generally pose no major difficulty to the validating State in those cases where the Certificate of Airworthiness being validated has been issued on a non-expiring basis. However, in those cases where the certificate is issued with an expiration date, the new State of Registry which validates the certificate may, as stated above, validate only for the period up to the expiration date of the certificate. Thus, in such cases, the new State of Registry will need to issue a new Certificate of Airworthiness subject to satisfactory completion of the examination required for the renewal of Certificates of Airworthiness given in 5.2.3.2. If the State does not have the technical resources to complete fully the required renewal procedures, it should obtain the technical assistance of another State's CAA (possibly that of the State of Manufacture) or of another State competent in such matters in respect of the aircraft in question.

5.2.4.3 When a State of Registry renders valid the Certificate of Airworthiness issued by another Contracting State it is, by its action, certifying that it is satisfied that the certificate was issued in compliance in all respects with the Convention and the provisions of the applicable Annexes. Furthermore, as the new State of Registry it is henceforth responsible for ensuring the continuing airworthiness and safe operation of the aircraft. In recognition of the foregoing, the AID should establish procedures for validation which, to the limits of its capability, approximate the examination required for issuance of a Certificate of Airworthiness. In any case, when a State of Registry renders valid the Certificate of Airworthiness issued by another Contracting State it must ensure that the aircraft is, in fact, airworthy.

#### 5.2.5 Airworthiness flight test

5.2.5.1 General airworthiness flight tests, as distinguished from type certification flights, are generally required for:

- a) aircraft under investigation for the issuance of a Certificate of Airworthiness which have previously been issued with a Certificate of Airworthiness by a Contracting State;
- b) aircraft being flown for an airworthiness flight test for renewal of a Certificate of Airworthiness; and
- c) aircraft under investigation for the approval of modifications incorporated after the issuance of a Certificate of Airworthiness.

5.2.5.2 Flight tests — issuance of a  
Certificate of Airworthiness

When an application is made for the issuance of a Certificate of Airworthiness, flight tests should have been completed in the originating State to a flight test schedule acceptable to the AID to establish compliance with:

- a) the airworthiness requirements of the originating State;
- b) such other conditions prescribed by the AID as special conditions for the issuance of a Certificate of Airworthiness;
- c) in certain circumstances the AID may require special flight tests to be carried out to determine conformity with the national airworthiness requirements. If this procedure is necessary, the applicant should be notified and should arrange for the tests to be conducted by personnel acceptable to the AID;
- d) the flight test schedules for the special test should be prepared by the applicant and should require the approval of the AID; and
- e) the applicant should submit to the AID the results of the special tests in a flight test report acceptable to the AID.

5.2.5.3 Flight tests — renewal of a  
Certificate of Airworthiness

- a) Flight tests associated with the renewal of a Certificate of Airworthiness should be conducted in accordance with an airworthiness flight test schedule prepared for the aircraft type and approved by the AID. The flight tests are required to ensure that the aircraft's flight characteristics and its functioning in flight do not differ significantly from the normal performance for the type. Flight performance should be checked against the appropriate sections of the flight manual which is fully amended to current standards.
- b) At the conclusion of an airworthiness flight test in connection with renewal of the Certificate of Airworthiness, the test report should be prepared in a manner acceptable to the AID and should include the results of tests specified in the airworthiness flight test schedule, as well as a statement of observed performance versus flight manual performance for the same configuration and atmospheric conditions.
- c) Airworthiness flight test reports should be submitted to the AID. If any phase of the tests needs to be repeated, the AID should give notification of requirements.

## 5.2.5.4 Flight test — modification

- a) If, in the opinion of the AID, a modification is likely to affect the flight characteristics, performance or functioning in flight of the aircraft, the AID may decide that special flight tests are required. If so decided, the flight test schedule should include:
  - 1) tests necessary to establish compliance with the appropriate airworthiness requirements. In particular cases other tests, not confined to flight tests, may be necessary to prove that the modification has not adversely affected airworthiness requirements; and
  - 2) flight tests necessary to provide information for inclusion in the flight manual and in other documents associated with the Certificate of Airworthiness.
- b) At the conclusion of a flight test, a flight test report should be prepared in an approved form which should include the results of the tests specified in the flight test schedule for the aircraft concerned.
- c) Flight test reports should be submitted to the AID for approval. If examination of a flight test report reveals that certain tests need to be repeated, the AID should give notification of requirements.

## 5.2.5.5 Flight test — personnel

- a) The airworthiness flight tests specified above should be carried out by pilots and crew approved for the purpose by the AID. They should be appropriately licensed for the particular type of aircraft concerned and competent to conduct the tests laid down in the Airworthiness flight test schedule.
- b) Except where the AID requires additional crew to be carried for a particular airworthiness flight test, the number of persons conducting the test should be confined to the crew specified in the Certificate of Airworthiness (flight manual).

5.2.6 Period of validity of a  
Certificate of Airworthiness

- a) A Certificate of Airworthiness issued by the State of Registry and subject to renewal should normally specify the period of validity (a number of States specify a period of one year). It should, however, cease

to be valid if the aircraft, or such of its equipment as is necessary for the airworthiness of the aircraft, is overhauled, repaired or modified or if any part of the aircraft or such equipment is removed or is replaced in a manner or with material of a type which has not been approved by the AID, either generally or in relation to a class of aircraft or to the particular aircraft.

- b) The Certificate of Airworthiness should also cease to be valid until completion of required inspection of the aircraft, or any components which are considered by the AID to be necessary for the purpose of ascertaining whether the aircraft remains airworthy, or until completion to the satisfaction of the AID of any modifications of the aircraft or its components considered necessary by the AID for the purpose of ensuring airworthiness of the aircraft.

*Note.— Refer also to Volume II of this manual, Part B, Chapter 4 — Maintenance of the Validity of the Certificate of Airworthiness.*

### 5.3 AIRWORTHINESS APPROVALS FOR EXPORTS

#### 5.3.1 General

An exporter of an aircraft or an aeronautical product is normally required to obtain an export airworthiness approval from the Civil Aviation Authority of the State in which the aircraft is registered or in the case of a new aircraft or an aeronautical product, the State of Manufacture. The export approval is normally revalidated by the Civil Aviation Authority of the importing State. A number of States have identified certain special requirements or conditions to which the aircraft or aeronautical product must conform before they will validate the export approval issued by the exporting State. In many cases, information on such special requirements or conditions is not readily available. It is therefore important that the exporter obtain the necessary information on any special requirements or conditions from the CAA of the importing State.

#### 5.3.2 Special requirements

The administrative requirements which must be satisfied as a condition of shipment at the time of export are generally referred to as special requirements, and include, for example, the requirement for an export Certificate of

Airworthiness for the aircraft, copies of log books, flight manuals, etc. When a product does not meet the special requirements of the importing State, the exporter should obtain a written statement from the CAA of the importing State indicating acceptance of the deviation. This statement should accompany each application for an export airworthiness approval.

#### 5.3.3 Special conditions

Any additional design requirements considered necessary by the importing State in addition to the requirements of the exporting State to provide a level of safety and environmental quality (including noise) equivalent to what is provided by the importing State's certification basis are referred to as special conditions. These additional conditions should be included in the Type Certificate data sheet. When any of the special conditions cannot be satisfied, the exporters must obtain a statement from the CAA of the importing State indicating that it will accept the deviation.

#### 5.3.4 Classification of products for export

The regulations issued by the CAA concerning exports should normally provide that any exporter or an authorized representative may obtain an export airworthiness approval. For this purpose the products may be classified as follows:

- a) Class I product — a complete aircraft, aircraft engine or propeller which has been type certificated in accordance with the appropriate airworthiness requirements and for which the necessary Type Certificate data sheets or equivalent have been issued.
- b) Class II product — a major component of a Class I product, such as wing, fuselage, empennage surface, etc., the failure of which would jeopardize the safety of a Class I product or any part, material or system thereof.
- c) Class III product — any part or component which is not a Class I or Class II product or a standard part.

In the case of an aircraft, the export approval is normally issued in the form of an export Certificate of Airworthiness. For other products, it may be issued in the form of airworthiness approval tags. Both should include, among other things, the conformity certification and should indicate whether the product is new, newly overhauled or used.

*Note.— When the term “newly overhauled” is used to describe the product it means that the product has not been operated or placed in service, except for functional testing, since having been overhauled, inspected and approved for return to service in accordance with the appropriate airworthiness requirements.*

### 5.3.5 Issuance of export certificate

The Export Certificate of Airworthiness for an aircraft should not cover the flight approval for a foreign registered aircraft. Before an aircraft is flown, the certificate should be either revalidated or replaced by a new certificate issued by the new State of Registry, and a flight permit for export delivery should be issued by the CAA of the exporting State. Guidance on the issuance of an export airworthiness approval is included in Appendix D to this chapter.

## 5.4 APPROVALS FOR SPECIAL FLIGHTS

5.4.1 The CAA airworthiness regulations should make provisions for the AID to issue a special flight permit, providing the aircraft is capable of safe flight, for the purpose of:

- a) relocating the aircraft to a base where repairs, modifications or maintenance are to be performed, or to a point of storage;
- b) delivering or exporting the aircraft, subject to the approval of the States concerned;
- c) evacuating the aircraft from an area of impending danger, or in cases of *force majeure*; or
- d) at any other times determined by the AID.

5.4.2 Application for a special flight permit should be submitted in a manner prescribed by the AID, indicating at least the following:

- a) the name and address of the registered owner of the aircraft;
- b) the make, model, serial number and registration marks of the aircraft;
- c) the purpose of the flight;
- d) the proposed itinerary;

- e) the crew required to operate the aircraft;
- f) details of non-compliance with applicable airworthiness requirements;
- g) any restriction the applicant considers necessary for safe operation of the aircraft; and
- h) any other information considered necessary by the AID for the purpose of prescribing operating limitations.

5.4.3 Since a special flight authorization is issued to cover operation of an aircraft which may not meet airworthiness standards established by ICAO or the State of Registry, appropriate limitations must be prescribed to minimize hazard to persons or property. To enable determination of these limitations, the AID may make or require the applicant to make appropriate inspections or tests. Because of the different kinds of operations involved, there may be differences in the detailed limitations. However, the following limitations are considered to be essential in all special flight authorizations:

- a) a copy of the authorization should be displayed in the aircraft at all times when operating under the terms of the authorization;
- b) the registration marks assigned to the aircraft by the State of Registry should be displayed on the aircraft in conformity with the requirements of that State;
- c) persons or property should not be carried for compensation or hire;
- d) no person should be carried in the aircraft unless that person is essential to the purpose of the flight and has been advised of the contents of the authorization and the airworthiness status of the aircraft;
- e) the aircraft should be operated only by crew holding appropriate certificates or licenses issued or validated by the State of Registry;
- f) all flights should be conducted in accordance with the applicable general operating rules of the States in or over which the operations are conducted;
- g) all flights should be conducted so as to avoid areas having heavy traffic or any other areas where flights might create hazardous exposure to persons or property;
- h) all flights should be conducted within the performance operating limitations prescribed in the aeroplane flight

manual and those additional limitations specified by the State of Registry for the particular flight; and

- i) all flights should be conducted prior to the expiry date of the authorization.

If the flight involves operations over States other than the State of Registry, the operator of the aircraft must obtain authorizations from the appropriate authorities of those States prior to undertaking the flight.

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**Appendix A to Chapter 5**  
**APPLICATION FOR ISSUANCE OF A**  
**CERTIFICATE OF AIRWORTHINESS**

(example only)

This application form, together with its appendix, when completed, should be forwarded to the Civil Aviation Authority.

1. Name of aircraft owner .....
2. Address of owner .....
3. Nationality .....
4. Name and address of applicant (if other than the aircraft owner) .....
5. Name and address of manufacturer .....
6. Place and year of manufacturer .....
7. State of Design .....
8. Registration marks (national or foreign) .....
9. Description of aircraft:
  - a) new or used .....
  - b) type .....
  - c) series .....
  - d) manufacturer's serial number .....
  - e) type of engine .....
  - f) number of engines fitted .....
  - g) type of propeller (where applicable) .....
  - h) seating accommodation (including crew) .....
  - i) avionics installed .....
10. Maximum take-off mass of aircraft .....

***Complete for domestically manufactured aircraft***

11. Is the aircraft:
  - a) a prototype, i.e. an aircraft of new design which has not previously been investigated? .....
  - b) a prototype (modified), i.e. an aircraft the design of which in part has not been previously investigated? .....

- c) one of a series, i.e. an aircraft the design of which (including the engines and all equipment) is similar in every respect to the design of one for which a Certificate of Airworthiness has previously been issued? If the aircraft is one of a series, quote registration marks, if known, of the aircraft with which it conforms in every respect .....

**Complete for foreign-manufactured aircraft**

- 12. a) State of Origin of Certificate of Airworthiness presented .....
- b) number of the Certificate of Airworthiness presented .....
- c) type of certificate (domestic or export) .....
- d) date of issue .....
- 13. Types of operations envisaged, e.g.:
  - a) transport of passengers .....
  - b) transport of cargo .....
  - c) general purpose .....
  - d) aerial work .....
  - e) private .....
  - f) special operations (specify) .....
- 14. Name and address of approved organization/licensed aircraft  
    maintenance personnel with whom aircraft is available for inspection .....

**15. DECLARATION**

I hereby declare that the particulars entered on this application and its appendix are accurate in every respect.

Date ..... Signature of applicant .....

# APPENDIX TO THE APPLICATION FOR ISSUANCE OF A CERTIFICATE OF AIRWORTHINESS

## AIRCRAFT SYSTEMS, INSTALLATIONS AND EQUIPMENT

When applying for the initial issuance of a Certificate of Airworthiness, the applicant should be required to complete the items listed in this appendix.

All items should be completed as appropriate; in cases where items are not relevant, the words "Not applicable" should be entered.

Name of applicant: .....

Aircraft type: .....

Series: .....

Registration marks — current or allotted: .....

previous marks (if any): .....

Manufacturer's serial number: .....

### System, installation or equipment details

1. Pressurization system .....
2. Automatic flight control and guidance systems .....
3. Cockpit voice recorder .....
4. Electric power generators:
  - 4.1 Engine-driven:
    - a) DC only (including alternators with built-in rectification) .....
    - b) DC and AC .....
    - c) AC only, frequency range .....
  - 4.2 Helicopter transmission-driven:
    - a) DC only (including alternators with built-in rectification) .....
    - b) DC and AC .....
    - c) AC only, frequency range .....
5. Main batteries
  - a) nickel/cadmium .....
  - b) lead/acid .....
  - c) number fitted .....
6. Oxygen
  - a) installed .....
  - b) portable .....



7. Engine fire detection system .....
8. Portable fire extinguishers .....
9. Stall detection and warning system .....
10. Fuel quantity indicating system .....
11. Ice and rain protection systems .....
12. Flight data recording systems .....
13. Emergency lighting system .....
14. Anti-collision lighting
  - a) rotating beacons .....
  - b) strobe lights .....
15. Compasses
  - a) remote reading .....
  - b) direct reading .....
16. Automatic navigation system .....
17. Rotor low rpm warning system (helicopters only) .....
18. Systems installed for agricultural purposes .....

#### Other information

19. Are there provisions for the installation of safety harnesses at:
  - a) flight crew seat positions? .....
  - b) cabin crew seat positions? .....
  - c) passenger seat positions? .....
20. Are there provisions for carrying external loads? .....
21. Are there provisions for glider towing? .....
22. State total fuel capacity (in kg) .....
23. Give details of equipment, other than that listed in 1 to 18, which has been introduced by modification action (state manufacturer and type) .....
24. Give details of changes, if any, introduced in the flight manual, as a result of modification action .....

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**Appendix B to Chapter 5**  
**APPLICATION FOR RENEWAL OF A**  
**CERTIFICATE OF AIRWORTHINESS**

(example only)

This application form, when completed, should be forwarded to the Civil Aviation Authority.

1. Aircraft type ..... Registration marks .....  
Maintenance schedule reference .....

Types of operations envisaged:

  - a) transport of passengers .....
  - b) transport of cargo .....
  - c) general purpose .....
  - d) aerial work .....
  - e) private .....
  - f) special operations .....

2. Name and address of applicant .....
3. Name and address of registered owner .....
4. Name and address of approved organization/licensed aircraft maintenance  
personnel with whom aircraft is available for inspection .....
5. Maximum take-off mass authorized (in kg) .....
6. Details of avionic equipment (if fitted) .....
7. Utilization during 12 months prior to date of application: ..... hours flying  
(required for aircraft whose maximum total mass authorized exceeds 5 700 kg)

I hereby certify that in carrying out inspection of the above-mentioned aircraft, all the requirements of the approved maintenance schedule, appropriate airworthiness directives and special inspections have been complied with.

Signature of applicant .....

Date .....

**PART II**

The following work is to be carried out for the renewal of the Certificate of Airworthiness:

.....  
.....  
.....  
.....  
.....  
.....  
.....

Signed (for the Civil Aviation Authority) .....

Date .....

\_\_\_\_\_

# Appendix C to Chapter 5

## GUIDANCE ON THE CONTROL OF AIRCRAFT MASS

### Sample State instructions to operators/owners

#### 1. APPLICABILITY

These instructions apply to all aircraft registered in the State and specify in detail the procedures to be followed in connection with the determination of mass of such aircraft.

#### 2. DEFINITIONS

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

**Aircraft.** Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

**Aircraft component.** Any equipment, instrument, system or portion of an aircraft which, when fitted to an aircraft, is essential to the operation of the aircraft.

**Approved.** Approved by or on behalf of the Civil Aviation Authority in accordance with the pertinent requirements of State regulations.

**Authorized signatory.** A person nominated by an operator or owner and authorized by the Civil Aviation Authority to sign on its behalf for certification of the aircraft mass.

**Centre of gravity.** An imaginary point about which the nose heavy and tail heavy moments are equal in magnitude.

**Empty mass.** The mass of the aircraft in empty condition as specified in its appropriate approved manuals. This includes all operating equipment that has a fixed location and is installed in the aircraft.

**Maximum take-off mass.** The maximum authorized mass of the aircraft and its contents, as specified in its appropriate approved manuals.

**Modification.** Any change in the design and construction of an aircraft component or its power-unit.

**Person.** Any individual, organization or enterprise.

**Power-unit.** A system of one or more engines and ancillary parts which are together necessary to provide thrust, independently of the continued operation of any other power-unit(s), but not including short period thrust-producing devices.

**Repair.** The restoration of an aircraft, aircraft component or power-unit to a condition for safe operation after damage or deterioration.

**To certify.** To accept responsibility for the completion of specified maintenance work in accordance with sound engineering practice and the requirements of State regulations.

#### 3. ABBREVIATIONS

When the following abbreviations are used in this appendix, they have the meaning shown:

**TOM:** take-off mass

**CG:** centre of gravity

**EMCG:** empty mass centre of gravity

**MAC:** mean aerodynamic chord: used to locate the CG range of the aircraft. The location and dimension of the MAC are given in the aircraft specifications.

