



AIRCRAFT SAFETY STARTS FROM AIRWORTHINESS

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APPENDIX – II

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Further, I certify that the work is based on the investigation made, data collected and analyzed by him and it has not been submitted in any other University or Institution for award of any degree. In my opinion it is fully adequate, in scope and utility, as a dissertation towards partial fulfillment for the award of degree of Executive BBA.

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CHAPTER 1

INTRODUCTION:

Airworthiness is the science and practice of ensuring that aircraft, aero engines, aircraft systems and associated equipment are safe to operate for the duration of the aircraft's life. UK Aerospace has made a major contribution to the global development of safe aviation in both civil and military operating environments. One of the main or earliest examples of airworthiness regulation was the publication of a pamphlet detailing design requirements for military aircraft during the 1st World War by Royal Aircraft Factory. The ADS specialist boards and committees debating airworthiness topics continue to contribute to this development and support airworthiness projects throughout the world.

The ICAO requirement to development SMS in all areas of aerospace management is throwing up challenges to many elements of the aerospace industry which, whilst stakeholders in aviation safety, have not formally managed safety within their organisations. The current ADS remit covers predominantly air vehicle design and support, but expansion of the ADS safety management role may take place as other parts of the UK industry seek support for their new safety responsibilities.



ADS holds quarterly meetings of 3 committees which debate airworthiness concepts and topics. These are:

- The Airworthiness Safety and Regulation Board
- The Civil Aviation Safety Group (CASG)
- The Military Aviation Safety Group (MASG)

1.1 Airworthiness Approval

The application of airworthiness defines the condition of an aircraft and supplies the basis for judgment of the suitability for flight of that aircraft, in that it has been designed with engineering rigor, constructed, maintained and is expected to be operated to approved standards and limitations, by competent and approved individuals, who are acting as members of an approved organization and whose work is both certified as correct and accepted on behalf of the State. The airworthiness of aircraft ranges from the initial approval of a new aircraft design to ensuring an aircraft's on-going safety standards. Most approvals of new aircraft manufactured in Europe are undertaken by the European Aviation Safety Agency (EASA). This enables manufacturers to gain one approval for the continent which is then recognised throughout the world. Aircraft built outside Europe would normally be certified by the regulatory authorities in the nation concerned.

It is then the responsibility of each national authority to oversee the continued safety standards of the aircraft registered in that country, for UK-registered aircraft (those whose registrations comprise of G- and then four letters) this responsibility falls to the CAA. Every aircraft is provided with a Certificate of Airworthiness or Permit to Fly. Each time this is renewed the aircraft is inspected to ensure it complies with the relevant safety standards. Certain modifications or changes to aircraft also require approval to ensure they do not affect overall safety.

The operators of aircraft from outside the UK that wish to fly in UK airspace, but whose aircraft does not hold an internationally recognised Certificate of Airworthiness or Permit to Fly, must apply in advance to the CAA for permission. This is often the case for some amateur built and vintage aircraft.

1.2 Problems facing in the airworthiness of aircraft safety.

Airworthiness is the legal and mechanical status of an aircraft in terms of its readiness and suitability for a flight. This includes the design and construction. An airworthy aircraft is one that is fit to fly. Additionally it must be operated within the limits laid down; an aircraft which exceeds any limit may be judged to become un-airworthy. In service, an aircraft must also be maintained to specific requirements for it to remain airworthy; the latter case is referred to as Continuing Airworthiness. The problems facing in the airworthiness of aircraft safety were structural failure of the aircraft, Engine failure, Stalling, Ground damage, Human factors, Electromagnetic interference etc. Finding out the problems in implementing the Inspection, maintenance, Assessment's. Several airline companies, today, are realizing the virtues of gaining visibility and control on the multitude of internal and external risks. Every aircraft is provided with a Certificate of Airworthiness or Permit to Fly. Each time this is renewed the aircraft is inspected to ensure it complies with the relevant safety standards. Certain modifications or changes to aircraft also require approval to ensure they do not affect overall safety. and also enable the state to maintain continuing and maintenance facility without unduly inhibiting by effective direction and control.

1.3 Airworthiness Directives (ADs)

One way the FAA keeps owners, mechanics, and pilots current on required maintenance issues is with the Airworthiness Directive, or AD. It's important and has its own part in the FARs, which usually isn't included in commercial compilations of the regulations. Briefly, Part 39 says that we can't operate an aircraft to which an AD applies unless we comply with the requirements of that AD.

ADs differ significantly. Some require a one-time inspection or modification. Others require a periodic inspection or part replacement. An AD might apply to all aircraft of a certain make or model, or only certain aircraft within a range of serial numbers. It may apply to all aircraft that have a certain component, such as a particular engine, propeller, or accessory. The point is, just because an aircraft has a valid annual inspection doesn't mean it's airworthy today. For example, if the deadline for a recurring AD passes without compliance six months after the airplane's annual inspection, the airplane isn't airworthy.

Checking an airplane's compliance with its ADs isn't something a pilot normally does, especially if renting airplanes. But it's not a bad idea to confer with the owner or a mechanic about ADs that apply to the aircraft you fly periodically. Often, an AD compliance table is part of the aircraft maintenance records, and you can get an idea about when recurring ADs are due by studying the table. Many flight schools keep a table that lists the required inspections, maintenance, and ADs, when they were completed - and when they are due - in their aircraft.

1.4 Minimum Equipment List (MEL)

A minimum equipment list is a user-friendly, black-and-white way to determine whether problems affect the safety and legality of a flight. As the name implies, an MEL lists the minimum equipment and instruments that must properly operate before an airplane can legally fly. MELs are aircraft-specific right down to a registered aircraft and its owner. In other words, an MEL for Cessna Skyhawk 12345 cannot be used on Skyhawk 67890.