#### 4. ADMINISTRATION AND PROCEDURES — PERIODIC DETERMINATION OF MASS

##### 4.1 General

4.1.1 Except as specified in 4.1.2, the mass of each aircraft should be determined prior to the initial issue of the Certificate of Airworthiness.

4.1.2 Determination of the mass of an aircraft prior to the initial issue of a Certificate of Airworthiness may not be required in the case of:

- a) an aircraft in respect of which the mass has been determined prior to importation and in respect of which any subsequent changes in mass have been duly computed and recorded;
- b) a newly manufactured aircraft having a maximum TOM not exceeding 5 700 kg, the empty mass of which has been established in accordance with information and computations supplied by the manufacturers thereof; or
- c) if the basic mass is estimated to have changed by not more than 0.5 per cent of the maximum take-off mass, and if the centre of gravity is estimated to have changed by not more than 0.5 per cent of the MAC.

**4.2 Periodic determination of mass**

Unless otherwise approved by the CAA, further determination of mass should be done subsequent to the initial determination of mass arrived at in accordance with 4.1 above and at the intervals specified in the following table:

	<i>Interval for determination of mass (to be determined by the CAA)</i>
a) Aeroplanes of maximum TOM greater than 5 700 kg, the mass control of which is supervised by an aircraft mass control design signatory	.....
b) Aeroplanes of maximum TOM greater than 5 700 kg, the mass control of which is not supervised by an aircraft mass control design signatory; rotorcraft of maximum TOM greater than 2 000 kg	.....
c) Aeroplanes of maximum TOM not greater than 5 700 kg, but greater than 2 000 kg, excluding aeroplanes certificated in the agricultural category; rotorcraft of maximum TOM not greater than 2 000 kg	.....
d) Aeroplanes of maximum TOM not greater than 2 000 kg; aeroplanes of maximum TOM not greater than 5 700 kg, certificated in the agricultural category	.....
e) Gliders	.....

**4.3 Procedures for determining mass**

4.3.1 Aircraft mass determination should be supervised by either an airworthiness officer of the CAA or an aircraft mass control design signatory. Aircraft should be presented for mass determination in a condition acceptable to the person authorized to supervise the measurements. Aircraft mass should be determined on scales approved by the CAA.

4.3.2 Sufficient personnel and equipment, such as slings, ballast and trestles, should be provided by the owner or operator of the aircraft to complete the mass determination satisfactorily. The CAA should not be responsible for the safety of the aircraft or personnel performing the measurements.

4.3.3 Unless otherwise approved by the CAA, two independent determinations should be made and the aircraft longitudinal datum line should be horizontal in at least one of these determinations. The load should be completely removed from the equipment between determinations. Any discrepancy between the aircraft gross masses as determined by the two measurements should not exceed 0.2 per cent or 10 kg, whichever is the greater. If this tolerance is exceeded, the measurements should be repeated until the gross mass, as determined by two consecutive and independent measurements, agrees with that tolerance.

4.3.4 Normal precautions, consistent with good practices in the mass determination procedures, should be taken, such as:

- a) aircraft and equipment should be checked for completeness;
- b) fluids should be properly accounted for;
- c) mass determination should be carried out in an enclosed building, to avoid the effect of wind;
- d) the scales used should be properly calibrated and used in accordance with the manufacturer's instructions; and
- e) each scale should have been calibrated, either by the manufacturer or by the appropriate State authority, or other body authorized and approved by the State within one year prior to the mass determination of the aircraft.

4.3.5 An aircraft mass summary should be completed and a copy, certified by the person supervising the

measurement, submitted to the CAA. Data recorded should be sufficient to enable the empty mass and empty mass centre of gravity position to be accurately determined.

*Note. – If there is any doubt regarding the accuracy of the measurement, the CAA may require the measurements to be repeated.*

4.3.6 The empty mass and empty centre of gravity position should be determined by the owner or operator of the aircraft in accordance with the recorded results of the measurements.

#### 4.4 Loading data

4.4.1 The loading schedule should be kept with the aircraft, forming a part of the aircraft flight manual. It should include instructions on the proper load distribution such as filling of fuel tanks and oil tanks, passenger movement, distribution of cargo, etc. A check should be made to determine if the schedule will allow computation of separate loading conditions when the aircraft is to be loaded in other than the specified conditions shown in the loading schedule.

4.4.2 Information on which to base records of mass and balance changes to the aircraft may be obtained from the pertinent aircraft specifications, aircraft flight manual and the aircraft mass and balance report. Operators should maintain records of all known mass and centre of gravity changes which occur after the aircraft mass has been determined.

4.4.3 A mass and centre of gravity schedule should be provided for each aircraft. Each schedule should be identified by the aircraft designation, nationality and registration marks. The date of issue of the schedule should be given and the schedule should be signed by an approved representative of the organization or a person suitably qualified or acceptable to the CAA. A statement should be included indicating that the schedule supersedes all earlier issues.

#### 4.5 Aircraft mass control organization

4.5.1 The CAA should consider applications from an operator to determine the mass of certain types of aircraft on a sampling basis, provided the operator has an approved

mass control organization. Such an organization should consist of a minimum of two engineers, or one engineer and one mass control officer, or two mass control officers.

4.5.2 The staff of an approved mass control organization should have adequate facilities to enable the maintenance of records of mass changes of each aircraft of the operator's fleet. Any change in the constitution of the minimum staff, upon the basis of which approval was granted, should be notified in writing to the CAA. Any provisions approved should be considered as cancelled until such time as the CAA approves such change.

4.5.3 *Signatories.* One engineer or control officer of the operator should be authorized by the CAA as approved signatory of documents required. An approved signatory should not delegate his authority. In cases where the minimum staff requirements are exceeded, an additional person may be authorized by the CAA to act as approved signatory during the absence of the authorized person.

4.5.4 *Application for approval.* Application for approval should be made to the CAA and should include the following:

- a) the names, qualifications, and experience of the persons nominated as signatories;
- b) the names, qualifications, and experience of the remaining members of the aircraft mass control organization;
- c) details of the method of liaison with other sections of the organization to ensure that all records of mass changes are transmitted to the aircraft mass control organization;
- d) details of the procedure within the organization for ensuring adequate control of the loading of all aircraft.

An aircraft mass control organization approved under this section should operate in accordance with the national regulations and the procedures contained in the operator's maintenance manual.

4.5.5 Periodic mass determination of aircraft on a sampling basis is necessary to determine if major mass changes have taken place which might indicate a trend or a condition prevalent in the entire fleet. The following table shows a periodic sampling procedure, indicating the number of aircraft to be included in mass determination every 24 calendar months:

Number in fleet	Minimum number to be used
3	3
4 or 5	4
6 or 7	5
8 to 13	6
14 to 23	7
24 and over	6, plus 10% of the number of aircraft over 9

The sampling rate may be reduced by approval of the CAA where it can be shown that the variation in fleet mass is small from year to year. Extensions should not be granted which would permit any aircraft to exceed 48 calendar months since the last mass determination. A rotation programme should be established, so that the mass of all aircraft in the fleet can be periodically determined.

4.5.6 the mass and balance control system should include methods by which the operator will complete a current and continuous record of the mass and centre of gravity of each aircraft. Such records should reflect all alterations and changes affecting either the mass or balance of the aircraft and should include a complete and current equipment list. When fleet mass is used, pertinent computations should be available in individual aircraft files.

4.5.7 The operator should take into account all probable loading conditions which may be experienced and show that the loading schedules may be applied to individual aircraft or to a complete fleet. When an operator uses several types or models of aircraft, the loading schedule (which may be index type, tabular type, or a computer used) should indicate the type or model of aircraft for which it is designed.

#### 4.6 Preparation and approval of loading data

4.6.1 Loading data prepared in accordance with the provisions of this sub-section should be approved by an appropriately authorized aircraft mass control design signatory or by the CAA. Where the applicable flight manual pages are used as the load data sheet and to specify any required loading system, the completed pages should be submitted to the CAA for incorporation in the aircraft flight manual.

4.6.2 The operator should be responsible for the preparation of a load data sheet for each aircraft based on the empty mass and empty centre of gravity position. Unless otherwise approved by the CAA, the flight manual page titled "aircraft mass" should be used as the load data sheet in the case of aeroplanes of maximum TOM not greater than 5 700 kg.

4.6.3 The operator should be responsible for the preparation of a loading system for each aircraft based on the empty mass and empty centre of gravity position, unless it can be shown that the aircraft cannot be loaded so that its centre of gravity falls outside the approved range.

*Note.— When the necessary loading limitations can be conveniently presented in placard form, such placards, prominently displayed in the aircraft, will be an acceptable type of loading system.*

4.6.4 One copy of each data sheet and loading system approved by an aircraft mass control design signatory should be submitted to the CAA, except that where flight manual pages are used as the load data sheet or to specify the loading system, two copies should be supplied. Alternatively, two copies of all calculations, load data sheet, loading system or flight manual pages as appropriate should be submitted to the CAA for approval.

4.6.5 Load data sheets approved by an aircraft mass control design signatory should be validated by the signatory for a period expiring not later than the time at which the next mass determination is to be done.

#### 4.7 Equipment lists

4.7.1 Prior to the initial issue of a Certificate of Airworthiness for each aeroplane and rotorcraft, a list of equipment included in the empty mass should be submitted to the CAA. If an operating mass is used, a similar list of removable equipment and disposable load included in the operating mass should also be submitted to the CAA.

4.7.2 Where a change occurs in the items included in either the empty mass or, if applicable, the operating mass of an aircraft, the appropriate list should be amended by the operator and a copy submitted to the CAA.

4.7.3 At each mass determination of an aircraft, it should be the responsibility of the operator to check whether the list of equipment requires revision. A copy of any revised list should be supplied to the CAA.

## 5. OPERATION AND APPROVAL

### 5.1 Record of mass alterations

5.1.1 A complete, current, and continuous record of changes in empty mass and empty centre of gravity position should be maintained for each aircraft. This record should contain details of all alterations affecting either the mass or balance of the aircraft.

*Note.— A number of alterations performed at the same time may be recorded collectively.*

5.1.1 Under the provisions of the preceding paragraph, a record of mass and centre of gravity alterations is required; a record should be raised after each determination of mass and a copy of the renewed document should be supplied to the CAA.

### 5.2 Mass control during modification

5.2.1 It should be the responsibility of the operator of an aircraft to renew the load data sheet when a loading system has been issued, if the system applicability limits are exceeded as the result of a modification or, as shown in the record of mass alterations, changes have occurred in the empty mass or empty centre of gravity position as follows:

- a) for aeroplanes:
  - the empty mass has changed by more than 0.5 per cent of the maximum TOM; or
  - the empty centre of gravity position has changed by more than 0.5 per cent of the mean aerodynamic chord.
- b) for rotorcraft:
  - the empty mass has changed by more than 1 per cent of the maximum TOM; or

- the empty centre of gravity position has changed by more than 1 cm or 10 per cent of the maximum permissible centre of gravity range, whichever is the less.

5.2.2 Further to the provisions of 5.1, if the CAA or an aircraft mass control design signatory is of the opinion that adequate mass control has not been exercised over an aircraft during the modification, the CAA or the aircraft mass control design signatory may require that a new empty mass and empty centre of gravity position should be determined.

5.2.3 Where a loading system has not been required previously, it is the responsibility of the operator to check the need for a loading system in the circumstances specified in 5.1 and, where necessary, provide a loading system.

5.2.4 Loading data renewed in accordance with 5.1 should be based on the new empty mass and empty centre of gravity position and should be prepared and approved in accordance with 5.1.

### 5.3 Aircraft fleets

Three or more aeroplanes or rotorcraft of the same type under the control of one operator may, with the approval of the CAA, be treated as a fleet for the purposes of preparation and approval of loading data, provided the specifications listed in 4.2 are met.

### 5.4 Load sheets

Except where the aircraft load sheets are used by an operator, any document intended as a load sheet should be submitted to the CAA for approval before use, or should be approved by an aircraft mass control design signatory. If approved by an aircraft mass control design signatory, a copy of the approved load sheet form should be supplied to the CAA.



### SAMPLE MASS AND BALANCE REPORT

#### MASS CONTROL CERTIFICATE

Date issued ..... \*Date/time of first flight ..... UTC

\* IMPORTANT: This date/time must be later than the date of issue

#### Aircraft mass and centre of gravity determination

No. ....

Date .....

Aircraft registration .....

Aircraft type .....

Aircraft serial number .....

Name of operator .....

Place of determination of mass .....

Reason for determination of mass .....

Performed by
Checked by

Empty mass
Empty CG from datum line
Index

Approved by: .....  
.....

(Authorized personnel)

**MASS CONTROL CALCULATION**

**Empty mass lever arms**

Aircraft type .....

Registration .....

Reaction (wheel, jack, point, etc.)	Average scale reading (kg)	ARM (cm)	Moment (cm-kg)
Left main gear			
Right main gear			
Sub-total			
Nose/tail gear			
Total (as measured)			

Items included in empty mass:

1. ....
2. ....
3. ....
4. ....
5. ....

Remarks:

**MASS CONTROL CALCULATION**

**Aircraft mass and centre of gravity determination**

COLUMN I			
Items included but not part of empty mass	Mass (kg)	ARM (cm)	Moment (cm-kg)
<b>TOTAL</b>			

COLUMN II			
Basic items not included when determining mass	Mass (kg)	ARM (cm)	Moment (cm-kg)
<b>TOTAL</b>			

**Aircraft mass record**

Description	Net mass (kg)	ARM (cm)	Moment (cm-kg)
Total (as measured)			
Less total mass from Column I			
Plus total mass from Column II			
<b>Net empty mass</b>			

CG limitation:

forward ..... cm  
aft ..... cm } from reference line

Index formula:

INDEX:

\_\_\_\_\_

## Appendix D to Chapter 5

# SAMPLE STATE GUIDANCE FOR ISSUANCE OF EXPORT AIRWORTHINESS APPROVALS

### 1. APPLICATION FOR AN EXPORT AIRWORTHINESS APPROVAL

1.1 A separate application for an export airworthiness approval should be made for:

- a) each aircraft;
- b) each engine and propeller, except that one application may be made for more than one engine or propeller, if all are of the same type and model and are exported to the same purchaser and country;
- c) each type of Class II product, except that one application may be used for more than one type of Class II product when:
  - 1) they are separated and identified in the application as to the type and of the related Class I product; and
  - 2) they are to be exported to the same purchaser and country.

1.2 Each application for export airworthiness approval of a Class I product should include, as applicable:

- a) a statement of conformity, for each new product that has not been manufactured under a production certificate;
- b) a mass and balance report, etc., with a loading schedule when applicable, for all transport aircraft. This report should be based on an actual weighing of the aircraft within the preceding 12 months, after any major repairs or alterations to the aircraft. Changes in equipment not classified as major changes that are made after the actual weighing may be accounted for on a "computed" basis and the report revised accordingly. Manufacturers of new non-transport aircraft may submit reports having computed mass and balance data, in place of an actual weighing of the aircraft, if fleet mass control procedures approved by the AID have been established for such aircraft. In such cases, the following statement should be entered in each report:

"The mass and balance data shown in this report are computed on the basis of AID-approved procedures for establishing fleet mass averages. The mass and balance report should include an equipment list showing mass and moment arms of all required and optional items of equipment that are included in the certificated empty mass."

- c) a maintenance manual for each new product when such a manual is required by the applicable airworthiness rules;
- d) evidence of compliance with the applicable airworthiness directives. A suitable notation should be made when such directives are not complied with;
- e) when temporary installations are incorporated in an aircraft for the purpose of export delivery, the application form should include a general description of the installations together with a statement that the installation will be removed and the aircraft restored to the approved configuration upon completion of the delivery flight;
- f) historical records such as aircraft and engine log books, repair and alteration forms, etc., for used aircraft and newly overhauled products;
- g) for products intended for overseas shipment, the application form should describe the methods used, if any, for the preservation and packaging of such products to protect them against corrosion and damage while in transit or storage. The description should also indicate the duration of the effectiveness of such methods;
- h) the aircraft flight manual, when such material is required by the applicable airworthiness regulations for the particular aircraft;
- i) a statement as to the date when title passed or is expected to pass to a foreign purchaser; and
- j) the data required by the special requirements of the importing country.

A sample application form is shown in Example 1.

## 2. ISSUANCE OF EXPORT CERTIFICATE OF AIRWORTHINESS FOR CLASS I PRODUCTS

An applicant should be entitled to an Export Certificate of Airworthiness for a Class I product if it is shown that, at the time the product is submitted to the AID for export airworthiness approval, it meets the following requirements, as applicable:

- a) new or used aircraft manufactured in the country should meet the airworthiness requirements of that country, subject to the special requirements of the importing country;
- b) new or used aircraft manufactured outside the country should have a valid CAA airworthiness certificate;
- c) used aircraft should have undergone an annual type inspection and be approved for return to service. The inspection should have been performed and properly documented within 30 days before the date the application is made for an Export Certificate of Airworthiness;
- d) new engines and propellers should conform to the type design and should be in condition for safe operation;
- e) the engines and propellers which are not being exported as part of a certificated aircraft should have been newly overhauled; and
- f) the special requirements of the importing country should have been met.

A sample Export Certificate of Airworthiness for Class I products is shown in Example 2.

## 3. ISSUANCE OF EXPORT AIRWORTHINESS APPROVAL TAGS FOR CLASS II PRODUCTS

An applicant should be entitled to an Export Airworthiness Approval Tag for a Class II product if he shows that:

- a) the product conforms to the approved design data;
- b) the product is in a condition for safe operation;
- c) in the case of a newly overhauled product, it has not been operated or placed in service except for functional testing since having been overhauled, inspected and approved for return to service;

- d) the product is identified with at least the manufacturer's name, part number, model designation (when applicable), and serial number or equivalent; and
- e) the product meets the special requirements of the importing country.

A sample Export Airworthiness Approval Tag for Class II products is shown in Example 3.

## 4. ISSUANCE OF EXPORT AIRWORTHINESS APPROVAL TAGS FOR CLASS III PRODUCTS

An applicant should be entitled to an Export Airworthiness Approval Tag for a Class III product if he shows that:

- a) the product conforms to the approved design data applicable to the Class I or Class II product of which it is a part;
- b) the product is in a condition for safe operation; and
- c) the product complies with the special requirements of the importing country.

A sample Export Airworthiness Approval Tag for a Class III product is shown in Example 4.