An MEL identifies the aircraft's equipment and instruments individually, and specifies each item that may be inoperative for various combinations of day and night VFR and IFR operations. If an item isn't required by the MEL for the intended operation, the airplane may be legally flown if the item is either removed, or deactivated and placarded.

Talking with an inspector at the local FAA Flight Standards District Office (FSDO) is the first step in getting an approved MEL for an aircraft. You don't create an MEL from scratch. The FAA has make-and-model-specific Master MELs (MMELs) for many multiengine aircraft and a generic single-engine MMEL. You customize the applicable MMEL to the specific equipment requirements for your airplane.

Items on the MMEL that are not installed in your aircraft are deleted. Equipment in your aircraft but not on the MMEL are added to the list. When this task is completed, you submit the MEL with a request to the FSDO. The request is usually evaluated by FAA representatives specializing in operations, airworthiness, and avionics. Once the MEL is agreed upon, you and the FAA sign a letter of authorization, which enables you to use the MEL.

1.5 Concern Process

The Airworthiness Concern Process (ACP) is a cooperative information-sharing initiative between industry and the FAA intended to increase industry participation in the development of airworthiness issues before (or in lieu of) a proposed or final airworthiness directive (AD) for an aircraft. The ACP has been successfully employed for airframe-related concerns for years. As a result of AOPA's efforts, the ACP was expanded to include engine- and propeller-related airworthiness issues. An important element of this official FAA process is AOPA Online, which serves as a "central hub" for distribution of airworthiness concern sheets to aircraft type clubs, and submittal of type club comments to the FAA.

CHAPTER: 2

AIRWORTHINESS OF AIRCRAFT, SUPPORTING GUIDANCE MATERIAL (ANNEX 8)

2.1: Type Certification

- A Type Certificate is a formal document issued by the State of Design or the State of Registry for the approval of a type design of an aeronautical product. Type Certificates are generally issued for aeronautical product categories regarded as whole entities, such as aircraft, engines and propellers. Other forms of design approval may be issued to cover the remaining aeronautical product categories such as major components, auxiliary power units, appliances, equipment, instruments, and other parts intended for installation in the aircraft, engine or propeller. Thus, prior to issuing a Type Certificate for the aircraft, States would also have to ensure compliance with those airworthiness requirements that specify separate Type Certificates for engines and/or propellers or separate design approvals for major components prior to its installation on the aircraft.
- The airworthiness organization of the State of Registry, as discussed under Part II, is responsible for ensuring the airworthiness of aircraft to which it issues a Certificate of Airworthiness. It is incumbent upon the State of Registry to facilitate this through a validation of the State of Design's Type Certificate. In doing so, it will rely on the State of Design's certification programme to the maximum extent practicable, in order to ensure the State of Registry's airworthiness standards are satisfied. If adopting the State of Design's airworthiness requirements, the State of Registry may validate the State of Design's Type Certificate without a technical investigation, provided that it is satisfied with the State of Design's airworthiness certification process and findings. When determining the level of technical investigation, the State of Registry may consider the outcome of the ICAO Safety Oversight Audit Programme or rely on a bilateral agreement between the State of Design and State of Registry. The State of Registry may also issue its own Type Certificate to indicate a satisfactory validation of the State of Design's Type Certificate.
- For those CAAs that have an ACD, the ACD will normally establish and carry out procedures for the type certification or other design approval of aircraft, engine, propellers, equipment, instruments, etc., that are designed or produced in that State, as

well as including procedures for the validation of Type Certificates and other design approvals issued by another State. It is essential that the basic criteria and procedures be developed in detail by the ACD, approved by the DCA, and made available to all parties involved within the CAA and the aviation industry. The criteria and procedures should be set forth in straightforward terms and in a form suitable for use by the ACD engineers, as well as the design and test engineers employed by the manufacturers. The procedures should be of a general nature and normally not tailored to a specific aircraft type or specialized equipment and components. Furthermore, the procedures should provide for active participation of the AID at an early stage of the type certification/design approval process and for effective communication between all parties concerned.

- Some States may not have an aviation manufacturing industry and, consequently, do not necessarily have in their airworthiness organization the engineering capability to perform type design review or technical validation of a foreign Type Certificate. States in this category should establish through, regulations or policy, the recognition and direct acceptance of the type certification already done by the State of Design. Alternatively, States may obtain the services of qualified persons or organizations on a temporary basis to allow the fulfilment of its responsibilities for type certification under Annex 8.
- All Contracting States are encouraged to give maximum credit and recognition to the type certification already done by the State of Design, and avoid duplicate or redundant testing where practical and without prejudice to its own unique national requirements. The majority of airworthiness standards currently used by States with aviation manufacturing industries are already harmonized, and the remaining differences are either with the unique technical requirements, due to operational or environmental constraints, and/or interpretation of the same requirements. Although full harmonization of all airworthiness requirements is yet to come, the overall objective that all States should work towards is reducing the amount of work needed to accomplish the approval of an aircraft type design and, subsequently, the issuance of a Certificate of Airworthiness under Annex 8 by the State of Registry.