## 5. RESPONSIBILITIES OF EXPORTERS

Each exporter receiving an export airworthiness approval for a product should:

- a) forward to the CAA of the importing country all documents and information necessary for the proper operation of the products being exported, e.g., flight manuals, maintenance manuals, service bulletins, assembly instructions, and such other material as is stipulated in the special requirements of the importing country. The documents, information, and material may be forwarded by means consistent with the special requirements of the importing country;
- b) forward the manufacturer's assembly instructions and an AID approved flight test check-off form to the CAA of the importing country when unassembled aircraft are being exported. These instructions should be in sufficient detail to permit whatever rigging, alignment, and ground testing is necessary to ensure that the aircraft will conform to the approved configuration when assembled;

- c) remove or cause to be removed any temporary installation incorporated on an aircraft for the purpose of export delivery and restore the aircraft to the approved configuration upon completion of the delivery flight;
- d) secure all proper foreign entry clearances from all the countries involved when conducting sales demonstrations or delivery flights;
- e) when title to an aircraft passes or has passed to a foreign purchaser:
  - 1) request cancellation of the current registration and Certificates of Airworthiness, giving the date of transfer of title, and the name and address of the foreign owner;
  - 2) return the Certificate of Registration and Certificate of Airworthiness to the AID; and
  - 3) submit a statement certifying that the State's identification and registration numbers have been removed from the aircraft.

## Example 1

## SAMPLE APPLICATION FOR AN EXPORT AIRWORTHINESS APPROVAL

EXAMPLE APPLICATION FOR EXPORT CERTIFICATE OF AIRWORTHINESS	AIRCRAFT INSPECTION DIVISION	EXPORT CERTIFICATE NO.
Instructions: This application is to be submitted to the AID (one copy) when the product(s) to be exported is (are) presented for inspection. Use Part I for Class I products and Part II for Class II products. For complete aircraft execute items 1 through 11 as applicable. For engines and propellers, omit items 5 a) and 6. Part III is for AID use only.		

PART I (for Class I products)						
1. Application is made for an Export Certificate of Airworthiness to cover the product(s) described below, which is (are): <input type="checkbox"/> New <input type="checkbox"/> Used (aircraft) <input type="checkbox"/> Newly overhauled						
2. Name and address of exporter			3. Name and address of foreign purchaser		4. Country of destination	
5. Description of product(s)						
Type	Make and model	Identification number	Serial numbers	Spec. number	Operating time (hours)	
					Since overhaul	Total
a) Aircraft						
b) Engines						
c) Propellers						
6. The aircraft was given a satisfactory flight test on (date):						
7. Does the product comply with all applicable CAA regulations, airworthiness directives and other AID requirements?				<input type="checkbox"/> Yes	<input type="checkbox"/> No (explain in "Remarks")	
8. Have applicable special requirements of the importing country been complied with?				<input type="checkbox"/> Yes	<input type="checkbox"/> No (explain in "Remarks")	
9. Has proper preventive treatment been applied to products susceptible to rapid corrosion when being shipped?				<input type="checkbox"/> Yes	<input type="checkbox"/> No (explain in "Remarks")	
10. Remarks						
11. Exporter's certification:  I certify that the above statements are true and that the product(s) described here is (are) airworthy and in condition for safe operation except as may be noted under Item 10 "Remarks", above.						
Date	Signature of applicant or authorized representative			Title		

<b>PART II (for Class II products)</b>								
12. Application is made for approval of aeronautical parts for export as indicated below								
13. Name and address of exporter	14. Name and address of foreign purchaser	15. Country of destination						
16. Parts are eligible for installation on: Make and model Class I product: _____ Spec. No.: _____								
17. The parts are (check one): <input type="checkbox"/> New <input type="checkbox"/> Newly overhauled								
18. The parts are described (check one):  <input type="checkbox"/> By name, part number, and quantity on the attached invoice or packing sheet no. _____ <input type="checkbox"/> Below by name, part number, and quantity.  <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 33%;">Name</th> <th style="text-align: left; width: 33%;">Part number</th> <th style="text-align: left; width: 33%;">Quantity</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			Name	Part number	Quantity			
Name	Part number	Quantity						
19. I certify that the above statements are true and that the product(s) described here is (are) airworthy and in condition for safe operation except as may be noted under Item 10 "Remarks", above.								
_____ Date	_____ Signature of applicant or authorized representative	_____ Title						

**PART III — Approval (for AID use only)**

20. It is considered that the product(s) described in <input type="checkbox"/> Part I <input type="checkbox"/> Part II is (are) airworthy and conform(s) to pertinent requirements except as noted in Item 10.  <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 33%;">Date</th> <th style="text-align: left; width: 33%;">Signature of AID Inspector</th> <th style="text-align: left; width: 33%;">Number</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			Date	Signature of AID Inspector	Number			
Date	Signature of AID Inspector	Number						
21. _____ approval tags, forms were issued for the parts described in Part II. (Quantity)								
22. Export file spot-checked by:  <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 33%;">Date</th> <th style="text-align: left; width: 66%;">AID Inspector</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			Date	AID Inspector				
Date	AID Inspector							



## Example 2

SAMPLE EXPORT CERTIFICATE OF AIRWORTHINESS  
(for Class I products)

## EXAMPLE

AIRCRAFT INSPECTION DIVISION No.

EXPORT CERTIFICATE OF AIRWORTHINESS  
(for Class I products)

THIS CERTIFIES that the product identified below, and more particularly described in Specification(s)\* of the Aircraft Inspection Directorate numbered \_\_\_\_\_, has been examined and as of the date of this certificate, is considered airworthy in accordance with the comprehensive and detailed airworthiness code of \_\_\_\_\_ (State), and is in compliance with those special requirements of the importing State filed with \_\_\_\_\_ (State), except as noted below. This certificate in no way attests to compliance with any agreements or contracts between the vendor and purchaser, nor does it constitute authority to operate an aircraft.

Product: \_\_\_\_\_ Engine model: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Propellor model: \_\_\_\_\_

Serial No.: \_\_\_\_\_

 New       Newly overhauled       Used aircraft

State to which exported: \_\_\_\_\_

Exceptions:

Date

Signature of AID Inspector

- For complete aircraft, list applicable specification or Type Certificate data sheet numbers for the aircraft, engine and propellor. Applicable specifications or Type Certificate data sheet, if not attached to this Export Certificate, will have been forwarded to the appropriate governmental office of the importing country.

AID Form No. AW .....

**Example 3**

**SAMPLE EXPORT AIRWORTHINESS APPROVAL TAG  
(for Class II products)**

<p><b>EXAMPLE</b></p> <p style="margin-left: 200px;">AIRCRAFT INSPECTION DIVISION                      No.</p> <p style="margin-left: 150px;">EXPORT CERTIFICATE OF AIRWORTHINESS TAG (for Class II products)</p>											
1. Name and address of exporter	2. Name and address of foreign purchaser	3. Country of destination									
<p>4. The parts are eligible for installation on:</p> <p style="margin-left: 40px;">Make and model Class I product: _____ AID Spec. No.: _____</p>											
<p>5. The parts are (check one):</p> <p style="margin-left: 40px;"> <input type="checkbox"/> New                      <input type="checkbox"/> Newly overhauled                      <input type="checkbox"/> Used aircraft                 </p>											
<p>6. The parts are described (check one):</p> <p style="margin-left: 40px;"> <input type="checkbox"/> By name, part number, and quantity on the attached invoice or packing sheet no. _____                 </p> <p style="margin-left: 40px;"> <input type="checkbox"/> Below by name, part number and quantity                 </p> <table style="width: 100%; margin-left: 40px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 30%;">Name</th> <th style="text-align: left; width: 30%;">Part number</th> <th style="text-align: left; width: 30%;">Quantity</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			Name	Part number	Quantity						
Name	Part number	Quantity									
<p>7. The parts do not meet the applicable CAA requirements in respect of the following:</p>											
<p>8. It is considered that the product(s) described in Item 6 is (are) airworthy and conform(s) to pertinent requirements except as noted in Item 7.</p>											
<p>_____</p> <p>Date</p>	<p>_____</p> <p>Signature of authorized representative</p>										

AID Form No. A/W .....

Example 4

**EXPORT AIRWORTHINESS APPROVAL TAG  
(for Class III products)**

AIRCRAFT INSPECTION DIVISION	
EXPORT AIRWORTHINESS APPROVAL TAG (FOR CLASS III PRODUCTS)	
DESCRIPTION OF PARTS	
<input type="checkbox"/> NEW <input type="checkbox"/> NEWLY OVERHAULED	
APPROVAL BASIS	
QUANTITY, NAME AND PART NUMBER	
ELIGIBLE FOR INSTALLATION ON: (T.C. PRODUCT)	
SEE SHIPPER'S INVOICE NUMBER	
INSPECTED AND APPROVED	
AGENCY NAME AND NUMBER	
SIGNATURE OF AID REPRESENTATIVE	
DATE	NUMBER

AID Form No. AW .....

# Chapter 6

## AIR OPERATOR CERTIFICATE — AIRWORTHINESS ASPECTS

### 6.1 GENERAL

6.1.1 A well established method by which the State of the Operator may exercise the necessary control of its operators is through the issuance of an air operator certificate (AOC). The award of an AOC constitutes certification by the State of the Operator that specified operations are authorized in compliance with applicable regulations and rules. Through the issuance of an AOC, the State of the Operator can ensure the protection of the public interest and exercise indirect influence and control upon the major aspects of the operation without encroaching upon the operator's direct responsibility for its safety. Detailed guidance on the establishment of a State system for the initial certification of operators and the subsequent surveillance of operations is contained in ICAO's *Manual of Procedures for Operations Inspection, Certification and Continued Surveillance* (Doc 8335). The material contained in the present chapter and in Chapter 7 (Approved Maintenance Organizations) is to be used in conjunction with Doc 8335 to amplify the airworthiness aspects of operator certification and surveillance procedures. In some instances, certain material contained in Doc 8335 has been repeated herein for the sake of clarity.

6.1.2 Annex 6, Part I, 4.2.1.3 states:

"The issue of an air operator certificate or equivalent document by the State of the Operator shall be dependent upon the operator demonstrating an adequate organization, method of control and supervision of flight operations, training programme and maintenance arrangements consistent with the nature and extent of the operations specified."

In making the "maintenance arrangements" referred to above, operators are required to ensure that the aeroplanes they operate are maintained in an airworthy condition. Annex 6, Part I, 8.1.2 requires that an aeroplane shall not be operated unless it is maintained and released to service by an approved maintenance organization or under an equivalent system.

6.1.3 Operators may have an approved maintenance organization as part of their organization or the maintenance may be contracted to one or more maintenance

organizations approved for the purpose. The approval of the maintenance organization shall be acceptable to the State of Registry of the operator's aeroplanes. In issuing the AOC, the State of the Operator will have to be satisfied as to the actions of the State of Registry in granting the approval of the maintenance organization, maintenance programme and setting the standards for the continuing airworthiness of the operator's aeroplanes. For States which have ratified Article 83 *bis*, the State of Registry may transfer some or all of its responsibilities for the airworthiness aspects for the issuance of an AOC to the State of the Operator. (Refer to Doc 8335, Chapter 10 and to Volume II of this manual, Part B, Chapter 10 for information on lease, charter and interchange.)

6.1.4 Procedures for operator certification and surveillance should normally take the sequence of:

- a) application to the CAA by the prospective operator;
- b) preliminary assessment of the application;
- c) operational inspection (administrative, flight, maintenance, etc.);
- d) decision on application and award of AOC; and
- e) continuing surveillance and inspection.

6.1.5 A major factor in the certification process is the determination of the capability of applicants to adequately maintain their aircraft in an airworthy condition. This will require a detailed inspection and evaluation of the applicant's maintenance organization, staffing, facilities, maintenance programme, operator's maintenance control manual, maintenance organization's procedures manual, training and ability to carry out day-to-day operations. The maintenance inspections and evaluations should be carried out by qualified inspectors of the AID under the overall coordination of the inspector-in-charge of the certification team. The inspector-in-charge may be the Director himself or a flight operations inspector designated by the Director.

6.1.6 When first assigned to a CAA certification team, the AID inspector should make certain that he fully understands the interrelationship of the various duties and

responsibilities of the individual inspectors. This understanding is essential in order to prevent duplication of effort, contradictory instructions to the applicant and conflicting inspection schedules. It is also incumbent upon the AID inspector to develop, at a very preliminary stage of the certification, an overall appreciation of the exact nature of the proposed operation.

## 6.2 AIRWORTHINESS ASSESSMENT

6.2.1 The application for an AOC should contain the essential information which will permit an assessment of the capability of the applicant to conduct the proposed operation. In respect of maintenance, the application should contain at least the following information:

- a) management organization and a listing of key staff members, including their titles, names, education and practical experience (in particular, the name, background and responsibility of the designated manager should be provided);
- b) types of aircraft, communications and navigation equipment, instruments and major items of equipment to be used;
- c) manuals and documents as described in the following paragraphs:
  - 1) arrangements for maintenance and inspection of aircraft and associated equipment;
  - 2) State of Registry of the aircraft (if foreign registered, a copy of the lease agreement should be provided);
  - 3) area of operations and bases from which operations will be conducted; and
  - 4) detailed description of how the applicant intends to show compliance with each maintenance-related provision of the applicable civil aviation regulations.

6.2.2 The importance of a thorough and careful preliminary assessment of the application cannot be overemphasized. The more thoroughly the applicant's competence is established at the initial stage, the less will be the likelihood of having serious problems in the operational inspection phase preceding certification or during the course of subsequent operations. In assessing the maintenance-

related aspects of the application prior to a detailed operational inspection, it will be necessary for the AID inspector member of the certification team to make a preliminary investigation to satisfy himself (and the inspector-in-charge) that the applicant has:

- a) a comprehensive maintenance programme;
- b) suitable personnel, equipment, facilities, manuals, buildings, shops, service agreements, etc., or will be able to obtain them;
- c) aircraft suitable for the proposed operation. In this connection the following questions should be considered:
  - 1) Can the aircraft be properly maintained and supplied with the available maintenance and spare parts resources?
  - 2) Is the requirement for aircraft utilization reasonable?
  - 3) Does the plan of operations permit compliance with aircraft maintenance schedules?
- d) outlined the duties and responsibilities of key maintenance staff with sufficient precision to provide a reasonable assurance that the safety of operations will not be adversely affected by the lack of organization and management control; and
- e) a full appreciation of responsibilities under the regulatory requirements, including the obligations of a potential holder of an AOC.

6.2.3 It is generally beneficial for the AID inspector to arrange for meetings with key personnel of the applicant's maintenance organization to review the information submitted in the application to clarify any questions the inspector or the applicant's personnel may have concerning the certification procedure. The inspector should arrange to have minutes or notes kept of these meetings, to be included in the report of the certification assessment.

## 6.3 MAINTENANCE MANAGEMENT

6.3.1 Annex 6, Part I, 8.1.2 requires that an aeroplane be maintained by an approved maintenance organization or under an equivalent system. An approved maintenance organization may be a part of the operator's organization or

it may be another organization to which the operator has subcontracted aeroplane maintenance tasks. In either case, Annex 6, Part I, 8.1.4 also requires that the operator employ a person or persons to ensure that the maintenance work is carried out in accordance with the operator's maintenance control manual. The maintenance responsibilities of 6.2 above should be fully satisfied and the quality assurance programme of 6.4 below should be in place.

6.3.2 Where the maintenance organization is part of the operator's own organization, it should be subjected to the same approval procedure as for independent organizations (see Volume I, Chapter 7 of this manual).

6.3.3 Where maintenance is contracted out, a written contract should be agreed between the operator and the maintenance organization detailing the responsibilities of both parties. The technical aspects of the contract should be accepted by the Authority.

## 6.4 QUALITY SYSTEM

### 6.4.1 Quality assurance system

6.4.1.1 An operator should establish a quality assurance system as part of the management system and designate a quality manager to monitor compliance with, and adequacy of, procedures required to ensure safe maintenance practices and airworthy aircraft. Compliance monitoring should include a feed-back system to the designated manager to ensure corrective action as necessary. The operator may establish a single quality assurance system for both the operations department and the maintenance department.

6.4.1.2 The quality system should include a quality assurance programme which contains procedures designed to verify that all tasks are being conducted in accordance with all applicable requirements, standards and procedures. The quality assurance system, and the quality manager, should be acceptable to the Authority, and should be described in relevant documentation.

### 6.4.2 Alternative to a quality assurance system

When the Authority issuing the approval agrees that setting up a comprehensive quality assurance system is not appropriate, the authority may accept a simpler method of quality verification.

### 6.4.3 Content of the maintenance programme

6.4.3.1 Annex 6, Part I, 8.3 places an obligation on operators to provide a maintenance programme approved by the State of Registry for the use and guidance of maintenance and operational personnel and to ensure that the maintenance of their aeroplanes is performed in accordance with this maintenance programme.

6.4.3.2 Annex 6, Part I, 11.3 sets out the information that must be contained in the maintenance programme. For convenience the information is repeated as follows:

- a) maintenance tasks and the intervals at which these are to be performed, taking into account the anticipated utilization of the aeroplane;
- b) when applicable, a continuing structural integrity programme;
- c) procedures for changing or deviating from a) and b) above; and
- d) when applicable, condition monitoring and reliability programme descriptions for aircraft systems, components and powerplants.

6.4.3.3 Annex 6, Part I, 11.3.2 also requires that maintenance tasks and intervals that have been specified as mandatory in approval of the type design shall be identified as such (refer to Volume II of this manual, Part A, Chapter 3 — Airworthiness Limitations and Certification Maintenance Requirements).

6.4.3.4 Annex 6, Part I, 11.3 also contains a recommendation that the maintenance programme be based on maintenance programme information made available by the State of Design or by the organization responsible for the type design. For large aeroplanes, this information is normally issued in the form of a maintenance review board report for the particular aircraft type (refer to Volume II of this manual, Part A, Appendix B to Chapter 2 for details of the maintenance review board process).

### 6.4.4 Items specific to maintenance

For maintenance purposes, the operator's system described in 6.4.1 and 6.4.2, should include at least monitoring:

- a) that the maintenance activities related to the responsibilities of the operator are being performed in accordance with accepted procedures;

- b) that all contracted maintenance is carried out in accordance with the contract;
- c) that implementation actions related to mandatory continuing airworthiness information are performed in time; and
- d) the continued compliance with the appropriate provisions of this chapter.

#### 6.4.5 Subcontracting of monitoring

If, in case of a small operator, the monitoring as described in 6.4.1 is subcontracted, the technical details of the contract should be submitted to the Authority for review and acceptance.

### 6.5 OPERATOR'S MAINTENANCE CONTROL MANUAL

6.5.1 Annex 6, Part I, 8.2 includes requirements for operators to ensure that a maintenance control manual is provided for the use and guidance of their maintenance and operational personnel as applicable. The operator is required to ensure that the manual is amended and revised as necessary and that copies of changes are distributed to holders of the manual.