2.2 Application for a Type Certificate

Applicant

An applicant for a Type Certificate can be an organization, an individual or, where allowed by a State, a representative for that organization or individual. Regardless, the applicant is, for purposes of type certification, the organization or individual that has responsibility for the type design of the aircraft, engine, or propeller and in whose name the Type Certificate will be issued. The applicant should have the technical capability, or have access to a technical capability, to establish and demonstrate compliance of the type design to the applicable airworthiness and environmental Standards. In cases of complex design and production of aeronautical products involving multi-national agreements, joint ventures, partnerships or similar collaboration, the applicant for a Type Certificate remains responsible overall for the type design of the aircraft, engine, or propeller that is under consideration for a Type Certificate. Type certification of an aircraft, engine or propeller should not be attempted unless the applicant has a sound knowledge of the design principles embodied in the aeronautical product being considered.

Application form

A formal application for a Type Certificate should be submitted in a form and manner prescribed by the CAA and submitted to the ACD. Information should be provided as follows:

1. For an application for an aircraft Type Certificate, a three-view drawing of that aircraft and preliminary basic data, including the proposed operating characteristics and limitations;
2. For an application for an engine or propeller Type Certificate, a general arrangement drawing, a description of the design features, the operating characteristics, and the proposed operating limitations of the engine or propeller;
3. A statement identifying the airworthiness Standards to which the aircraft, engine or propeller is designed and intended to show compliance with; and
4. An indication from the applicant on the need for concurrent or subsequent type certification in another State or States.

Validity period of an application

An application for a Type Certificate is normally subjected to a validity period prescribed by the CAA, within which the type certification process should be completed. The validity period starts from the date of application up to a pre-determined number of years, the exact number being commensurate to the complexity of the review and approval of the type design of the aeronautical product. For example, many States have a validity period of five years when certifying large transport aircraft, and three years when certifying an engine or propeller. As a consequence of any extension granted to an applicant, the certification basis should be reviewed again for currency or validity. The CAA and applicant should jointly review the potential impact or consequence of their extended validity period when requesting foreign validation of their Type Certificate.

Management of the application

An application is considered outstanding or open until a Type Certificate is finally issued, or denied by the CAA. Given that an application has to be completed within the validity period established in 1.2.4, the CAA needs to convene a certification team that will administer the type certification process and manage the actual certification activities involved in each application. For a State of Design, this team is commonly referred to as the Type Certification Board (TCB). For a State of Registry, this team is commonly referred to as the Validation Team. The functions of both teams are the same, i.e., to process an application for a Type Certificate and provide a recommendation to the CAA. However, the activities of the Validation Team are expected to be limited in scope and depth, giving due recognition to the work being performed, or already done, by the authority of the State of Design.

Type certification board

Type certification boards are normally established for all aircraft and engine projects in which a complete type certification is involved. These may also be established for propellers, when considered necessary, and for projects involving complex changes to the type design. The purposes of a TCB are to acquaint the applicant and the ACD with the specific certification project, resolve significant problems, establish milestones and schedules for the overall accomplishment of the type certification programme, review the applicant's certification plan, review the proposed certification basis, and assure all outstanding

certification issues are resolved. Clear expectations from, and assignments for, the applicant and ACD are established by the TCB. It is also the TCB that submits the final recommendation to the DCA for the issuance or denial of a Type Certificate.

Board membership and participation

The TCB should have permanent members from both the CAA and from the organization responsible for the type design, consisting of at least the following:

- ❖ A representative of the ACD;
- ❖ A representative of the AID;
- ❖ A representative of the Operations Division; and
- ❖ The applicant and their representatives.

Additional representatives should be invited as participants on an advisory basis when their presence is warranted because of new features, specialized considerations, or due to inter-regional and regulatory implications. These participants may include the following:

- ❖ Engineering and manufacturing specialists from the CAA;
- ❖ Maintenance and inspection specialists from the AID;
- ❖ Associated aircraft, engine or propeller manufacturers whose representative may assist in providing technical information;
- ❖ Representatives of other divisions of the CAA, as necessary

2.3 Type Certification activities: State of Design

The main objective of the type certification process is for a State to determine for itself the overall compliance of the type design of an aeronautical product with their applicable airworthiness requirements. This objective applies to both the State of Design and State of Registry. The State of Design has prime responsibility for the original or initial approval of the aeronautical product. A State of Registry has a responsibility to establish that there is satisfactory evidence of design approval of an aircraft being issued a Certificate of Airworthiness under Annex 8. While Annex 8 sets the minimum international airworthiness Standards in the form of general design objectives, it is not sufficient by itself to be the sole basis for the approval of a type design and issuance of a Type Certificate. The ability to issue the Type Certificate referred to in Annex 8 is conditioned upon States having comprehensive

and detailed airworthiness (design) standards for the aircraft, engine and/or propeller that include or implement the design objectives of Annex 8.

- There are five key activities associated with a type certification process, namely:
 1. Establishing the certification basis;
 2. Establishing the means or methods of compliance;
 3. Demonstration and findings of compliance;
 4. Certifying the type design; and
 5. Post-type certification activities.

2.4 Type Certification activities: State of Registry

Annex 8, Part II, Chapter 3, Certificates of Airworthiness, states in part that the issuance or rendering valid, of a Certificate of Airworthiness must be based on satisfactory evidence that the aircraft complies with the design aspects of the appropriate airworthiness requirements of the State of Registry. The satisfactory evidence used by a majority of Contracting States is the aircraft Type Certificate. It is not expected nor encouraged that States of Registry perform the same in-depth determinations of compliance that the State of Design has already done. Instead, States are encouraged, through regulations, bilateral agreements or policy, to give maximum credit to the type certification work already done by the State of Design and, minimize duplicate or redundant testing that add little or no value to the overall airworthiness of the aeronautical product.

The majority of airworthiness standards currently used by States with aviation manufacturing industries are harmonized, and the remaining differences are either with the unique technical requirements, due to operational or environmental constraints, and/or interpretation of the same requirements. States that have similar or same airworthiness requirements can take advantage of the potential reduction in type certification activities and associated costs, while still fulfilling their national requirements. For States that do not presently have a well-defined or well-established airworthiness requirements for the type certification of aeronautical products, consideration should be given to accept, adopt, or incorporate by reference in their national regulations those airworthiness standards that are internationally recognized and widely accepted.

The type certification activity to be conducted by a State of Registry will depend on their national requirements. Some Contracting States require the issuance of their own Type Certificate. Some Contracting States, however, do not need to issue their own and can accept or adopt the Type Certificate by the State of Design. The overall objective that all Contracting States should work towards is reducing the amount of work needed to accomplish the approval of an aircraft type design and, subsequently, the issuance of a Certificate of Airworthiness under Annex 8 by the State of Registry.

A common practice by a majority of States of Registry in establishing compliance of an imported aeronautical product to their own applicable airworthiness standards is the validation exercise. The activities associated with the validation of a Type Certificate are similar to those performed for an initial Type Certificate (see Section 1.3 of this Part, Type Certification Activities: State of Design), except for the actual amount of certification work involved. Typically, a State of Registry would confine its certification review to the differences that exist between its airworthiness requirements and those of the State of Design, or on those requirements where the State of Registry retains exclusive approval authority under their certification system. A validation exercise between two Contracting States is conducted on the basis of confidence and a strong commitment to cooperate in reducing the unnecessary duplication of work already accomplished. Under a validation exercise, a complete re-investigation of compliance is not necessary.

Validation of Type Certificate

- For States that want to perform a review of the approved type design, a validation exercise is highly recommended. The validation of the original Type Certificate issued by the State of Design should generally reduce to one of examination or validation of the type design records and the certification documents held by the State of Design. The validation activity normally includes:
 - Receipt of an application from the Type Certificate holder and State of Design for type certification (or validation);
 - Technical briefing by the applicant and State of Design ACD on the approved type design and certification performed;
 - An assessment of the adequacy of the airworthiness and environmental Standards applied by the State of Design relative to the requirements of the State of Registry;

- An assessment of acceptability of any findings of equivalent level of safety or exemptions granted by the State of Design;
- An assessment of suitability of any special conditions of airworthiness specified and certified by the State of Design; and
- An assessment of adequacy of the approved type design and compliance demonstration in regard to specified requirements, operating conditions, airworthiness directives, and airworthiness philosophies of the State of Registry.

Instructions for continued airworthiness

Instructions for continued airworthiness (ICA) are developed by the design approval holder and some of these instructions are approved by the State of Design. They provide guidance to the operator about what is necessary to maintain the airworthiness of the aircraft, engine, or propeller, including incorporated modifications or repairs, over time. They provide documentation of necessary methods, inspections, processes, and procedures. These instructions are distributed in two categories depending on the compliance requirements: maintenance requirements that have been specified as mandatory in the approval of the type design and those for which compliance is recommended.

- The format and topics will vary depending upon the subject of the instructions and the complexity of requirements to maintain airworthiness. Specific airworthiness codes specify what needs to be addressed by the ICA.
- The ICA may include sections on airworthiness limitations, certification maintenance requirements (CMR), maintenance instructions, engine and, if applicable, propeller maintenance, component maintenance, system wiring diagrams, and non-destructive test and inspection.

Certification maintenance requirements and airworthiness limitations

- Annex 8 places an obligation on States of Design to ensure that information is provided for use in developing procedures for maintaining the aircraft in an airworthy condition. It requires that mandatory maintenance requirements that have been specified by the State of Design as part of the approval of the type design shall be identified as such.

- Where the maintenance tasks result from a system safety analysis, they are usually known as certification maintenance requirements (CMRs). A CMR is a required periodic task, established during the design certification of the aircraft as an operating limitation of the Type Certificate. Notwithstanding the importance of the other airworthiness limitations, this chapter is primarily intended to provide an introduction to the concept of CMRs, their relevance to an aircraft maintenance programme and their importance as an integral part of the in-service validation of the type design. It is not intended for this chapter to provide comprehensive guidance on the responsibilities associated with the organizations responsible for the type design.
- It should be noted that some CMRs require the performance of certain flight crew procedures. When included in a CMR, these procedures are mandatory and should be shown as such in the flight manual or equivalent document. It is likely that future design developments will limit the use of CMR to maintenance tasks.



FAA Aviation Safety

Background information for helicopters

Helicopters are classified as rotary wing aircraft, and their rotary wing is commonly referred to as the main rotor or simply the rotor. Unlike the more common fixed wing aircraft such as a sport biplane or an airliner, the helicopter is capable of direct vertical take-off and landing; it can also hover in a fixed position. These features render it ideal for use where space is limited or where the ability to hover over a precise area is necessary. Currently, helicopters are used to dust crops, apply pesticide, access remote areas for environmental work, deliver supplies to workers on remote maritime oil rigs, take photographs, film movies, rescue people trapped in inaccessible spots, transport accident victims, and put out fires. Moreover, they have numerous intelligence and military applications.