6.5.2 Annex 6, Part I, 11.2 specifies the subjects that shall be included in the maintenance control manual. The manual may be issued in separate parts, but must be acceptable to both the State of the Operator and the State of Registry. For convenience, the required contents of the maintenance control manual are repeated as follows:

- a) a description of the procedures required to ensure that:
  - 1) each aeroplane is maintained in an airworthy condition;
  - 2) the operational and emergency equipment necessary for the intended flight is serviceable;
  - 3) the Certificate of Airworthiness of each aeroplane remains valid;
- b) a description of the administrative arrangements between the operator and the approved maintenance organization;
- c) a description of the maintenance procedures and the procedures for completing and signing a maintenance release when maintenance is based on a system other than that of an approved maintenance organization;
- d) the names and duties of the person or persons employed to ensure that all maintenance is carried out in accordance with the maintenance control manual;
- e) a reference to the maintenance programme (refer to 6.4 of this chapter);
- f) a description of the methods used for the completion and retention of the operator's maintenance records which show:
  - 1) the total time in service (hours, calendar time and cycles, as appropriate) of the aeroplane and all life-limited components;
  - 2) the current status of compliance with all mandatory continuing airworthiness information;
  - 3) appropriate details of modifications and repairs to the aeroplane or its major components;
  - 4) the time in service (hours, calendar time and cycles, as appropriate) since the last overhaul of the aeroplane or its components subject to a mandatory overhaul life;
  - 5) the current status of aeroplane's compliance with the maintenance programme; and
  - 6) the detailed maintenance records to show that all requirements for the signing of a maintenance release have been met;
- g) procedures for monitoring and assessing maintenance and operational experience in order to improve the maintenance programme;
- h) a description of the procedures for monitoring, assessing and reporting maintenance and operational experience to the State of Registry (only applicable to aeroplanes over 5 700 kg and helicopters over 2 730 kg maximum certificated take-off mass);
- i) a description of the procedures for complying with the service information reporting requirements of Annex 8, Part II, 4.3.5 and 4.3.8;
- j) a description of the procedures for assessing continuing airworthiness information and recommendations

- available from the organization responsible for the type design. Resulting actions considered necessary as a result of the assessment shall be in accordance with a procedure acceptable to the State of Registry (only applicable to aeroplanes over 5 700 kg and helicopters over 2 730 kg maximum certificated take-off mass);
- k) a description of the procedures for implementing action resulting from mandatory continuing airworthiness information;
  - l) a description of establishing and maintaining a system of analysis and continued monitoring and performance and efficiency of the maintenance programmes, in order to correct any deficiency in that programme (refer to 6.7 of this chapter);
  - m) a description of aircraft types and models to which the manual applies;
  - n) a description of procedures for ensuring that unserviceabilities affecting airworthiness are recorded and rectified; and
  - o) a description of the procedures for advising the State of Registry of significant in-service occurrences.

## 6.6 MAINTENANCE PROGRAMME

*Note.— The maintenance programme is a document which describes the specific maintenance tasks and their frequency of completion, necessary for the continued safe operation of those aircraft to which it applies.*

6.6.1 In accordance with the basic aviation law of the State, the Director, CAA should be given the authority and responsibility for the approval of each operator's maintenance programme — that is, the approval of the programme that establishes the time limitations (or standards for determining time limitations), for overhauls, inspections and checks of aircraft, engines and appliances. The characteristics of these limitations and standards have been subject to evolutionary change with improved design, and the knowledge of inspection techniques has increased along with a much better appreciation of the effectiveness of preventive maintenance.

6.6.2 A number of different primary maintenance processes in respect of scheduled maintenance tasks planning are defined basic concepts of the aircraft

maintenance programmes, which are generally identified by specific names.

- a) Perhaps the oldest is called “hard time”, and it requires the periodic overhaul, restoration or replacement of the affected equipment or part. In the early years of commercial air transport aviation, “hard time” was generally considered to be the most effective maintenance programme and was applied with the objective of ensuring operating safety when aircraft system redundancy was limited.
- b) In the late 1940s it was recognized that for some types of equipment, checking to a physical standard at periodic intervals was also an effective maintenance process. The standard is designed to provide a basis for the removal of the given part before failure during normal operations. This process, called “on-condition”, was generally recognized along with “hard time” as an acceptable maintenance process.
- c) As a result of experience with reliability programmes and new maintenance analysis techniques, a third primary maintenance process has evolved in recent years known as “condition monitoring”. This process applies to components and equipment which have design characteristics warranting the use of a process not involving either “hard time” or “on-condition” checks.

6.6.3 The three primary maintenance processes referred to above do not have an implied order of preference. Each process has its own place in an effective maintenance programme. The application of a given process should be determined primarily by the design of the component or equipment and secondarily by the operator's economic requirements.

## 6.7 RELIABILITY PROGRAMMES

6.7.1 Annex 6, Part I, 11.3.1 states:

“A maintenance programme for each aeroplane as required by 8.3 shall contain the following information:

- a) maintenance tasks and the intervals at which these are to be performed, taking into account the anticipated utilisation of the aeroplane;
- b) when applicable, a continuing structural integrity programme;



- c) procedures for changing or deviating from a) and b) above; and
- d) when applicable, condition monitoring and reliability programme descriptions for aircraft systems, components and powerplants.”

*Note.— In the context of this paragraph, “when applicable” means that the condition monitoring and reliability programmes are only applicable to aircraft types where the maintenance programme was derived using the maintenance review board process.*

6.7.2 Details of reliability programmes are set out in Appendix A to this chapter.

## 6.8 MAINTENANCE RECORDS

### 6.8.1 Introduction

6.8.1.1 Annex 6, Part I, Chapter 8, 8.4.1 states that:

“An operator shall ensure that the following records are kept for the periods mentioned in 8.4.2:

- a) the total time in service (hours, calendar time and cycles, as appropriate) of the aeroplane and all life-limited components;
- b) the current status of compliance with all mandatory continuing airworthiness information;
- c) appropriate details of modifications and repairs to the aeroplane and its major components;
- d) the time in service (hours, calendar time and cycles, as appropriate) since last overhaul of the aeroplane or its components subject to a mandatory overhaul life;
- e) the current aeroplane status of compliance with the maintenance programme; and
- f) the detailed maintenance records to show that all requirements for signing of a maintenance release have been met.”

6.8.1.2 Annex 6, Part I, Chapter 8, 8.4.2 states:

“The records in 8.4.1 a) to e) shall be kept for a minimum period of 90 days after the unit to which they refer has been permanently withdrawn from service, and the records in 8.4.1 f) for a minimum period of one year after the signing of the maintenance release.”

6.8.1.3 Annex 6, Part I, Chapter 8, 8.4.3 states:

“In the event of a temporary change of operator, the records shall be made available to the new operator. In the event of any permanent change of operator, the records shall be transferred to the new operator.”

6.8.1.4 Annex 6, Part I, Chapter 8, 8.7.6 states:

“8.7.6.1 The maintenance organization shall retain detailed maintenance records to show that all requirements for the signing of a maintenance release have been met.

“8.7.6.2 The records required by 8.7.6.1 shall be kept for a minimum period of one year after the signing of the maintenance release.”

### 6.8.2 General

6.8.2.1 Maintenance records should give an overall picture of the maintenance status of the aeroplane.

6.8.2.2 Operators should ensure that they always receive complete records associated with maintenance release from approved maintenance organizations so that the required records can be retained.

6.8.2.3 The term “an operator shall ensure that the following records are kept” does not mean that operators have to retain the maintenance records by themselves. This can also be done by an approved maintenance organization. When operators arrange for the relevant maintenance organization to retain maintenance records on their behalf, they will nevertheless continue to be responsible for the preservation and transfer of records. Operators should ensure that the approved maintenance organization retains the maintenance records in compliance with the retention periods as prescribed in Annex 6 and that they receive all maintenance records concerning their aircraft retained by the approved maintenance organization when this maintenance organization terminates its operation.

6.8.2.4 In all cases, an approved maintenance organization must record details of all work carried out.

6.8.2.5 The appropriate authority must have access to any maintenance records, whether kept by an operator or an approved maintenance organization.

6.8.2.6 The keeping of maintenance records should be described in the operator’s maintenance control manual and the approved maintenance organization’s procedures manual.

### 6.8.3 Contents of records

6.8.3.1 When recording data on the compliance of airworthiness requirements, the aircraft or component identification should contain information about the model, serial number, part number and registration mark. Information about the work carried out should identify the certifying staff who performed or supervised the work and the inspector of that work, if applicable, and should contain the date the work was completed.

6.8.3.2 The current status of compliance with all mandatory continuing airworthiness information should identify the applicable information, including revision or amendment numbers. Where the information is generally applicable to the aeroplane or component type but is not applicable to the particular aeroplane or component, this should be identified. The status of the information should include the date when it was accomplished. The status of the information should further specify which part of a multi-part directive has been accomplished and the method, where a choice is available in the information.

6.8.3.3 Appropriate details of modifications and repairs include records identifying any modification or repair and information about their accomplishment as well as the return-to-service approval; the details should include component installation and removal data.

*Note.— Volume II of this manual, Part B, Appendix C to Chapter 5 contains further information about the retention of records of modifications and repairs concerning the substantiating data supporting compliance with the airworthiness requirements.*

6.8.3.4 Records about aircraft or component inspection status found during inspections should include information about defects or unairworthy conditions, details of faults and any subsequent rectification, the total time in service as appropriate and the state of maintenance when it enters the approved maintenance organization's facilities.

6.8.3.5 The current record status of all life-limited aeroplane components should indicate the component life limitation, total number of hours, accumulated cycles or calendar time and the number of hours/cycles/time remaining before the required retirement of the component is reached. It is important to retain authentication data for the components that have been installed.

6.8.3.6 When operators wish to take advantage of modular design (e.g. modular assembled gas turbines where a specification of a true total time in service is not relevant), the total time in service and maintenance records for each

module are to be maintained. The maintenance records as specified are to be kept with the module and should show compliance with any mandatory requirements pertaining to that module.

### 6.8.4 Record-keeping

6.8.4.1 The maintenance records required in Annex 6 should be kept in a form and manner acceptable to the authority.

6.8.4.2 If a paper system is applied, a robust material which can withstand normal handling and filing should be used. The record should remain legible throughout the required retention period, irrespective of the medium.

6.8.4.3 If a computer system is used, it should have at least one back-up system which should be updated within 24 hours of any maintenance. Each terminal should contain programme safeguards against unauthorized alteration of the database and should also have traceability features (for example, requiring the use of a magnetic or optical card in conjunction with a personal identity number (PIN) known only to the individual concerned).

6.8.4.4 If microfilming or optical or other high-density storage of maintenance records is used, the records should be as legible as the original record and remain so over the required retention period.

6.8.4.5 Maintenance records should be kept in a such a way that they are protected from hazards such as fire, flood, theft or alteration. Computer backup disks, tapes, etc., should be safely stored in a different location.

6.8.4.6 Records should be structured or stored in such a way as to facilitate auditing.

6.8.4.7 Further information about keeping and transferring records in case of aircraft leasing is contained in Volume II of this manual, Part B, Appendix A to Chapter 10.

## 6.9 ASSESSMENT OF THE OPERATOR'S ARRANGEMENTS FOR MAINTENANCE

### 6.9.1 General

The preceding sections of this chapter, together with Section 6.8 and Chapter 7 below, set out the airworthiness requirements to be met for the issuance of an AOC. The

AID inspector will be required to make an assessment as to the adequacy of the operator's actions in meeting these requirements prior to the issuance of an AOC. The following paragraphs may assist in the assessment.

### **6.9.2 Operator's maintenance control manual, maintenance programme and maintenance organization's procedures manual**

The content of these documents should be checked against the requirements set out in this chapter and in Chapter 7. In connection with their detailed review, AID inspectors should ascertain that effective procedures have been established by the applicant for the distribution, amendment and use of the document. Each manual should be numbered and issued according to a specific distribution list, and each holder made responsible for its prompt and accurate amendment. The distribution list should include all key maintenance and servicing personnel as well as flight engineers and others requiring the information therein for proper performance of their duties. Those parts of the manuals required to be carried on board each aircraft should be designed for convenient use and all parts should permit ready and accurate reference. Acceptance or approval of these documents is by the State of Registry.

### **6.9.3 Continuing airworthiness information**

Although continuing airworthiness information issued by manufacturers and States, such as service bulletins, etc., is not considered part of the document set described above, the inspector should determine that such information relevant to the equipment operated by the applicant is promptly circulated to all those who need such information.

### **6.9.4 Maintenance records**

As part of the assessment, maintenance records should be examined to ensure that the requirements set out in 6.8 are being met.

### **6.9.5 Maintenance inspection and quality management**

State regulations should require the applicant to ensure that there is a system of inspection and quality management within the maintenance organization to ensure that all maintenance, overhaul, modifications and repairs which

affect airworthiness are carried out in accordance with the operator's procedures and pertinent State regulations. The adequacy and functioning of this system should be checked during the inspection of the applicant's maintenance organization. In this regard, the ready availability of properly qualified and designated maintenance inspectors should be determined by spot checks of ongoing work requiring inspections.

### **6.9.6 Maintenance training programme**

The AID inspector should check the adequacy of the applicant's maintenance training programme and ascertain that personnel receive instruction in new or revised maintenance methods or equipment. In this connection, the qualifications of maintenance staff should be examined on a random basis to determine recent training received and, as a measure of effectiveness, ability to perform the various associated work processes of overhaul, repair, alteration and periodic checks of the aircraft and installed systems and components.

### **6.9.7 Certifications for maintenance**

During the inspection of the applicant's maintenance organization, several checks should be made at each facility and base to ensure that persons certifying the airworthiness of an aircraft following maintenance or signing the maintenance release for flight are duly licensed or possess equivalent qualifications as properly authorized personnel in an approved maintenance organization.

### **6.9.8 Maintenance facilities**

The applicant's maintenance facilities, including workshops, shop equipment, engine test cells, instrument overhaul and test shops, spare parts storage, etc., should be inspected for adequacy with respect to the proposed operations, and for compliance with safety regulations. This inspection should cover the facilities at each base utilized for maintenance of the applicant's aircraft. An operator should provide suitable office accommodation at appropriate locations for the personnel involved in maintenance management.

### **6.9.9 Additional items to be assessed**

In addition to the above items, the AID inspector should ensure that the operator's aircraft are equipped for their particular operational roles with the necessary avionics, safety equipment and cargo restraints, etc.

## 6.10 MAINTENANCE-RELATED OPERATIONS SPECIFICATIONS

### 6.10.1 General

6.10.1.1 State regulations should require that the operations specifications and limitations applicable to an AOC be issued in conjunction with the issuance of the certificate. These operating specifications and limitations, hereinafter referred to as operations specifications, are utilized to supplement the general provisions of the basic certificate, list authorizations and limitations not specifically covered by State regulations and facilitate the administrative procedures. The combined issuance of the AOC and the operations specifications constitutes State approval of the operation.

6.10.1.2 For purposes of standardization and administrative convenience, operations specifications may be divided into separate parts. The exact content of the various parts of the operations specifications will vary depending upon the nature and scope of the operation and the provisions of the individual State regulations. In general terms, however, the parts should cover the following:

- a) *Part A — General provisions.* Specify the make and model of aircraft authorized for use, the maximum passenger seating capacity authorized by the State, authorized system of flight following and any other general authorizations or limitations not covered by the other parts.
- b) *Part B — En-route authorizations and limitations.* Specify the routes or route segments which may be used by the operator, the conditions under which deviations from such routes are authorized, minimum en-route altitudes, conditions under which operations are authorized under VFR and operations within minimum navigation performance specifications (MNPS) airspace.
- c) *Part C — Aerodrome (or heliport) authorizations and limitations.* Specify destination and alternate aerodromes authorized for use, instrument approach procedures, aerodrome (or heliport) operating minima authorized including take-off minima and any special operating limitations in respect of minima.
- d) *Part D — Maintenance.* Specify all special maintenance authorizations on inspections, overhauls and reworking of components.
- e) *Part E — Mass and balance.* Specify all authorizations of standard mass quantities and mass and balance control.
- f) *Part F — Interchange of equipment operations.* Specify the authorized interchange of aircraft between the operator and other operators, the type of equipment to be used, the crews to be utilized, the routes and aerodromes to be used, the operations manual and aircraft operating manual to be utilized (i.e. which operator's manual) and applicable aerodrome (or heliport) operating minima.
- g) *Part G — Aircraft leasing operations.* Specify the parties to the agreement and the duration thereof; the type of lease (i.e. wet or dry); in the case where two operators are involved, the operator responsible for operational control; the routes, area of operation and aerodromes (or heliports) involved; the type and registration numbers of the aircraft involved; the party responsible for maintenance; and reference to States' approval letter or order of the lease.

*Note 1.— Sample forms for operations specifications Parts A, B, C, F and G are given in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335); sample forms for Parts D and E are given in Appendices B and C respectively to this chapter.*

*Note 2.— See the Manual of All-Weather Operations (Doc 9365) concerning Part C, aerodrome operating minima.*

6.10.1.3 In most cases, considerable time and effort will be saved if the CAA inspector and assistants work closely with the applicant and staff in preparing the various parts of the operations specifications prior to the time the recommendation is made to the DCA. It must be recognized that the details of the operations specifications must initially be drafted by the applicant and that the final version must be acceptable to the operator, the CAA inspector and the DCA. Accordingly, every reasonable effort should be made by the CAA inspector to detect and informally resolve any difficulties which might result in a delay or possible disapproval at the time when the DCA is asked to take a formal decision on the application.

### 6.10.2 Amplification of Part D

6.10.2.1 Part D is necessary to provide any detailed maintenance-related authorizations and limitations for a particular operator that are not specifically prescribed by CAA regulations. For example, time limitations for overhaul, inspections and checks may vary with aircraft type and the type of maintenance programme followed; some aircraft have parts that are life-limited by the manufacturer.

Consequently, such authorization and limitations need to be specified and when so specified should be as binding on the operator as the CAA regulations themselves.

6.10.2.2 It is generally convenient to divide Part D into two categories of material. One category specifies the inspection, check and overhaul time limits for airframes, powerplants, propellers, rotors and other equipment. The pages of Part D listing the foregoing are frequently referred to as "maintenance pages". The other category of material consists of a number of maintenance-related authorizations which are required by the particular characteristics of the proposed operations. These specified authorizations are generally divided into sub-categories, depending on the individual operation. A description of the individual authorization pages (sometimes referred to as the "preface pages") and maintenance pages of Part D, as well as example pages, are contained in Appendix B to this chapter.

### 6.10.3 Amplification of Part E

6.10.3.1 Part E is necessary to specify the procedures the operator is to follow for control of the mass and balance of the aircraft to be used. The method of compliance given in Part E should not make reference to any general guidance material. All references should be limited to the operator's mass and balance control manual or operations manual.

6.10.3.2 The material contained in Part E needs to provide a clear and accurate description of the methods and procedures the operator is to follow for:

- a) determination of mass of passengers and crew;

- b) determination of mass of cargo and baggage;
- c) periodic determination of aircraft mass (weighing);
- d) loading schedules for each type and series of aircraft; and
- e) loading instructions.

Sample Mass and Balance Control pages are given in Appendix C to this chapter.

## 6.11 RECOMMENDATIONS FOLLOWING ASSESSMENT

Following the satisfactory completion of the inspections described in this chapter and the required correction of any deficiencies by the applicant, AID inspectors should submit to the inspector-in-charge their recommendations as to the applicant's ability, in respect of maintenance, to carry out safely the proposed operation. These recommendations should of course be accompanied by inspection reports and other documentation to substantiate the recommendation.

## 6.12 SURVEILLANCE

This aspect is addressed in Chapter 8 of the *Manual of Procedures for Operations Inspection, Certification and Continued Surveillance* (Doc 8335). The areas to be covered are essentially the same as those assessed for the issuance of the AOC.

# Appendix A to Chapter 6

## RELIABILITY PROGRAMMES

### 1. INTRODUCTION

1.1 Reliability programmes are designed to supplement the operator's overall programme for maintaining aircraft in a continuous state of airworthiness. There are a number of maintenance reliability programmes now in operation that use new and improved maintenance management techniques. Although the design and methods of application vary to some degree, the basic goals are the same — to recognize, access and act upon meaningful symptoms of deterioration before malfunction or failure in order to establish and monitor the maintenance control requirements.

1.2 Performance standards (alert values, etc.) are established by actuarial study of service experience using statistical methods coupled with application of technical judgement. These standards are used to identify trends or patterns of malfunction or failures experienced during programme operation. Even though reliability programmes vary, they should provide means for measurement, evaluation, and improvement predictions. They should contain the following elements: an organizational structure, a data collection system, a method of data analysis and display, procedures for establishing performance standards or levels, procedures for programme revision, procedures for time control, and a section containing definitions of significant terms used in the programme.

1.3 It is intended that the specific needs of operators, in terms of operating philosophy, record-keeping practices, etc., be reflected in their reliability programmes. The extent of statistical and data processing required for programme operation is entirely dependent on the character of the particular programme. Programmes may be simple or complex, depending on the size of the operator and other factors. The smaller as well as the larger operators may develop maintenance reliability programmes to meet their own specific needs.

### 2. RELIABILITY PROGRAMME CRITERIA

2.1 The word “reliable” is a broad term meaning dependable or stable. The term, as used by the aviation

industry, applies to the dependability or stability of an aircraft system or part thereof under evaluation. A system or component is considered “reliable” if it follows an expected law of behavior and is regarded “unreliable” if it departs from this expectation. These expectations differ greatly, depending upon how the equipment is designed and operated.

2.2 Reliability programmes should describe the techniques used for measuring the performance and calculating the remaining service life of the component sufficiently in advance in order to take corrective maintenance action prior to failure. Essentially, reliability programmes are used for the control of maintenance by establishing performance levels for each type of unit and/or system individually or as a class. Generally, reliability programmes depend on the collection of data which can be analysed and compared to previously established programme goals.

2.3 A good reliability programme should contain means for ensuring that the reliability which is forecast is actually achieved; a programme which is very general may lack the details necessary to satisfy this requirement. It is not intended to imply that all of the following information should be contained in one programme, since the operating philosophy and programme management practices, etc., for each operator are different; however, the following information could be applied to the specific needs of either a simple or a complex programme.

### 3. ORGANIZATIONAL STRUCTURE

The programme should contain an organizational chart which includes:

- a) a diagram of the relationship of key organizational blocks;
- b) a listing of the organizational elements by title responsible for the administration of the programme;
- c) a statement describing lines of authority and responsibility. The programme should identify the organization responsible to management for the overall

reliability functions. It should define the authority delegated to these organizations to enforce policy and assure necessary follow-up and corrective actions; and

- d) a procedure for the preparation, approval and implementation of revisions to the programme.

#### 4. DATA COLLECTION SYSTEM

It is important that the data be as factual as possible in order that a high degree of confidence may be placed in any derived conclusion. Data accuracy is particularly important when it is used for predicting reliability because the prediction technique gives at best a broad estimate of the expected reliability. Therefore, the more dependable the data, the higher the degree of confidence that can be placed in the reliability estimate. Data should be obtained from units functioning under different operational conditions. Typical sources of information are: unscheduled removals, confirmed failures, pilot reports, sampling inspections, functional checks, shop findings, bench checks and service difficulty reports.

#### 5. DATA ANALYSIS AND DISPLAY

5.1 Data display and reporting provide a timely and systematic source of information, and even though after-the-fact, this material is a necessary prerequisite for correcting existing deficiencies. Reporting is not an end objective, but rather a necessary link in the chain of events leading to system improvement. The principal reason for gathering reliability data is to use it for making various determinations and predictions. Among these are such items as failure rate of parts and components, serviceability, and maintainability.

5.2 In general, almost any desired information can be extracted from these data if they are obtained in a planned and organized manner and carefully recorded and collated. However, the methods of analysis must be clearly understood in order to interpret properly the results obtained. Reliability data collected and analysed with no particular end in view usually result in conclusions that are defective for one reason or another. The programme should provide the information necessary to properly evaluate the graphic presentations submitted in support of the programme. These are used to reveal briefly and simply via graphics those aspects which would normally require a cumbersome analysis of a text or tabular material.

#### 6. PERFORMANCE STANDARD

6.1 Each reliability programme should include a performance standard expressed in mathematical terms. This standard becomes the point of measure of maximum tolerable unreliability. Thus, satisfactory reliability trend measurements are those which fall at or preferably below the performance standard. Conversely, a reliability trend measurement exceeding the performance standard is unsatisfactory and calls for some type of follow-up and corrective action.

6.2 A performance standard may be expressed in terms of system or component failures per thousand hours of aircraft operation, number of landings, operating cycles, departure delays, or of other findings obtained under operational conditions. In some instances, an upper and lower figure may be used. This is known as a reliability band or range and provides the standard by which equipment behavior may be interpreted or explained.

6.3 When the performance standard is exceeded, the programme should provide for an active investigation which leads to suitable corrective action.

6.4 A description of the types of action appropriate to the circumstances revealed by the trend and the level of reliability experience should be included in the programme. This is the central core of maintenance control by reliability measurement. It is the element that relates operating experience to maintenance control requirements. Statistical techniques used in arriving at reliability measurements presented in support of maintenance control actions should be described. Appropriate action might be:

- a) actuarial or engineering studies employed to determine need for maintenance programme changes;
- b) actual maintenance programme changes involving inspection frequency and content, functional checks, or overhaul limits and times;
- c) aircraft system or component modification, or repair;
- d) other actions peculiar to the condition that prevails.

6.5 The results of corrective action programmes should become evident within a reasonable time from the date of implementation of corrective action. An assessment of the time permitted should be commensurate with the severity or safety impact of the problem. Each corrective action programme should have an identified completion date.

6.6 Due to the constantly changing state-of-the-art, no performance standard should be considered fixed — it is subject to change as reliability changes. The standard should be responsive and sensitive to the level of reliability experienced. It should be “stable” without being “fixed”. If, over a period of time, the performance of a system or component improves to a point where even abnormal variations would not produce an alert, then the performance standard has lost its value and should be adjusted downward. Conversely, should it become evident that the standard is consistently exceeded in spite of taking the best known corrective measures to produce the desired reliability, then the performance standard should be re-evaluated and a more realistic standard established. Each programme should contain procedures to effect, when required, such changes to the prescribed performance standards.

## 7. ESTABLISHING INITIAL STANDARDS

7.1 In order to establish the initial standards for structural components, powerplants and systems, the past operating experience with the same (or, in the case of new aircraft, similar) equipment should be reviewed in sufficient depth to obtain a cross-section of the subject system's performance. Normally, a period of six months to one year should be sufficient. For a system common to a large fleet of aircraft, a representative sample may be used, while small fleet systems may require 100 per cent review. Operators introducing a new aircraft into service may establish their alert by using this available data. After the operator completes about one year's operating experience, however, the alert value should be adjusted based upon his experience.

7.2 Due to different operating conditions and system design, it is necessary to use different measuring devices (either singly or combined) to obtain satisfactory performance criteria. As stated before, there are various methods used to evaluate and control performance — aircraft diversions, mechanical interruptions in flight, delays and flight cancellations, component unscheduled removal rates, etc.

7.3 The following are typical examples of methods that can be used to establish and maintain alert values. It should be understood that the methods of evaluation given below are only illustrative and that other suitable methods of evaluation could be used:

- a) Pilot reports per 1 000 aircraft departures:
  - 1) Several operators have selected pilot reports as related to the number of departures as the primary measure of aircraft systems performance reliability. The reference base for the computation of alert values is a cumulative rate of the previous calendar year's experience. This provides a large statistical base and takes into consideration the extremes in seasonal effects. The baseline for each system is initially calculated by compiling the number of pilot reports logged for the previous twelve-month period times 1 000 divided by the number of aircraft departures for the same twelve-month period. The purpose of multiplying the pilot reports by 1 000 is to arrive at a figure that expresses the rate per 1 000 departures.
  - 2) In order for this to be a cumulative or rolling rate for the immediately previous twelve month period, it must be recalculated each month. The data for the first month of the existing twelve month data set is dropped, and the data compiled for the last month is added; ie. if the initial calculation was from March 1998 to February 1999, the next month's calculation would cover the period from April 1998 to March 1999.
  - 3) When the base line is computed for a particular system, an alert value is established at a point above the base line equal to, say, five pilot reports per 1 000 aircraft departures. The alert values assigned to each system represent the maximum rate of pilot-reported malfunctions considered to deviate sufficiently from the base line to require investigation.
- b) Pilot reports per 1 000 aircraft hours:
  - 1) For the purpose of measuring reliability, pilot reports per 1 000 aircraft flight hours may be selected as the indicator of aircraft systems performance. Performance standards in terms of pilot reports per 1 000 hours are established for each of the aircraft systems. Several programmes in current use utilize two performance numbers, an “alert” number and a “target” number. A review and evaluation of a minimum of six to twelve months' history of pilot reports are done to establish the initial alert and target numbers. Established alert and target numbers are valid for a six-month period, at the end of which all alert and target numbers are reviewed and adjusted as necessary.



- 2) The alert number is defined as the three-month moving (running) average which is considered to indicate unsatisfactory performance.
- 3) Historically, alert numbers show seasonal variations. To provide a more realistic alert number, the year is divided into six-month periods. One period encompasses the winter months, the other, the summer months. When reviewing a particular six-month period to ascertain if the alert number is still practical, it is important that the comparison is made between similar periods.
- 4) The target number is defined as the operator's goal and predicted level of performance at the end of a six-month period. Target numbers are set to specify the operator's desires and expectations for future system performance. The target number is established in the same manner as the alert number, the difference being that the alert number is the upper limit of the range and, when exceeded, indicates unsatisfactory performance. The target or the lower limit is set as a goal which represents a level that the operator believes is attainable.
- 5) Each month a three-month running average for each system is calculated. First, a three-month average is obtained by compiling and analysing data for three consecutive months — the total pilot reports for three months are divided by the number of aircraft hours flown during the same three-month period. To maintain a running average, each month the first month's data is deleted and the data for the current month added. Any system which either exceeds the alert or which has a trend indicating the target will not be met is considered to be in need of special attention.

### 8. ESTABLISHING ALERT VALUES STATISTICALLY

8.1 Many programmes establish alert values by reviewing past performance and then, by using "good judgement", establish the numerical value for the alert. Although this generally works well, the value can become controversial since the "good judgement" of one person may well be different from that of another person. In an effort to avoid controversy, some operators prefer the statistical or mathematical approach. This is a broad term that covers a number of methods of gathering numbers of instances and evaluating the result; all methods, however, require a sufficient quantity of accurate data to be available for analysis.

8.2 In order to establish system alert values, an evaluation is made of the operational performance of each system to be controlled by the programme. The yardsticks covering failure performance are clearly defined in the programme. Using these definitions, the failure data for each system are extracted from pilot-reported malfunctions for at least a 12-month period. The "mean" and the "standard deviation" are then computed from those data and each system's alert value is established equal to the mean plus three standard deviations.

8.3 The current performance level of each system is computed on a monthly basis as a three-month cumulative performance rate. This rate is computed by multiplying the number of in-flight malfunctions for a three-month period by 1 000 and dividing by the total aircraft flight hours for the same period. Maintaining a cumulative rate requires that the first month's data be deleted and the data for the current month be added to the sum of the previous two months. When a trend of deteriorating system performance is detected, or if a system is over the alert value, an active investigation is conducted to assess the causes of the change in system performance and to develop an active corrective programme, if required, to bring the system performance under control.

### 9. CONDITION-MONITORED MAINTENANCE PROGRAMMES

9.1 Other techniques are used which monitor the functional condition of systems or components without disturbing them in their installed environment. These programmes are based on the establishment of acceptable performance as base line data. Internal and external leakage, functional testing, and unit teardown analysis are the factors used to determine the base line. The results of this test become a part of the aircraft's permanent record. The point to be established is that the tests accurately and conservatively identify discrepancies before operational reliability is degraded.

9.2 This type of programme lends itself readily to components. It has also proven very successful in monitoring the functional condition of aircraft systems such as hydraulics, air conditioning and pneumatics (the system primarily utilizing this type of programme is hydraulics). The various tests perform the function of system or subsystem interrogation to determine the presence or absence of component degradation. Internal leakage rates serve as the criteria to evaluate wear and rigging effect on component performance while pressures are used to determine certain component functional responses.

9.3 During the test, individual parts, components and subsystems are evaluated by selective positioning of the various system controls and isolation points. From the comparison of the response produced by sequential steps to the established tolerance, the general location or the specific location of the faulty unit can be determined.

9.4 Additional advantages are:

- a) analysis of the data is not required before departure unless functional tests indicate a need for immediate corrective action;
- b) results of the test do not require immediate replacements of units showing deterioration provided the functional tests of the subsystem or component are satisfactory; and
- c) evaluation of these test data can be used to schedule component replacement at a subsequent inspection or check.

## 10. MONITORING BY AGE/RELIABILITY RELATIONSHIP

10.1 Several operators use an actuarial analysis technique as a basic requirement for making technical decisions concerning component reliability in their "on-condition" overhaul and monitored maintenance reliability programmes. Components selected for these programmes are those on which a determination of continued airworthiness may be made by visual inspection, measurements, tests or other means without a teardown inspection or periodic overhaul. Under these programmes, components are allowed to operate in service subject to meeting the established performance standard or the established "on-condition" base line data.

10.2 Initially, an actuarial analysis of each component is prepared to determine its reliability versus age characteristics. A component is considered acceptable for inclusion in the programme when the analysis shows that reliability does not deteriorate with increased time in service up to a predetermined point established by the operator. Normally, this cutoff point is considered to be the practical limit based on the amount of data collection and analysis required to qualify the component.

10.3 When the reliability of a component deteriorates to a value above the established performance standard, another actuarial analysis is made to determine the component's reliability versus age characteristics. Normally, this analysis will also include a determination of the reasons

for the deterioration and the corrective action required to bring the condition under control. This reliability analysis is a continuing process and reveals whether a component requires a different maintenance programme or is in need of a design change to improve reliability.

10.4 An actuarial analysis is also made when the observed performance of a component improves to the point where more components are reaching higher operating times without experiencing premature removal failures. With such an improvement in survival characteristics possible, it is desirable to make a reliability analysis to determine its age-to-reliability characteristics.

10.5 In the past, component performance has been evaluated largely on the basis of gross premature removal rate and the subsequent analysis of the teardown findings in the shop. The introduction of the "on-condition" overhaul concept has made it increasingly important to gain more information about the operating performance of the components and to examine the relationship of this performance to the time in service. This need has fostered the development of actuarial analysis techniques.

10.6 This method of analysis requires, for a specified calendar period, that the following information be available for each component under study:

- a) the time on each operating component at the beginning of the study;
- b) the time on each component removed and installed during this period;
- c) the reason for removal and disposition of each component; and
- d) the time on each operating component at the end of the study period.

10.7 An analysis is made of the performance of each component as its life progresses from one overhaul to another as follows:

- a) A time and failure distribution chart is prepared showing the amount of operating time for each component and the failures experienced in each 100-hour time bracket for the specified study period. In conjunction with this chart, a digest of the causes of failure for each 100-hour time bracket is also prepared.
- b) The next step is to develop failure rate and survival curves versus time since overhaul (TSO). A failure rate curve shows the failure rate per 1000 hours for each

component in each 100-hour time bracket. A survival curve shows the number of units remaining at any given TSO. The shape of the survival and failure rate curves are valuable when determining the deterioration of reliability. The operating time which can be realized between consecutive overhauls is determined by the area which is under the survival curve and is bounded by the horizontal and vertical axes.

- c) Additional information is available from these data by developing a probability curve. This curve will show the probability of a component reaching a given TSO and the number of components expected to fail in a given time bracket. The number of components that would probably fail in a given time bracket is obtained by taking the difference of the ordinates at the beginning and end of a given time bracket. This would also be a reflection of the slope of the survival curve at that point. The percentage of components which survive to a given TSO is also the probability of a single component operating to that time without failing.
- d) A still better evaluation is possible by developing a conditional probability curve. This curve will show the probability of failure of a component within a given time interval. Data for a conditional probability is obtained by dividing the number (or percentage) of components entering an interval by the number (or percentage) of components removed during an interval. It is considered that this curve best depicts the relationship between reliability and overhaul time.

10.8 Some advantages of this type of analysis are as follows:

- a) a determination can be made as to whether failures are being prevented by the TSO specification;
- b) an indication is given statistically concerning the current TSO limit and whether or not it has reached an optimum point;
- c) an indication is provided as to what might occur to the overall premature removal rate if the TSO limit were changed;
- d) an indication will be provided of any unusual high rate of premature removals/failures that have occurred immediately after a check and repair or overhaul;
- e) in some cases, an indication may be given that scheduled interim maintenance would result in an improvement of the overall premature rate;
- f) other useful conclusions can be made concerning the relationship of the failure to the time in service, time intervals, engineering change accomplishment, etc; and
- g) this technique of in-service component reliability analysis readily lends itself to computer programming.

These advantages emphasize the value of such an analysis in determining a maintenance programme that is best for the component involved.