- For a number of years, helicopter systems were evaluated to specific requirements, to the single fault criterion, or to the fail-safe design concept.
- Helicopter type designs are unique in comparison to aeroplane designs in that transmissions, rotors, and some elements of the flight control systems have critical components that may be adversely affected by operating conditions and time in service, cycle, and retirement index number (RIN) exposure.
- The instructions for continued airworthiness (ICA) mandate airworthiness limitations and maintenance instructions for helicopters. ICAs contain airworthiness limitations (structural life limits associated with fatigue requirements for helicopter structures), maintenance provisions, and allow for CMRs. In addition, helicopters systems are increasingly complex and are capable of performing more safety-critical functions. CMRs for helicopters, while not traditionally included in ICAs, may be needed in order to detect and rectify possible hidden (latent) failures.
- As more demanding helicopter operating environments evolved, more safety-critical functions were required to be performed which generally resulted in an increase in the complexity of the system designed to perform these functions. The potential hazards to the helicopter and its occupants that could arise in the event of loss of one or more functions provided by a system, or the effect of that system's malfunction, had to be considered, as did the interaction between systems performing different functions.

2.5 Maintenance review board (MRB)

The primary purpose of the MRB process is to assist the design organization and the operator in establishing an initial approved maintenance programme for aeroplanes and the regulatory authority in approving that programme. The MRB report becomes the basis for the first issue of an operator's initial maintenance programme. Adjustments may be necessary to address operational or environmental conditions unique to that operator. Through operator experience, and with regulatory approval, additional changes to the maintenance programme may be made by the operator in order to maintain a safe and efficient maintenance programme.

The MRB process involves the following organizational bodies:

- Industry steering committee (ISC). Management of maintenance programme development activities is normally accomplished by an ISC composed of operators and design organizations. The ISC establishes policies, sets goals for maintenance check intervals, directs activities of working groups, prepares final maintenance programme recommendations and represents operators in contacts with regulatory authorities.
- Working groups (WGs). One or more WGs, consisting of specialists from participating operators, design organizations and regulatory authorities, may also be formed to develop initial minimum maintenance requirements for new or derivative aeroplanes. The ISC ensures that applicable supporting technical data and analysis are provided to the WG.
- Maintenance review board (MRB). The State of Design should approve certain minimum maintenance requirements that an operator needs to accomplish when the aeroplane is initially placed in service. The authority normally approves initial minimum maintenance requirements that are proposed by selected specialists in airworthiness requirements, continuing airworthiness and aeroplane design. The State of Design may also invite participation from authorities of the States of the intended operators. A group of these specialists is referred to as the MRB. The MRB also ensures that the design organization and manufacturer provide the necessary technical training to MRB, ISC and WG members. The MRB reviews reports, provides notification of potential problem areas and offers guidance and assistance to the ISC

and WG. Upon successful review, the regulatory authority approves the MRB report or revision.

Maintenance review board process

1. The MRB supports, by active participation, the development of a proposal or a report containing the initial minimum maintenance requirements to be used in the development of an approved maintenance programme for a derivative or newly certificated transport aeroplane.
2. The design organization normally provides a recommended maintenance programme for the aeroplane model. In order to assure that this recommended maintenance programme is compatible with the intended operation of the aeroplane, the design organization will assemble an ISC, the goal of which is to review the recommended maintenance programme and revise it as needed so that it meets the requirements of the intended operators. The authorities of the State of Design and the States of the intended operators normally participate in the ISC and its individual WGs in an advisory capacity regarding continuing airworthiness requirements.
3. The ISC directs the WGs and coordinates activities with the MRB. The MRB acts on MRB report proposals or revisions, and briefs other concerned regulatory authorities regarding MRB policies and procedures.

Implementation of maintenance review board reports and revisions

- Operators of the aeroplane type are strongly urged to implement the MRB report, or revisions, in accordance with established procedures. For operators of similar aeroplanes and depending upon the operator's qualifications and overall maintenance experience, adjustments to initial maintenance programme intervals may be approved by the State of Registry.
- With the agreement of the regulatory authority, operators may elect to deviate from the MRB report or revision. In this case, operators may have additional requirements placed in their maintenance programme by the State of Registry to ensure that equivalent safety is maintained

Aircraft flight manual (AFM), master minimum equipment list (MMEL) and configuration deviation list (CDL)

The aircraft flight manual (AFM), the configuration deviation list (CDL) and the master minimum equipment list (MMEL) are approved by the State of Design and often established by the organization responsible for the type design. The State of the Registry may either validate these documents or approve its own which could be different due to differences in its airworthiness rules. These documents should not be less restrictive than the one approved by the State of Design

Aircraft flight manual (AFM)

****** Annex 8 requires that the AFM shall be made available as a main document associated with an aircraft Certificate of Airworthiness. The AFM is a primary document for flight operations of an aircraft. It contains the limitations, procedures, performance and other information and instructions required to operate the aircraft safely, plus all required AFM supplements. An AFM supplement is a booklet or group of pages containing changes to the information and instructions in the basic AFM (i.e. the approved AFM that the Type Certificate holder provides with the aircraft). The AFM supplement contains AFM changes that are necessary for continued safe operation of an aircraft that is modified, is in a non-standard configuration, has special role equipment fitted, or is to engage in some special purpose activity. An aircraft may not conform exactly to the standard aircraft to which the available basic AFM is applicable. The aircraft may have a different configuration or modifications. If these physical differences cause changes to the approved AFM information, those changes must be accounted for by relevant CAA-approved AFM supplements that provide the necessary extra AFM information.

****** The Type Certificate holder or its licensee should make available a current AFM at the time of delivery of the aircraft to the owner (operator). On the other hand, the certificated operator has an ongoing obligation to keep his flight crew operating manual up-to-date by incorporating amendments approved by the relevant CAA for the AFM.

Master minimum equipment list (MMEL)

The MMEL is a master list appropriate to an aircraft type which determines those instruments, items of equipment or functions that, while maintaining an acceptable level of safety as intended by the applicable requirement, may temporarily be inoperative either due to the inherent redundancy of the design, and/or due to specified operational and maintenance procedures, conditions and limitations, and in accordance with the applicable procedures for continued airworthiness.

In conjunction with the certification of each new type of aircraft, a board should be established to develop and maintain the MMEL for the aircraft and additional models of that aircraft developed in the future. The board is an advisory body to the CAA and should have representation from the flight operations and airworthiness (AID and ACD) organizations within the CAA, as well as from the organization responsible for the type design and operators of the aircraft. The MMEL board could be an independent organizational body headed by the CAA.

*** The interaction between systems should be fully analyzed to ensure that multiple failures will not result in an unsatisfactory level of safety. When an aircraft is designed, it is designed to achieve a certain level of safety. When any one system, instrument or equipment becomes inoperative, the design level of safety may be reduced. With modern aircraft it is usual to provide extra redundancy in some systems to enable the aircraft to take off and complete a flight with acceptable margins of safety even if, for example, one channel of a system has failed during a previous flight. Minor deficiencies which do not too seriously affect safety may be acceptable to flight, even without the provision of extra redundancy. In any case, the MMEL board will need to carry out a thorough assessment on safety together with engineering judgment as a guide to developing an acceptable list.

*** The MMEL should not include obviously required items such as wings, empennage, power-units, etc., nor should it include items which are not required for safe operation of the aircraft, such as entertainment systems, etc. It must be stressed and understood by all persons developing and using the MMEL that all items which are related to the airworthiness of the aircraft and are not included on the list are automatically required to be operative.

*** The actual format of the MMEL may vary, but all major systems should be listed to indicate they have been considered (communications systems, navigation systems, automatic flight control systems, etc.). In addition, components of those systems required for flight should be listed on the MMEL (e.g. attitude gyros, VSI, DME, etc.).

*** The MMEL board should be responsible for maintaining an up-to-date MMEL. Amendment normally results from operator experience or analyses carried out by the organization responsible for the type design or from rule changes.

Configuration deviation list (CDL)

The CDL identifies any external parts of an aircraft type which may be missing at the commencement of a flight, and which contains, where necessary, any information on associated operating limitations and performance correction. Operation of the aircraft without certain secondary airframe and engine parts could be allowed through the use of an approved CDL. The CDL should be included in the AFM as a separately approved appendix.

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

The CDL is usually prepared by the aircraft manufacturer and is part of the Aircraft Flight Manual (AFM).

The CDL should not be confused with the Minimum Equipment List (MEL).

The following guidance should be followed when preparing the CDL.

□ The parts or combinations of parts permitted to be missing, together with the associated performance penalties and other limitations should be determined and presented in the same format as the Master Minimum Equipment List (MMEL).

□ Unless it can be established that a zero or negligible performance degradation occurs as a result of a part missing from the aircraft, a performance penalty should be presented for each part or for each combination of parts.

□ Performance penalties are normally presented as mass or percent mass decrements. Equivalent penalties expressed as other parameters are also acceptable. A single performance penalty applicable to all AFM performance limitations may be presented for a missing part or, subject to certain restrictions, performance penalties may be presented for each phase of flight.

Typical examples are:

1. Only a single performance penalty for take-off and a single performance penalty for landing will be permitted. For take-off, the penalty shall be the most restrictive of the take-off field length, first, second and final segment climbs, and take-off flight path considerations. For landing, the penalty shall be the most restrictive of approach climb, landing climb, and landing distance considerations.
2. Only a single mass penalty for en-route climb performance, applying to both the one-engine-inoperative and two-engine-inoperative cases, as applicable, will be permitted.
3. The CDL should contain the explanations of take-off performance penalty, landing performance penalty and en route performance penalty, as appropriate for the aircraft.

APPENDIX: A

EXAMPLE OF STANDARD AIRWORTHINESS CERTIFICATE

UNITED STATES OF AMERICA DEPARTMENT OF TRANSPORTATION—FEDERAL AVIATION ADMINISTRATION STANDARD AIRWORTHINESS CERTIFICATE			
1 NATIONALITY AND REGISTRATION MARKS	2 MANUFACTURER AND MODEL	3 AIRCRAFT SERIAL NUMBER	4 CATEGORY
5 AUTHORITY AND BASIS FOR ISSUANCE This airworthiness certificate is issued pursuant to the Federal Aviation Act of 1958 and certifies that, as of the date of issuance, the aircraft to which issued has been inspected and found to conform to the type certificate therefor, to be in condition for safe operation, and has been shown to meet the requirements of the applicable comprehensive and detailed airworthiness code as provided by Annex 8 to the Convention on International Civil Aviation, except as noted herein. Exceptions:			
6 TERMS AND CONDITIONS Unless sooner surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator, this airworthiness certificate is effective as long as the maintenance, preventative maintenance, and alterations are performed in accordance with Parts 21, 43, and 91 of the Federal Aviation Regulations, as appropriate, and the aircraft is registered in the United States.			
DATE OF ISSUANCE	FAA REPRESENTATIVE	DESIGNATION NUMBER	
Any alteration, reproduction, or misuse of this certificate may be punishable by a fine not exceeding \$1,000, or imprisonment not exceeding 3 years, or both. THIS CERTIFICATE MUST BE DISPLAYED IN THE AIRCRAFT IN ACCORDANCE WITH APPLICABLE FEDERAL AVIATION REGULATIONS.			
FAA Form 8100-2 (8-82)		U.S. GPO:2001 668-455	