## 11. CONTROL FOR ADJUSTING TIME LIMITATIONS

11.1 When considering the merits of a time extension, there are many different methods which may be used. The programme should identify these methods and the group responsible for the preparation of a substantiation report to justify the requested time extension. The programme should show that such action is approved by at least two separate organizational segments of the operator, one of which exercises inspection or quality control responsibility for the operator. The programme should also identify the other organizational segment responsible for the performance of the function. When evaluating a particular programme, consideration should be given to the following:

- a) Are the specific parameters used to determine time extensions spelled out (i.e., sampling, functional checks, unscheduled removal, etc.)?
- b) If sampling is used, does it explain the method, number of samples required, when they will be taken, and at what time interval? Time on units or exhibits used as samples should be specified.
- c) Does the programme provide for time increase in overhaul times, periodic services, routine and service checks, phase checks and block overhauls?
- d) Are provisions made for changing items having specified fixed time between overhaul to "on-condition"?
- e) What substantiating data are provided to justify a time increase for emergency equipment which is not normally operated during routine flight?
- f) Who establishes the increments of time increases, the sampling requirements, and other substantiation for each proposed action?

- g) Are instructions available relative to manual revision concerning time increases and what will have to be accomplished prior to pursuing a subsequent time increase?
- h) Does the programme provide for revision of the Operations Specifications, Part D — Maintenance whenever a change is made to the current document?

11.2 It should be ensured that the proposed time between overhauls (TBO) adjustment does not conflict with a corrective action programme established by a previous reliability analysis. A provision should be made for the AID to be advised when increases to time limitations of system/components controlled by the programme occur. Furthermore, operators should be encouraged where possible to include a graphic display of major system/component (engine/airframe) TBO escalation.

## 12. APPROVAL OF PROGRAMMES

12.1 Maintenance reliability programme approvals are a means of complying with the CAA Regulations and, therefore, become part of the AOC holder's operations specifications. The programmes are to be administered and controlled by the AOC holders and monitored by the AID Inspector. An operator's application for approval should be accompanied by a document describing programme operation; this document should contain the essentials of systems operation and any other instructions required because of the particular programme or character of maintenance organization involved.

12.2 The AOC holder should submit the maintenance reliability programme and standard for determining time limitations to be included in the operations specifications, Part D — Maintenance (it is not necessary to enter the entire document). Due to the differences encountered in the programmes submitted for approval, the operations specifications will vary somewhat from operator to operator.

12.3 An attempt should be made to list all the important elements that should be considered regardless of the programme being evaluated. It is recognized that all of the elements may not apply to a particular programme; however, the AID Inspector should use those that are appropriate to the programme being evaluated. Emphasis should be given to the elements entered in the operations specifications.

12.4 The procedures for implementing revisions to the programme should be described in sufficient detail to identify the isolated areas which require AID approval. The AOC holder should also identify the segment of the organization having overall responsibility for the approval of amendments to the programme. The areas involving programme revision which require AID approvals include:

- a) reliability measurement;
- b) changes involving performance standards, including instructions relating to the development of these standards;
- c) data collection analysis;
- d) data analysis methods and application to the maintenance programme;
- e) procedures for adding or deleting systems or components; and
- f) procedures for transferring systems or components to other programmes.

12.5 When evaluating programme revision procedures, consideration should also be given to the following:

- a) Does the programme provide for periodic review to determine if the established performance standard is still realistic or in need of recalculation?
- b) What distribution is given to approved revisions?
- c) Are the overhaul and inspection periods, work content and rescheduled maintenance activities controlled by reliability methods reflected in the appropriate maintenance manuals?

12.6 The AID Inspector member of the operator certification team faces a complex and demanding task in reaching a decision as to the adequacy of the applicant's proposed maintenance reliability programme. In the case of applicants proposing to operate large aircraft, the inspector may require assistance from other AID technical experts. In many States where adequate AID resources are not available for this important function, the Director will need to obtain technical assistance from the CAA of the State of Manufacture or another State possessing substantial experience in such matters.

# Appendix B to Chapter 6

## OPERATIONS SPECIFICATIONS, PART D — MAINTENANCE

### 1. GENERAL

1.1 Operations specifications are prepared by the applicant (operator) in the form prescribed by the Director of the CAA. The assistance of the AID Inspector member of the certification team may be requested. In many instances, considerable time and effort will be saved if the assigned Inspector works closely with the applicant in the formulation of the specifications.

1.2 Part D is normally subdivided into two broad categories: authorization pages (sometimes referred to as "preface pages") and maintenance pages, both of which are discussed in detail below. Authorization pages should be numbered consecutively, but separately from maintenance pages and vice versa.

### 2. AUTHORIZATION PAGES

2.1 Authorization pages are divided into the categories described below and are completed as required by the individual applicant's proposed operation.

2.1.1 *General.* These pages contain the conditions which must be met in order for the operator to operate his aircraft under the terms of the Operations Specifications (for a sample page see Figure I-6B-1).

2.1.2 *Check, inspection and overhaul time limits.* These pages specify the time limits and conditions for the aircraft services, checks and inspections approved for the applicant. Limits expressed in terms other than time (in-service, clock, or calendar time) need to be defined. The symbols used on the maintenance pages are defined on this page. These pages may also be used to authorize the use of an identifiable programme, such as a manufacturer's maintenance programme (for a sample page see Figure I-6B-2).

2.1.3 *Reliability programme authorization.* These pages are used to authorize and control reliability programmes which generally fall into one of two categories:

- 1) those which control the inspection, check and overhaul times for the entire airframe or powerplant; or
- 2) those which control the inspection, check and overhaul time for complete systems or for individually specified items within the system.

In the case listed in 1) above, the authorization listed on the page may serve as the sole control as far as the operations specifications are concerned. When the entire airframe or powerplant is governed by a reliability programme, there is no need to list individual items on the aircraft maintenance pages; however, the airframe or powerplant controlled by an approved programme must be adequately identified on the authorization page (see Figure I-6B-3 for a sample page). In the case listed in 2) above, where complete systems or selected individual items are controlled by a reliability programme, reference to the control programme must be made on the authorization page, specifically identifying the controlling document. Individual items must be further identified on the aircraft maintenance page on which they appear by an asterisk, control programme name or acronym, or other symbol. The identification marks and symbols used must be identified on an authorization page.

2.1.4 *Short-term escalation authorization.* Applicants who wish to establish authorization for short-term increases in maintenance intervals (escalation) other than those which are part of their approved reliability programmes need to have those procedures authorized by an operations specification page. This page must reference the applicant's maintenance programme or other approved publication defining those procedures, in a manner that requires the operations specification page to be amended whenever the procedure is revised (for a sample page see Figure I-6B-4.)

2.1.5 *Maintenance contractual authorization.* CAA regulations should permit an operator to make arrangements with other persons for the performance of any maintenance, preventive maintenance or alterations. However, the Director should require that this arrangement be approved

by the CAA, and that an operations specification authorization page be issued containing such pertinent information as the names of contracting operators, contract identification and date, place where maintenance will be performed, reference documents approved for the control of maintenance and a clause referring to termination or alteration of the contract (for a sample page see Figure I-6B-5).

**2.1.6 Leased aircraft maintenance authorization.** This page is prepared to authorize an operator to use two different maintenance programmes for the same type aircraft. This authorization is intended to apply only in cases involving short term leases of aircraft that are intended to be returned to the lessor. This authorization permits the lessor to retain maintenance programme compatibility with other aircraft in his fleet (for a sample page see Figure I-6B-6).

**2.1.7 Parts pool authorization.** CAA regulations should contain provisions which permit, subject to approval by the CAA, an operator to enter into parts pool agreements with other persons or operators. In those cases where an operator wishes to enter into such an agreement, an authorization page should be prepared containing at least the elements listed on the sample page shown in Figure I-6B-7.

**2.1.8 Prorated time authorization.** Whenever the proration process is used to establish initial maintenance starting times, an authorization page needs to be included in Part D. This authorization is essential, not only for proper time accountability, but also for the transfer of the correct times should the aircraft be sold to another operator. This page should indicate to all concerned that the aircraft is being operated under adjusted times since overhaul, calculated via the proration process (for a sample page see Figure I-6B-8). (Further information on proration calculation is available in United States FAA Advisory Circular 121-1A.)

**2.1.9 Parts borrowing authorization.** CAA regulations should provide for operators of large aircraft to obtain

reasonable relief from approved overhaul time limits when borrowing parts from another operator. The preparation of an authorization page is necessary because an operator may need to borrow a part and the only available part may have a higher time since overhaul (TSO) than the operator's approved overhaul time limit. In some States, the operator is authorized to use the borrowed part for up to 100 hours (or 50 landings if part life is controlled by number of landings). In the case where the borrowed part has a lower TSO than the operator's approved overhaul time limit, the part in question is generally permitted to be used up to the operator's approved overhaul time limit providing:

- 1) the part has at least 200 hours (or 100 landings if the overhaul time limit is controlled by the number of landings) remaining to overhaul in respect of the lender's approved overhaul time limit; and
- 2) the part is not operated beyond its approved life if it is specifically "life limited" (for a sample page see Figure I-6B-9).

**2.1.10 Ferry flight authorization.** CAA regulations should contain provisions which permit continuing authorization for an operator to conduct ferry flights providing certain criteria are met. A sample page which grants this type of authorization is shown in Figure I-6B-10.

### 3. MAINTENANCE PAGES

Maintenance pages provide an orderly itemized listing of the inspection, check and overhaul time limits for airframes, powerplants, propellers, rotors and appliances. The symbology used on the maintenance pages is defined in the authorization page entitled "Check, Inspection and Overhaul Time Limits" (Figure I-6B-2). Sample maintenance pages are shown in Figures I-6B-11 and I-6B-12.

Government of _____	Page 1 of _____	
<b>OPERATIONS SPECIFICATIONS</b>		<b>PART D</b>
XYZ AIRLINES		
AUTHORIZATION PAGE		
<b>General</b>		
<p>Irrespective of the type of operation to be conducted by (name of operator), the continuing airworthiness and inspection programme limitations which are described and specified in these operations specifications shall be applicable to all (name of operator) aircraft listed and authorized for use under CAA Regulations.</p>		
<p>The operator shall provide a comprehensive maintenance programme necessary to fulfil his responsibility to maintain the aircraft in an airworthy condition in accordance with applicable CAA Regulations and standards prescribed and approved by the Director.</p>		
<p>The aircraft and its component parts, accessories, and appliances shall be maintained in an airworthy condition in accordance with the maximum time limits hereinafter set forth for the accomplishment of the overhaul, periodic inspections, and routine checks of the aircraft and its component parts, accessories, and appliances.</p>		
<p>"On-condition" items will be maintained in a continuous airworthy condition by periodic and progressive inspections, checks, services, repair, and/or preventive maintenance and shall be appropriately described in the operator's maintenance programme.</p>		
<p>Parts or subcomponents, not listed below, will be checked, inspected and/or overhauled at the same time limitations specified for the component or accessory to which such parts or subcomponents are related or at the time period indicated in the maintenance programme.</p>		
<p>Effective date: _____</p>		

**Figure I-6B-1. Sample authorization page (general)**

Government of _____	Page 1 of _____
<p><b>OPERATIONS SPECIFICATIONS</b> <span style="float: right;"><b>PART D</b></span></p> <p><b>XYZ AIRLINES</b></p> <p><b>AUTHORIZATION PAGE</b></p> <p><b>Check, inspection and overhaul time limits</b> <b>Douglas DC-XXX</b></p> <p><b>Preflight (PF)</b> The "pre-flight inspection" shall be accomplished in accordance with the applicable procedures in XYZ Airlines maintenance programme, Volumes A and C, each calendar day when the aircraft is in operation.</p> <p><b>Service Check (SC)</b> The "service check" shall be performed at intervals not exceeding 50 hours of aircraft time in service in accordance with the applicable procedures in XYZ Airlines maintenance programme, Volumes A and C.</p> <p><b>"Line" Inspection and Check (LC)</b> The "line" inspection and check shall be performed at intervals not exceeding 100 hours of aircraft time in service in accordance with the applicable procedures in XYZ Airlines maintenance programme, Volume C.</p> <p><b>"A" Inspection and Check (A)</b> The "A" inspection and check shall be performed at intervals not exceeding 175 hours of aircraft time in service and includes, in addition to the "line inspection and check", all applicable procedures in current chapters 01 and 02 of XYZ Airlines maintenance programme, Volume C.</p> <p><b>"B" Inspection and Check (B)</b> The "B" inspection and check shall be performed at intervals not exceeding 350 hours of aircraft time in service and includes, in addition to the "A" inspection and check, all applicable procedures in current chapters 01 and 02 of XYZ Airlines maintenance programme, Volume C.</p> <p><b>"Overhaul" (Major Inspection Programme)</b> A block overhaul will be performed at intervals not to exceed three thousand (3000) hours of aircraft time in service. A series of six (6) block overhauls comprise the complete major inspection programme. The blocks will be performed in accordance with applicable procedures in XYZ Airlines maintenance programme, Volume E.</p> <p><b>"Fixed Radio Installation"</b> The term "fixed radio installation" shall be understood to include the following: fixed antennae, indicators and warning light assemblies, jack boxes, cables, plugs, wiring, junction boxes, shockmounts, and remote tuning shafts.</p> <p>Effective date: _____</p>	

**Figure I-6B-2. Sample authorization page —  
Check, inspection and overhaul time limits**



Government of _____	Page 1 of _____	
<b>OPERATIONS SPECIFICATIONS</b>		<b>PART D</b>
XYZ AIRLINES		
AUTHORIZATION PAGE		
<b>Reliability programme authorization Douglas DC-XXX</b>		
<p>XYZ Airlines is authorized to utilize the provisions of a maintenance reliability programme which contains the standards for determining maintenance intervals and processes.</p>		
<p>The programme for these systems is described in and the standards are established in XYZ document (enter name, number, and date).</p>		
<p>The time limitations for the overhaul, inspection and checks of the aircraft and/or systems/components controlled by the programme are contained in XYZ Airlines DC-XXX maintenance programme.</p>		
<ol style="list-style-type: none"><li>1. The service time limits will be listed in the 5-2-0 section of the maintenance programme.</li><li>2. The component overhaul time limits and life limits will be listed in the 5-2-1 section of the maintenance programme.</li><li>3. The service item checks and scheduled maintenance tasks to be performed at routine service periods will be listed in the 5-2-2 section of the maintenance programme.</li><li>4. The inspection and maintenance of aircraft structures will be listed in the 5-2-3 section of the maintenance programme.</li><li>5. The parts and sub-components not listed in the 5-2-1 section of the maintenance programme will be checked, inspected and/or overhauled at the same time limit specified for the components or assembly to which such components are related.</li></ol>		
<p>In the event the programme document referenced above is cancelled, the maintenance programme covered by said document will be completely re-evaluated and maintenance and overhaul time limits established by the CAA.</p>		
<p>Effective date: _____</p>		

**Figure I-6B-3. Sample authorization page —  
Reliability programme authorization**

Government of \_\_\_\_\_

Page 1 of \_\_\_\_\_

**OPERATIONS SPECIFICATIONS**

**PART D**

**XYZ AIRLINES**

**AUTHORIZATION PAGE**

**Short-term escalation authorization**

A. The procedure for short-term escalation of maintenance intervals is contained in XYZ Airlines's General maintenance programme, Chapter 7, Section 3. This procedure is applicable to the following equipment:

**DOUGLAS DC-XXX Fleet**

**B. Limitations**

1. Aircraft A & B checks — 15 hours — time in service.
2. Aircraft C checks — 50 hours — time in service.
3. Aircraft D checks — 400 hours — time in service.
4. Powerplants and powerplant components — 5% not to exceed 500 hours — time in service.
5. Airframe components and appliances — 10% not to exceed 500 hours — time in service.

*Note.— An individual item may be escalated to a higher figure predicated on justification presented to the assigned CAA principal AID Inspector (maintenance or avionics as applicable) and subject to his approval prior to exceeding the current limit.*

**C. Prohibitions**

Short-term escalation procedures do not apply to the following:

1. Intervals specified by CAA airworthiness directives.
2. Life limits specified by Type Certificate data sheets, flight manuals, or manufacturer's publications.
3. Limitations specified by minimum equipment lists.
4. Structural sampling periods imposed by maintenance review boards.

Effective date: \_\_\_\_\_

**Figure I-6B-4. Sample authorization page —  
Short-term escalation authorization**

Government of _____	Page 1 of _____	
<b>OPERATIONS SPECIFICATIONS</b>		<b>PART D</b>
XYZ AIRLINES		
AUTHORIZATION PAGE		
<b>Maintenance contractual authorization</b>		
<p>XYZ Airlines is authorized to utilize the provisions of a contractual agreement with RST Airlines identified as _____ dated _____ for the maintenance of the following XYZ Airlines' DC-XXX aircraft in accordance with RST Airlines' approved continuous maintenance programme:</p>		
C-345A C-459A		
<p>The agreement provides for RST Airlines to perform all scheduled maintenance above the "A" check level, including structural inspection, powerplant shop maintenance and aircraft component shop maintenance, in accordance with RST Airlines' methods, standards, and procedures.</p>		
<p>Under the terms of this agreement RST will provide XYZ with a current copy of the publications and documents relating to their maintenance programme as listed in that agreement and revisions thereto. All maintenance performed by XYZ will be in accordance with those publications and documents.</p>		
<p>XYZ Airlines is authorized to participate in RST Airlines' reliability programme identified as _____ as revised, with XYZ aircraft included in RST fleet for the purpose of that programme. Maintenance intervals and assignment of maintenance processes are controlled by that programme.</p>		
<p>Under the terms of this agreement all maintenance records applicable to the subject aircraft shall be maintained by RST Airlines at their maintenance base in _____. XYZ Airlines shall expeditiously forward the original of all maintenance records generated during the period of this agreement to RST Airlines for inclusion in the records for that aircraft, and XYZ Airlines will retain a copy for their files for that aircraft.</p>		
<p>XYZ Airlines will determine that all replacement components, other than those provided by RST Airlines, that are common to the above listed aircraft and the RST fleet are evaluated by RST Airlines to ensure they meet RST standards.</p>		
<p>RST Airlines will maintain all components and systems not common to RST Airlines' fleet in accordance with the requirements of XYZ Airlines' specifications. Administration of this agreement and related policies and procedures, including those pertaining to the control of maintenance interval limits, will be included in XYZ Airlines' maintenance programme.</p>		
<p>In the event this arrangement is cancelled, altered, or if RST Airlines should cease for any reason to provide the services contracted for, the entire programme is subject to reevaluation by CAA.</p>		
<p>Effective date: _____</p>		

**Figure I-6B-5. Sample authorization page —  
Maintenance contractual authorization**

Government of _____	Page 1 of _____	
<b>OPERATIONS SPECIFICATIONS</b>		<b>PART D</b>
XYZ AIRLINES		
AUTHORIZATION PAGE		
<b>Leased aircraft maintenance authorization</b>		
<p>XYZ Airlines, Inc., is authorized to maintain DC-XXX aircraft C9351 S/N 1237, in accordance with RST Airlines, Inc., approved DC-XXX maintenance programme in accordance with the aircraft lease agreement between XYZ and RST dated _____. All maintenance accomplished under this authorization will be according to RST maintenance programme and will be recorded on RST forms except for the following, which will be maintained under XYZ's approved programme:</p>		
<ol style="list-style-type: none"><li>1. Life rafts, life vests, and emergency transmitters.</li><li>2. Pre-flight inspections.</li></ol>		
<p>This authorization has no bearing on XYZ Airlines, Inc., approved maintenance programme for this type aircraft.</p>		
<p>Effective date: _____</p>		

**Figure I-6B-6. Sample authorization page —  
Leased aircraft maintenance authorization**

Government of _____	Page 1 of _____	
<b>OPERATIONS SPECIFICATIONS</b>		<b>PART D</b>
XYZ AIRLINES		
AUTHORIZATION PAGE		
<b>Parts pool authorization</b>		
<p>The holder of these Operations Specifications is authorized, subject to the conditions and limitations specified herein, to participate in a parts pool agreement.</p>		
<p>1. Only those parts pool participants specified herein shall be eligible to provide parts to _____.</p>		
<p>2. _____ shall not utilize any part provided by any participant identified herein unless such part meets with the applicable provisions of the Civil Air Regulations and the certificate holder's manual.</p>		
<p>Effective date: _____</p>		

**Figure I-6B-7. Sample authorization page —  
Parts pool authorization**

Government of _____	Page 1 of _____	
<b>OPERATIONS SPECIFICATIONS</b>		<b>PART D</b>
XYZ AIRLINES		
AUTHORIZATION PAGE		
<b>Prorated time authorization</b>		
<p>The aircraft listed herein and including its installed powerplants, propellers, and appliances shall be maintained in accordance with the adjusted hours of time since overhaul as set forth in the document identified as:</p>		
Adjusted time since overhaul for C _____		
Document No. _____		
Dated _____		
<p>A copy of which is on file at the operator's main maintenance base and with the CAA.</p>		
<p>These time limits and this specification page shall remain in effect until such time as the aircraft, its powerplants, propellers and appliances are first overhauled. Thereafter, this authorization page shall be cancelled and the aircraft will be inspected and overhauled in accordance with _____ airlines' maintenance programme and approved time limits.</p>		
Effective date: _____		

**Figure I-6B-8. Sample authorization page —  
Prorated time authorization**

Government of _____	Page 1 of _____	
<b>OPERATIONS SPECIFICATIONS</b>		<b>PART D</b>
XYZ AIRLINES		
AUTHORIZATION PAGE		
<b>Parts borrowing authorization</b>		
<p>XYZ Airlines, when in need, may borrow a part from another _____ (State) operator (or from a parts pool if the operator is a participant of a parts pool agreement) and may use such part for a maximum of 100 hours (or 50 landings if the service or overhaul time limit is controlled by the number of landings) even though the time in service of such part exceeds XYZ Airlines' approved service and overhaul time limit providing:</p>		
<p>a) the part in question has a minimum time of 200 hours (or 100 landings if the service or overhaul time limit is controlled by the number of landings) remaining to service or overhaul in relation to the lender's approved service and overhaul time limit.</p>		
<p>b) the part is not specifically life limited. In such a case, the part may not be operated beyond its approved service life.</p>		
<p>Effective date: _____</p>		

**Figure I-6B-9. Sample authorization page —  
Parts borrowing authorization**

Government of _____	Page 1 of _____
<p><b>OPERATIONS SPECIFICATIONS</b> <span style="float: right;"><b>PART D</b></span></p> <p><b>XYZ AIRLINES</b></p> <p><b>AUTHORIZATION PAGE</b></p> <p><b>Ferry flight authorization</b></p> <p>This special flight permit with continuous authorization is (AOC) authorization to fly any aircraft listed in the Operations Specifications, that may not meet applicable airworthiness requirements but is capable of safe flight, to a base where the necessary maintenance or alterations can be performed.</p> <ol style="list-style-type: none"> <li>1. A copy of this operations specification, or appropriate sections of the AOC holder's manual containing a restatement of this permit, shall be carried on board the aircraft when operating under a special flight permit.</li> <li>2. Before operating an aircraft that does not meet applicable airworthiness requirements, the AOC holder shall make a determination that the aircraft can safely be flown to a station where maintenance or alterations can be performed. In addition, the AOC holder will have the aircraft inspected in accordance with procedures contained in the operator's manual and have a certificated engineer certify in the aircraft logbook that the aircraft is in safe condition for the flight as specified in the operator's manual.</li> <li>3. Only flight crew members and persons essential to operations of the aircraft shall be carried aboard during ferry flights where the aircraft flight characteristics may have been altered appreciably or the flight operations affected substantially.</li> <li>4. Operating mass of the aircraft must be the minimum necessary for the flight with necessary reserve fuel load.</li> <li>5. Flight shall be conducted in accordance with appropriate special conditions or limitations contained in (appropriate sections or pages) of the AOC holder's manual.</li> <li>6. This authorization does not permit operation of a product to which an airworthiness directive applies except in accordance with the requirements of that directive.</li> <li>7. Aircraft involved in an accident or incident may not be ferried prior to notifying the CAA accident co-ordinator.</li> <li>8. The AOC holder shall impose any further conditions or limitations necessary for safe flight.</li> </ol> <p>Effective date: _____</p>	

**Figure I-6B-10. Sample authorization page —  
Ferry flight authorization**



Government of _____		Page 1 of _____			
OPERATIONS SPECIFICATIONS					PART D
XYZ AIRLINES MAINTENANCE PAGE Douglas DC-XXX					
System/component	Model or P/N	Manufacturer	Overhaul period	Inspection and check period	Other
Air conditioning			OC	A, C, D	FC @ 1D
Turbine, air cycle			3 000	1C	
Valve, pneumatic			3 000	4C	
Filter, air			OC	1C	Clean @ 1C
Altimeter, cabin			9 000	1C	
Control, cabin pressure			OC	1C	Replace Filter Element @ 1D
Control, differential pressure			12 000	1C	
Regular, servo pressure			7 000	6C	
Valve, outflow			11 000	2C	1D-Replace Filter Element
Communications			OC	A, B, C	
Fixed radio installation			OC	C	
Amplifier, isolation	AI-27	Telephonics	2 000	C	
Transceiver HF	618T-2	Collins	OC	C	
Control, VHF communications	G-4817	Cables	OC	C	
Cockpit voice recorder	A-100	Fairchild	OC	C	
Equipment and furnishings			OC	B, C, D	
Evacuation slides			1 yr.	A, C	
Life vests			1 yr.	A, C	
Evacuation slide inflation bottles			3 yr.	A, C	See Note 25.1
Escape ropes or straps (cockpit/cabin)			OC	A, C	
Megaphone			OC	A	
Flotation equipment			OC	A, C	
First aid kit			OC	A	
Crash axe			OC	A	
Smoke goggles			OC	A	

Note 25.1: Inspections, hydrostatic test, and life limits will be accomplished as set forth in \_\_\_\_\_ of CAA Regulations.

Effective date: \_\_\_\_\_

Figure I-6B-11. Sample maintenance page

Government of _____		Page 1 of _____			
<b>OPERATIONS SPECIFICATIONS</b>					<b>PART D</b>
XYZ AIRLINES MAINTENANCE PAGE Douglas DC-XXX					
System/component	Overhaul period	Inspection and check period			Other
		P.F.	S.C.	P.I.	
Hydraulic	AO	X	X	X	
Pump, emergency	2 000	X	X	X	
Pump, engine-driven		X	X	X	
Regulator, air pressure	4 000			X	
Valve-reservoir, relief	4 000			X	
Accumulator, emergency	4 000		X	X	
Accumulator, regulator – primary	4 000		X	X	
Filters, pressure	OC		X	X	R & R 4-PI
Valve, thermal relief – emergency	4 000	X	X	X	
Reservoir air filters	OC				
Ice and rain	AO	X	X	X	
Windshield	OC		X	X	
Valve, modulating	OC		X	X	
Instruments	AO	X	X	X	
Flight data recorder (Fairchild P/n 15630-601)	2 500	X	X	X	
Clock (Elgin A-3)	OC	X	X	X	
Landing gear	10 000	X	X	X	
Wheels	OC	X	X	X	Zygro wheels each tire change
Brakes	OC	X	X	X	
Anti-skid control units	OC			X	Spin check at wheel or brake change
Tires	OC	X	X	X	
Cable – emergency system	OC			X	FC 4-PI
Bottle, nitrogen	OC	X	X	X	0
Doors and linkage	OC	X	X	X	
Valve assembly – power brake	4 000	X	X	X	
Lights	OC	X	X	X	
* Inspections, hydrostatic test, and life limits will be accomplished as set forth in _____ of CAA Regulations					
Effective date: _____					

Figure I-6B-12. Sample maintenance page

**Appendix C to Chapter 6**  
**OPERATIONS SPECIFICATIONS,**  
**PART E — MASS AND BALANCE CONTROL**

(sample)

Government of _____	Page 1 of _____
<b>OPERATIONS SPECIFICATIONS</b>	
<b>PART E</b>	
<b>XYZ AIRLINES</b>	
<b>Aircraft mass and balance control</b>	
<p>The following procedures have been established to maintain control of mass and balance of the XYZ Airlines' aircraft operated under the terms of these Operations Specifications (identified below) and to ensure that these aircraft are loaded within the gross mass and centre of gravity limitations.</p>	
<p><i>Determination of mass of passengers and crew.</i> Procedures by which either actual or approved average passenger mass may be used are provided for in the operator's mass and balance control manual.</p>	
<p><i>Determination of mass of baggage</i></p>	
<p>a) When computing the mass and balance of the aircraft, the average passenger baggage mass used is in accordance with the operator's mass and balance control manual.</p>	
<p>b) The average passenger baggage mass authorized in paragraph a) shall not be used in computing the mass and balance of charter flights and other special services involving the carriage of special groups.</p>	
<p><i>Periodic Aircraft Weighing.</i> All aircraft will be weighed in accordance with the procedures for establishing individual or fleet aircraft mass as outlined in the operator's aircraft mass and balance control manual.</p>	
<p><i>Loading schedules and identification of aircraft.</i> The following loading schedules are used for routine operations:</p>	
<i>Aircraft type</i>	<i>Type of loading schedule</i>
1. Douglas Model DC-XXX (passenger and cargo)	Tabular
2. Lockheed Model L-XXX (passenger)	Index
3. Boeing Model B-XXX (passenger)	Computer
4. Boeing Model B-XXX (passenger)	Computer
<p>Loading instructions. Loading instructions relative to the above-listed loading schedules are set forth in XYZ Airlines' Stations Manual, Volume E and Flight Operations Manual, Volume C.</p>	
Effective date _____	

I-6C-1

# Chapter 7

## APPROVED MAINTENANCE ORGANIZATIONS

This chapter provides descriptive guidance to airworthiness authorities on the issues to be considered in approval of organizations for the maintenance of aircraft. Many States have issued detailed requirements for approval of aircraft maintenance organizations — an example adopted by a large number of European airworthiness authorities is Joint Aviation Requirement 145, prepared by the Joint Aviation Authorities.

### 7.1 GENERAL

#### 7.1.1 Operator

7.1.1.1 Annex 6, Part I, 8.1.1 places an obligation on the operator to ensure that the aeroplanes operated are maintained in an airworthy condition. 8.1.2 requires that an aeroplane shall not be operated unless it is maintained and released by an approved maintenance organization or an equivalent system. A State, taking into account the complexity of aircraft and the degree of likely maintenance activity, may accept a system deemed to be equivalent in terms of continuing airworthiness. In this case, the certifying personnel must be licensed individually in accordance with Annex 1, Chapter 4.

7.1.1.2 Annex 6, Part I, 8.2 includes requirements for an operator to ensure that a maintenance control manual is provided for the use and guidance of maintenance and operational personnel. The operator is required to ensure that the manual is amended and revised as necessary and that copies of the changes are distributed to holders of the manual.

7.1.1.3 Annex 6, Part I, 11.2 specifies the subjects to be included in the operator's maintenance control manual.

7.1.1.4 Annex 6, Part I, 8.3 places an obligation on operators to provide a maintenance programme approved by the State of Registry for use and guidance of maintenance and operational personnel and to ensure that the maintenance of their aeroplanes is performed in accordance with this maintenance programme.

7.1.1.5 Taken together, Annex 6, Part I, 8.2 and 8.3 effectively place an obligation on operators to have maintenance programmes and systems of maintenance control.

7.1.1.6 Although an operator may include a maintenance facility within its organization, many operators now subcontract maintenance to a separate organization. This chapter therefore deals with approved maintenance organizations and Chapter 6 addresses the operator's maintenance responsibilities for the issuance of an air operator certificate.

#### 7.1.2 Maintenance organizations

7.1.2.1 Annex 6, Part I, 8.7 contains requirements for approved maintenance organizations as referred to under 8.1.2. In summary, the requirements are regulating:

- a) approval of the organization;
- b) maintenance organization's procedures manual;
- c) maintenance procedures and quality assurance system;
- d) facilities;
- e) personnel;
- f) records; and
- g) maintenance release.

### 7.2 OVERVIEW OF THE CRITERIA ON WHICH APPROVAL OF MAINTENANCE ORGANIZATIONS IS BASED

#### 7.2.1 Issuance of approval

7.2.1.1 It is strongly recommended that approval be granted only to a whole organization headed by its chief

executive officer (CEO), who should be responsible to the airworthiness authority for ensuring compliance with the terms and conditions of the approval. This approach provides a guarantee to the airworthiness authority that responsibility for corrective action for any deficiencies identified by the airworthiness authority is vested at the highest level in the organization's management structure, thus ensuring that the necessary executive authority (including finance, where applicable) will be available. This might not be the case, for example, if the approval is vested only in the inspection department of an organization.

7.2.1.2 To support the CEO there should be a group of key personnel, nominated to the airworthiness authority, who are appropriately qualified and experienced to manage the various aspects of the activities included in the approval.

## 7.2.2 Systems of inspection and quality management

7.2.2.1 To satisfy the obligation of States under Part I of Annex 6, aircraft cannot be released to service following scheduled or unscheduled maintenance unless certifications are made by appropriately licensed and approved personnel that the tasks have been completed satisfactorily and in accordance with the procedures described in the maintenance organization's procedures manual. There are three generally accepted methods of meeting this requirement:

- a) licensed personnel either complete the task, or are responsible for its completion, and issue the necessary certification;
- b) the staff of a production department complete the task, with a separate inspection department responsible for the necessary certification; or
- c) the staff of the production department complete the task to approved quality control standards and also issue the necessary certification, while a separate quality assurance department performs sample audits to determine that the approved procedures are being adhered to and that the final product is satisfactory.

It is not uncommon to find various combinations of a), b) and c) in organizations.

7.2.2.2 Of the three methods described above, c) is considered the optimum for the present generation of large transport aircraft. Before considering this topic further it is

necessary, for the purposes of this chapter, to provide definitions of quality, quality control and quality assurance:

- a) quality of a product or service is the degree to which it meets the requirements of the customer, including the relevant airworthiness requirements;
- b) quality control is a management system for programming and coordinating the ongoing quality and improvement efforts of the various groups in an organization to permit the completion of aircraft maintenance in accordance with the requirements of the airworthiness authority and any specific requirements of the organization or customer; and
- c) quality assurance is the overall authority for the supervision of quality standards, enabling the standards set by the system of quality control to be enforced.

7.2.2.3 In practical terms, it is very difficult to manage quality control in circumstances where completion of a task and determination of compliance with the associated quality requirements are responsibilities of separate persons (as in 7.2.2.2 b)). The highest standard of quality of aircraft maintenance is very much dependent on the competence of the personnel who complete the tasks; it is not something that can be "inspected-in". Thus responsibility for quality control management is best vested in a competent production work force which completes the tasks and is qualified to accept responsibility for certification of them, in accordance with prescribed procedures.

7.2.2.4 No system of quality management is complete without an element of quality assurance. This provides, through an independent audit system, the necessary feedback to the management of the approved organization to ensure that:

- a) through product sampling, the requirements of the customer, including those related to airworthiness, are being satisfied;
- b) the procedures of the organization are being complied with and that they remain appropriate for the undertakings of the organization; and
- c) the organization remains in compliance with the requirements and conditions of the approval granted by the airworthiness authority.

7.2.2.5 Further guidance material on quality management is provided in 7.3.

### 7.2.3 The purpose of the maintenance organization's procedures manual

7.2.3.1 Annex 6, Part I, 8.7.2 places an obligation on the approved maintenance organization to provide a maintenance organization's procedures manual.

7.2.3.2 The purpose of the procedures manual for an approved maintenance organization is threefold:

- a) to provide to the personnel the necessary information to enable them to fulfil their various roles in complying with the terms and conditions of the approval and the relevant airworthiness requirements;
- b) to provide airworthiness management for the maintenance activities undertaken by the organization; and
- c) to substantiate to the airworthiness authority how the activities included in the approval and the relevant airworthiness requirements will be satisfied.

7.2.3.3 It is recommended that the airworthiness authority consider the provision of this manual as an integral part of the approval of the organization. The manual and the subsequent amendments to the manual should therefore be acceptable to the Authority.

7.2.3.4 In the case of large organizations, it may be more appropriate for the manual to be divided into two or more volumes. The first volume would contain the essential requirements for management of the approval and compliance with the appropriate airworthiness requirements, including the control of the contents of the other volumes.

7.2.3.5 Further guidance on a maintenance organization's procedures manual is provided in 7.4.

### 7.2.4 Personnel

7.2.4.1 The organization should employ sufficient personnel to plan, perform, supervise and inspect the activities included in the approval. Because organizations engaged in aircraft maintenance for commercial reasons are under constant pressure to achieve maximum work throughput, it is important to determine that such organizations have the necessary personnel to match the anticipated workload without any reduction in the standards accepted by the airworthiness authority.

7.2.4.2 Annex 6, Part I, 8.7.5.3 requires the approved maintenance organization to establish the competence of

maintenance personnel in accordance with a procedure and to a level acceptable to the airworthiness authority; it also states that the person signing a maintenance release shall be qualified in accordance with Annex 1. It is important to realize that aircraft maintenance is an integrated activity, involving technical records, planning, supervision, quality control or quality assurance personnel, mechanics and specialist technicians such as non-destructive test personnel. Procedures should exist to ensure that these persons are assessed for competence in relation to their particular role within the organization.

### 7.2.5 Training policy

7.2.5.1 Annex 6, Part I, 8.7.5.4 requires that "The maintenance organization shall ensure that all maintenance personnel receive initial and continuation training appropriate to their assigned tasks and responsibilities." Air transport is an industry which, more than most, has to adapt to technology in a constant state of evolution. Training provided to personnel engaged in aircraft maintenance needs to mirror this state of change.

7.2.5.2 It is strongly recommended that policies for initial and refresher training be considered in the assessment for approval by the airworthiness authority. Consideration should be given to the needs of mechanics, quality control and quality assurance personnel, supervisors, planners and technical records personnel as well as of those persons signing a maintenance release.