UNITED STATES OF AMERICA DEPARTMENT OF TRANSPORTATION—FEDERAL AVIATION ADMINISTRATION STANDARD AIRWORTHINESS CERTIFICATE			
1 NATIONALITY AND REGISTRATION MARKS	2 MANUFACTURER AND MODEL	3 AIRCRAFT SERIAL NUMBER	4 CATEGORY
N2631A	PIPER PA-22-135	22-903	NORMAL
5 AUTHORITY AND BASIS FOR ISSUANCE This airworthiness certificate is issued pursuant to the Federal Aviation Act of 1958 and certifies that, as of the date of issuance, the aircraft to which issued has been inspected and found to conform to the type certificate therefor, to be in condition for safe operation, and has been shown to meet the requirements of the applicable comprehensive and detailed airworthiness code as provided by Annex 8 to the Convention on International Civil Aviation, except as noted herein. Exceptions: NONE			
6 TERMS AND CONDITIONS Unless sooner surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator, this airworthiness certificate is effective as long as the maintenance, preventative maintenance, and alterations are performed in accordance with Parts 21, 43, and 91 of the Federal Aviation Regulations, as appropriate, and the aircraft is registered in the United States.			
DATE OF ISSUANCE	FAA REPRESENTATIVE <i>Marion W. Williams</i>	DESIGNATION NUMBER	
08-10-95	MARION W. WILLIAMS	SW-FSDO-OKC	
Any alteration, reproduction, or misuse of this certificate may be punishable by a fine not exceeding \$1,000, or imprisonment not exceeding 3 years, or both. THIS CERTIFICATE MUST BE DISPLAYED IN THE AIRCRAFT IN ACCORDANCE WITH APPLICABLE FEDERAL AVIATION REGULATIONS.			
FAA Form 8100-2 (8-82)		GPO 892-804	

APPENDIX B

EXAMPLES OF A TYPE CERTIFICATE DATA SHEET.

Example 1

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

2A13	
Revision 41	
PIPER	
PA-28-140	PA-28-151
PA-28-150	PA-28-181
PA-28-160	PA-28-161
PA-28-180	PA-28R-201
PA-28-235	PA-28R-201T
PA-28S-160	PA-28-236
PA-28S-180	PA-28RT-201
PA-28R-180	PA-28RT-201T
PA-28R-200	PA-28-201T
May 12, 1987	

TYPE CERTIFICATE DATA SHEET NO. 2A13

This data sheet, which is a part of Type Certificate 2A13, prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Civil Air Regulations.

Type Certificate Holder Piper Aircraft Corporation
2926 Piper Drive
Vero Beach, Florida 32960

I. Model PA-28-160, Cherokee, 4 PCLM (Normal Category), Approved October 31, 1960.

Engine	Lycoming O-320-B2B or O-320-D2a with Carburetor setting 10-3678-32
Fuel	91/96 minimum grade aviation gasoline.
Engine Limits	For all operations, 2700 r.p.m. (160 h.p.)
Propeller and Propeller Limits	Sensenich M74DM or 74DM6 on S/N 1 through 1760 1760A; Sensenich M74DMS or 74D6SS on S/N 1761 and up. Static r.p.m. at maximum permission throttle setting: Not over 2425, not under 2325. No additional tolerance permitted. Diameter: Not over 74", not under 72.5". See Note 10.
Propeller Spinner	Piper P/N 14422-00 on S/N 1 through 1760A; Piper P/N 63760-04 or 65805 on S/N 1761 and up. See Note 11.

Page No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Rev. No.	41	36	36	35	35	36	36	35	36	36	35	35	36	35	36	35	36	36	36
Page No.	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Rev. No.	36	35	36	36	35	37	38	37	39	37	37	38	39	38	41	38	39	38	41
Page No.	39	40	41	42	43	44	45	46											
Rev. No.	38	41	38	38	38	38	38	39											

Example 2



TYPE CERTIFICATE

EASA.A.083

This Type Certificate is issued by EASA, acting in accordance with Regulation (EC) No. 216/2008 on behalf of the European Community, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation and in accordance with Commission Regulation (EC) No. 748/2012 to

UAB "SPORTINE AVIACIJA IR KO"

**POCIUNAI
59327 PRIENAI
LITHUANIA**

and certifies that the product type design listed below complies with the applicable Type Certification Basis and environmental protection requirements when operated within the conditions and limitations specified on the associated

Type Certificate Data Sheet Number: EASA.A.083

Type Design - Model

**LAK-17A
LAK-17AT
LAK-17B FES**

Date of Issue:

**21 April 2006
21 April 2006
31 October 2014**

For the European Aviation Safety Agency,

Date of issue: 31 October 2014


**Yves MORIER
Head of General Aviation and
Remotely Piloted Aircraft Systems (RPAS)**

TYPE CERTIFICATE - 1002060 - UAB "SPORTINE AVIACIJA IR KO"
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APPENDIX C— EXAMPLE OF SMALL AEROPLANE ICA CHECKLIST