7.2.5.3 It is important to note that training should not be limited to providing knowledge of the products which are maintained by the organization. There is a need to ensure that all personnel are given training on the company procedures associated with the approval. Where the organization utilizes specialized techniques such as non-destructive inspection or novel methods of repair, appropriate training should be provided.

7.2.5.4 Human Factors aspects are recognized to be an essential element in any aviation activity. The training programme is required to include training in knowledge and skills related to human performance, including coordination with other maintenance personnel and flight crew (guidance material relating to such training may be found in the *Human Factors Training Manual* (Doc 9683)).

### 7.2.6 Maintenance release

7.2.6.1 Annex 6, Part I, 8.8 states that a maintenance release shall be completed and signed to certify that the

maintenance work performed has been completed satisfactorily and in accordance with procedures described in the maintenance organization's procedures manual.

7.2.6.2 A maintenance release shall contain a certification including:

- a) the basic details of the maintenance carried out;
- b) the date such maintenance was completed;
- c) when applicable, the identity of the approved maintenance organization; and
- d) the identity of the person or persons signing the release.

### 7.2.7 Qualification of persons signing a maintenance release

7.2.7.1 ICAO requirements for the licensing of a person signing the maintenance release engaged in aircraft maintenance are provided in Annex 1. In relation to approved maintenance organizations, the qualification of certifying personnel employed by the organization shall be equivalent to the qualification required in Annex 1 for licensed individuals. Airworthiness authorities should give particular attention to this point in their national requirements for approval of maintenance organizations.

7.2.7.2 For airworthiness authorities that issue aircraft maintenance (technician/engineer/mechanic) licences, possession of an appropriate licence demonstrates a level of knowledge and experience which may be appropriate as a basic qualification. For airworthiness authorities that do not issue licences, it is important to ensure that proper procedures and training exist for qualifying the persons who will be signing the maintenance release.

7.2.7.3 All certifying personnel signing a maintenance release should be familiar with the relevant company systems and procedures, and have appropriate knowledge of the aircraft or component being maintained. It is important that compliance with this requirement is determined before a certifying authorization is granted.

### 7.2.8 Facility requirements

7.2.8.1 Facilities appropriate to the planned work should be available. These include access equipment and, in particular, protection from adverse weather conditions. Specialized workshops should be segregated to ensure that

environmental or work area contamination is unlikely to occur. Because aircraft maintenance is document-intensive, adequate office facilities should be available for personnel engaged in the management of quality, planning and technical records.

7.2.8.2 Storage facilities should be provided for parts, equipment, tools and material. Storage conditions should be such that unauthorized access to serviceable parts is prevented and that there is complete segregation of serviceable and unserviceable parts. The facilities should provide security and prevent deterioration and damage to stored items.

### 7.2.9 Equipment, tools, material, and airworthiness and maintenance data

7.2.9.1 Equipment, tools, material, and airworthiness and maintenance data should be available for completion of the scope of activities included in the approval granted by the airworthiness authority. For maintenance organizations that are not also aircraft operators, it is not uncommon to expect some specialized equipment, tools and data in respect of a particular variant of an aircraft type to be provided by the operator. An airworthiness authority which accepts an arrangement of this nature should ensure that the activity is controlled by proper contractual arrangement between the maintenance organization and the operator.

7.2.9.2 Much of the tooling and equipment associated with aircraft maintenance is subject to periodic calibration. The calibration procedures should be acceptable to the airworthiness authority and the actual standards themselves traceable to international standards acceptable to the State concerned.

### 7.2.10 Contract and subcontract

It is accepted practice for operators to contract their maintenance requirements to approved maintenance organizations. In some States, it is accepted practice to permit approved organizations to subcontract work to organizations which are either not approved by the airworthiness authority or not approved for the activities under consideration. In the acceptance of this practice, consideration should be given to the following points:

- a) the approved organization must be approved for the work which is to be subcontracted and have the capability to assess the competence of the subcontractor;

- b) the approved organization must retain responsibility for quality control and release of subcontracted activities, including the appropriate airworthiness requirements; and
- c) the necessary procedures must be in place for the control of subcontracted activities, together with terms of reference for the personnel responsible for their management.

- c) given clearly defined terms of reference and responsibility within the organization and reporting lines to senior management.

*Note.— This is particularly important where quality assurance personnel are also expected to perform other duties in the organization, e.g. to issue maintenance releases after the completion of base maintenance.*

## 7.3 QUALITY MANAGEMENT

### 7.3.1 General

7.3.1.1 In recognition of the key importance of this activity in continuing airworthiness, it is essential for the manager of the quality department to have direct access to the CEO on quality issues.

7.3.1.2 The maintenance organization's systems for quality control and assurance should take into account all of the facilities and procedures utilized to ensure continuing airworthiness, where activities take place affecting the airworthiness of the aircraft and product quality for subjects not directly related to airworthiness. Quality control should therefore be effective throughout the maintenance of aircraft and quality auditing should ensure that control is being properly applied and achieving satisfactory results.

7.3.1.3 The organization's quality control policies and systems should be described in the approved maintenance organization manual, together with the quality assurance audit programme in respect of product, facility and procedures.

### 7.3.2 Procedures and personnel qualifications

7.3.2.1 Staff assigned to quality control and assurance duties should be:

- a) sufficiently experienced in the company systems and procedures and technically knowledgeable of the aircraft being maintained so as to enable them to perform their duties satisfactorily;
- b) experienced in the techniques of quality control and assurance or receive suitable training before taking up their duties; and

7.3.2.2 The department responsible for quality control and assurance should arrange for independent quality audit checks to be carried out in accordance with the audit programme. Emphasis should be placed on the company systems employed to achieve and ensure airworthiness, their suitability and effectiveness. The scope of quality checks within the organization should be based on the guidelines given in Appendix A to this chapter.

7.3.2.3 All quality checks should be recorded and assessed and any criticisms forwarded to the person responsible for the particular facility or procedure for corrective action. There should be a feedback system for confirming to the quality assurance staff that corrective action has been taken and to ensure that persons concerned with any audit deficiency are made aware of both the adverse report and the outcome.

## 7.4 MAINTENANCE ORGANIZATION'S PROCEDURES MANUAL

*Note.— The maintenance organization's procedures manual is a document which provides details of the organizational structure, management responsibilities, maintenance procedures and quality assurance on inspection systems to be observed by the organization.*

7.4.1 The maintenance organization's procedures manual specified in Annex 6, Part I, 8.7.2 should provide clear guidance to personnel on how the activities included in the airworthiness authority approval are managed, on their personal responsibilities and on how compliance with the appropriate continuing airworthiness requirements is achieved. It should also include a statement of the organization's policies and objectives. If the maintenance organization is also the operator, the maintenance organization's procedures manual and the operator's maintenance control manual may be combined. The content of the procedures manual is outlined in Appendix B to this chapter.



## Appendix A to Chapter 7

# APPROVED MAINTENANCE ORGANIZATION'S QUALITY ASSURANCE AUDIT PROCEDURES

The lists which follow are not exhaustive, but include the principal audit checks which need to be considered.

1. *Checks on aircraft, while undergoing scheduled maintenance, for:*

- compliance with maintenance programme and mandatory continuing airworthiness requirements and ensuring that only work instructions reflecting the latest amendment standards are used;
- completion of work instructions including the transfer of defects to additional worksheets, their control, and final collation. Action taken in respect of items carried forward, not completed during the particular inspection or maintenance task;
- compliance with manufacturers' and the organization's standard specifications and procedures;
- standards of inspection and workmanship;
- condition of corrosion prevention and control treatments and other protective processes;
- aircraft maintenance which is not limited to the normal working day; procedures adopted during shift changeover of personnel to ensure continuity of inspection and responses; and
- precautions taken to ensure that, on completion of any work or maintenance, all aircraft are checked for loose tools and miscellaneous small items such as split pins, wire, rivets, nuts, bolts and other debris, and for general cleanliness and housekeeping.

2. *Checks on airworthiness data for:*

- adequacy of aircraft manuals and other technical information appropriate to each aircraft type, including engines, propellers and other equipment, and the continuing receipt of revisions and amendments. Availability of continuing airworthiness data, e.g. airworthiness directives, life limits, etc;

- assessment of manufacturer's service information, determining its application to aircraft types maintained and the recording of compliance or embodiment;
- maintenance of a register of manuals and technical literature held within the organization, their locations and current amendment status; and
- assurance that all the organization's manuals and documents, both technical and procedural, are kept up to date.

3. *Checks on stores and storage procedures for:*

- the adequacy of stores and storage conditions for rotatable components, small parts, perishable items, flammable fluids, engines and bulky assemblies in accordance with the specifications adopted by the organization;
- the procedure for examining incoming components, materials and items for conformity with order, release documentation and procurement from sources approved by the organization;
- the "batch recording" of goods received and identification of raw materials, the acceptance of part life items into stores, requisition procedures for issue of items from stores;
- labelling procedures, including the use of serviceable/unserviceable/repairable labels and their certification and final disposal after installation, and labelling procedures for components which are serviceable but "part life" only;
- the internal release procedure to be used when components are to be forwarded to other locations within the organization;
- the procedure to be adopted for the release of goods or overhauled items to other organizations (this procedure should also cover items being sent away for rectification or calibration);

- the procedure for the requisitioning of tools together with the system for ensuring that the location of tools, and their calibration and maintenance status, is known at all times; and
  - control of shelf life and storage conditions in the stores; control of the free-issue dispensing of standard parts, identification and segregation.
4. *Checks on maintenance facilities for:*
- cleanliness, state of repair and correct functioning of hangars, hangar facilities and special equipment and the maintenance of mobile equipment;
  - adequacy and functioning of special services and techniques including welding, non-destructive inspection (NDI), weighing, painting;
  - viewer/printer equipment provided for use with microfiche, microfilm and compact disk, ensuring that regular maintenance takes place and an acceptable standard of screen reproduction and printed copy is achieved;
  - the adequacy of special tools and equipment appropriate to each type of aircraft, including engines, propellers and other equipment;
  - the calibration and maintenance of tools and measuring equipment; and
  - environmental controls.
5. *Checks on the organization's general airworthiness control procedures for:*
- implementing the requirements of airworthiness directives, modifications and inspections and special aircraft fleet checks instituted in response to service difficulties, etc.;
  - monitoring the practices of the organization in respect of scheduling or pre-planning maintenance tasks to be carried out in the open air and adequacy of the facilities provided;
  - operation of the system for service difficulty reporting required by the airworthiness authority (Volume II of this manual, Part B, Appendix B to Chapter 8 refers);
  - authorization of personnel to issue maintenance releases in respect of inspections and maintenance tasks; the effectiveness and adequacy of training, including continuation training and the recording of personnel experience, training and qualifications for grant of authorization;
  - the effectiveness of technical instructions issued to maintenance personnel;
  - the adequacy of personnel in terms of qualifications, numbers and ability in all areas required to support the activities included in the approval granted by the airworthiness authority;
  - the efficacy and completeness of the quality audit programme;
  - maintaining logbooks and other required records and ensuring that these documents are assessed in accordance with the requirements of the State (ICAO requirements in respect of the preservation of records are contained in Annex 6, Part I, 8.7.6);
  - ensuring that major and minor repairs are only carried out in accordance with approved repair schemes and practices;
  - control of sub-contractors; and
  - control of activities sub-contracted to it, such as management of the operator's maintenance programme.

## Appendix B to Chapter 7

# CONTENT OF THE MAINTENANCE ORGANIZATION'S PROCEDURES MANUAL

1. Annex 6, Part I, 8.7.2 requires the following information to be included in the manual:

- a) A general description of the scope of work authorized under the organization's terms of approval.
- b) A description of the organization's maintenance procedures and quality assurance system or system of inspection.
- c) A general description of the organization's facilities.
- d) The names and duties of the person or persons required to ensure the maintenance organization is in compliance with Annex 6, Part I, 8.7.
- e) A description of the procedures used to establish the competence of maintenance personnel to the level acceptable to the State granting approval.
- f) A description of the method used for the completion and retention of the maintenance records. The records shall show that all requirements for signing of the maintenance release have been met. The records shall be kept for a minimum period of one year after signing of the maintenance release.
- g) A description of the procedure for preparing the maintenance release and the circumstances under which the release is to be signed.
- h) The personnel authorized to sign the maintenance release and the scope of their authorization. The person signing the maintenance release shall be qualified in accordance with Annex 1.
- i) A description, when applicable, of the additional procedures for complying with an operator's maintenance procedures and requirements.
- j) A description of the procedures in respect of aircraft of over 5 700 kg maximum certificated take-off mass, whereby information on faults, malfunctions, defects and other occurrences which cause or might cause adverse effects on the continuing airworthiness of the aircraft is transmitted to the organization responsible

for the type design of that aircraft and to the operator's airworthiness authority.

*Note.— Guidance on "interpretation of the organization responsible for the type design" is contained in Volume II of this manual, Part B, Chapter 3.*

- k) A description of the procedure for receiving, amending and distributing within the maintenance organization all necessary airworthiness data from the type certificate holder or type design organization.

If the manual is also used to comply with the requirements of Annex 6, Part I, 11.3, the maintenance programme should be included.

2. Notwithstanding the above requirements, consideration should be given to including the following in the procedures manual:

- a) *Management*
  - A statement signed by the CEO confirming that the manual defines the organization's procedures and associated personnel responsibilities and will be complied with at all times.
  - An organization chart showing the associated chains of responsibility of the persons nominated in accordance with d) above.
  - Notification procedures to the airworthiness authority regarding changes to the organization's activities/approval/location/personnel.
  - Liaison or contractual arrangements with other organizations which provide services associated with the approval.
  - Amendment procedures for the manual.
- b) *Maintenance procedures*
  - Supplier evaluation procedure.
  - Acceptance/inspection of aircraft components and material from outside contractors.
  - Storage, labelling/tagging and release of aircraft components and material to aircraft maintenance.
  - Acceptance of tools and equipment.
  - Calibration of tools and equipment.
  - Use of tooling and equipment by staff (including alternate tools).

- Cleanliness standards of maintenance facilities.
  - Maintenance instructions and relationship to aircraft/aircraft component manufacturers service information including updating and availability to staff.
  - Repair procedure.
  - Procedures for compliance with an operator's aircraft maintenance programme.
  - Airworthiness directives procedure.
  - Optional modification procedure.
  - Maintenance documentation in use and completion of same.
  - Technical record control.
  - Procedures for handling of defects arising during maintenance.
  - Issue of the maintenance release required by Annex 6, Part I, 8.8.
  - Records for the operator (if the organization is not an operator itself).
  - Reporting of defects and other occurrences as required by the airworthiness authority (Volume II of this manual, Part B, Chapter 8 refers).
  - Return of defective aircraft components to store.
  - Control of defective components sent to outside contractors for overhaul, etc.
  - Control of computer maintenance record systems.
  - Reference to specific maintenance procedures such as:
    - engine running procedures;
    - aircraft pressure run procedures;
    - aircraft towing procedures;
    - aircraft taxiing procedures.
  - Sub-contract procedures.
- c) *Line maintenance procedures* (when applicable)
- Line maintenance control of aircraft components tools, equipment, etc.
  - Line maintenance procedures related to servicing/ fuelling/de-icing, etc.
- Line maintenance control of defects and repetitive defects.
  - Line procedure for pooled parts and loan parts.
  - Line procedure for return of defective parts removed from aircraft.
- d) *Quality system procedures*
- Quality audit of organization procedures.
  - Quality audit of aircraft.
  - Quality audit remedial action procedure.
  - The qualification and training procedures for personnel issuing a maintenance release ("certifying staff").
  - Records of certifying staff.
  - The qualification and training procedures for quality audit personnel.
  - The qualification and training procedures for mechanics.
  - Exemption process control.
  - Concession control for deviation from organization's procedures.
  - Qualification procedure for specialized activities such as non-destructive testing (NDT), welding, etc.
  - Control of manufacturer's working teams based at the premises of the organization, engaged in tasks which interface with activities included in the approval.
  - Quality audit of sub-contractors (or acceptance of accreditation by third parties, e.g. use of NDT organizations approved by a State regulatory body other than the airworthiness authority).
- e) *Examples of standard documents*
- Examples of standard documents used by the organization which are associated with activities undertaken under the terms and conditions of the approval, such as:
- Technical record control.
  - Rectification of defects.

— END —

## ICAO TECHNICAL PUBLICATIONS

*The following summary gives the status, and also describes in general terms the contents of the various series of technical publications issued by the International Civil Aviation Organization. It does not include specialized publications that do not fall specifically within one of the series, such as the Aeronautical Chart Catalogue or the Meteorological Tables for International Air Navigation.*

**International Standards and Recommended Practices** are adopted by the Council in accordance with Articles 54, 37 and 90 of the Convention on International Civil Aviation and are designated, for convenience, as Annexes to the Convention. The uniform application by Contracting States of the specifications contained in the International Standards is recognized as necessary for the safety or regularity of international air navigation while the uniform application of the specifications in the Recommended Practices is regarded as desirable in the interest of safety, regularity or efficiency of international air navigation. Knowledge of any differences between the national regulations or practices of a State and those established by an International Standard is essential to the safety or regularity of international air navigation. In the event of non-compliance with an International Standard, a State has, in fact, an obligation, under Article 38 of the Convention, to notify the Council of any differences. Knowledge of differences from Recommended Practices may also be important for the safety of air navigation and, although the Convention does not impose any obligation with regard thereto, the Council has invited Contracting States to notify such differences in addition to those relating to International Standards.

**Procedures for Air Navigation Services (PANS)** are approved by the Council for worldwide application. They contain, for the most part, operating procedures regarded as not yet having attained a sufficient degree of

maturity for adoption as International Standards and Recommended Practices, as well as material of a more permanent character which is considered too detailed for incorporation in an Annex, or is susceptible to frequent amendment, for which the processes of the Convention would be too cumbersome.

**Regional Supplementary Procedures (SUPPS)** have a status similar to that of PANS in that they are approved by the Council, but only for application in the respective regions. They are prepared in consolidated form, since certain of the procedures apply to overlapping regions or are common to two or more regions.

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*The following publications are prepared by authority of the Secretary General in accordance with the principles and policies approved by the Council.*

**Technical Manuals** provide guidance and information in amplification of the International Standards, Recommended Practices and PANS, the implementation of which they are designed to facilitate.

**Air Navigation Plans** detail requirements for facilities and services for international air navigation in the respective ICAO Air Navigation Regions. They are prepared on the authority of the Secretary General on the basis of recommendations of regional air navigation meetings and of the Council action thereon. The plans are amended periodically to reflect changes in requirements and in the status of implementation of the recommended facilities and services.

**ICAO Circulars** make available specialized information of interest to Contracting States. This includes studies on technical subjects.

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