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS (ICA) REQUIREMENTS	Regulation Appendix (sample reference)	Location In ICA
() ICA for each engine.	G23.1(b)	
() ICA for each propeller.	G23.1(b)	
() ICA for each appliance required by this chapter.	G23.1(b)	
() Required information on the interface of () appliances, () engines, and () propellers with the aircraft.	G23.1(b)	
() If ICA are not supplied by the manufacturer of an () appliance, () engine, or () propeller installed on the aircraft, the ICA for the aircraft must include () the information essential to the continued airworthiness of the aircraft.	G23.1(b)	
() Applicant's programme showing how they or the manufacturers of products and appliances installed on the aeroplane will distribute changes to the ICA.	G23.1(c)	
() ICA in a manual or manuals.	G23.2(a)	
() Manuals arranged for easy and practical use.		
() Manuals prepared in English.	G23.3	
() Manual's must include introductory information that includes an explanation of the aeroplane's features and data to the extent necessary for maintenance or preventive maintenance.	G23.3(a)(1)	
() Description of the () aircraft and its systems and installations, () engines and its systems and installations, () propellers and its systems and installations, and () appliances and its systems and installations.	G23.3(a)(2)	
() Basic control and operating information describing () how the aircraft components and systems are controlled and () how the aircraft components and systems are operated, including () any special procedure and limitations.	G23.3(a)(3)	
() Servicing information covering () servicing points. () capacities of tanks, () capacities of reservoirs, () types of fluids used, and () pressures applicable to the various systems.	G23.3(a)(4)	
() Location of access panels for () inspection and () servicing.	G23.3(a)(4)	
() Servicing information covering () locations of lube points and () lube used.	G23.3(a)(4)	
() Equipment required for servicing.	G23.3(a)(4)	
() Tow instructions and limitations.	G23.3(a)(4)	
() Mooring information	G23.3(a)(4)	
() Jacking information	G23.3(a)(4)	
() Leveling information	G33(a)(4)	
() Scheduling information for each part of the () aircraft, including recommended periods for () cleaning, () inspecting, () adjusting, () testing, and () lubricating; and () the work recommended at these periods.	G25.3(b)(1)	
() Scheduling information for () aircraft engines, including recommended periods for () cleaning, () inspecting.	G23.3(b)(1)	

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS (ICA) REQUIREMENTS	Regulation Appendix (sample reference)	Location In ICA
() adjusting, () testing, and () lubricating; and () the work recommended at these periods. <u>NOTE:</u> This information may be in the FAA accepted engine ICA.		
() Scheduling information for () the aircraft's auxiliary power unit, including recommended periods for () cleaning, () inspecting, () adjusting, () testing, and () lubricating; and () the work recommended at these periods.	G23.3(b)(1)	
() Scheduling information for () aircraft propellers, including recommended periods for () cleaning, () inspecting, () adjusting, () testing, and () lubricating; and () the work recommended at these periods.	G23.3(b)(1)	
() Scheduling information for () aircraft accessories, including recommended periods for () cleaning, () inspecting, () adjusting, () testing, and () lubricating; and () the work recommended at these periods.	G23.3(b)(1)	
() Scheduling information for () aircraft instruments, including recommended periods for () cleaning, () inspecting, () adjusting, () testing, and () lubricating; and () the work recommended at these periods.	G23.3(b)(1)	
() Scheduling information for () aircraft equipment, including recommended periods for () cleaning, () inspecting, () adjusting, () testing, and () lubricating; and () the work recommended at these periods.	G23.3(b)(1)	
() Degree of inspection for each part of the () aircraft and its () engines, () the auxiliary power unit, () propellers, () accessories, () instruments, and () equipment.	G23.3(b)(1)	
() Applicable wear tolerances.	G23.3(b)(1)	
Applicant may refer to an () accessory, () instrument, or () equipment manufacturer as the source of this information if applicant shows () that the item is exceptionally complex and requires specialized maintenance techniques, test equipment, or expertise.	G23.3(b)(1)	
() Recommended overhaul periods and necessary cross-references to the ALS.	G23.3(b)(1)	
() An inspection programme that includes () the frequency and () extent of the inspection necessary to provide for continued airworthiness.	G23.3(b)(1)	
() Troubleshooting information describing () probable malfunctions, () how to recognize those malfunctions, and () remedies for them.	G23.3(b)(2)	
() Description of the order and method of () removing and () replacing products (engines and propellers) with any precautions.	G23.3(b)(3)	
() Description of the order and method of () removing and () replacing parts, with any precautions.	G23.3(b)(3)	
() Other instructions, including () storage limitations and procedures for () testing system during ground running. () making symmetry checks, () weighing and determining the center of gravity, () lifting, and () shoring.	G23.3(b)(4)	

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS (ICA) REQUIREMENTS	Regulation Appendix (sample reference)	Location In ICA
() Diagrams of structural access plates and information needed to gain access for inspections when access plates are not provided.	G23.3(c)	
() Details for applying special inspection techniques, including radiographic and ultrasonic testing, where such processes are specified.	G23.3(d)	
() Information needed to apply protective treatment to structure after inspection.	G23.3(e)	
() All data on structural fasteners, such as () identification, () discard recommendations, and () torque values.	G23.3(f)	
() List of special tools needed.	G23.3(g)	
() For Commuter Category aircraft: electrical loads applicable to the various systems.	G23.3(h)(1)	
() For Commuter Category aircraft: methods of balancing control surfaces.	G23.3(h)(2)	
() For Commuter Category aircraft: identification of primary and secondary structures.	G23.3(h)(3)	
() For Commuter Category aircraft: any special repair methods applicable.	G23.3(h)(4)	
() ICA must contain a section, titled Airworthiness Limitations, that is () segregated and () clearly distinguishable from the rest of the document. NOTE: The appropriate CAA office will evaluate and approve the Airworthiness Limitations Section (ALS) in the applicant's ICA.	G23.4	
() ALS must describe each () mandatory replacement time, () structural inspection interval, and () related structural inspection procedure, including () envelope structural integrity, required for type certification.	G23.4	
() If ICA consist of multiple manuals, the ALS required by this paragraph must be in the principal manual.	G23.4	
() ALS must contain a legible statement in a prominent location, that reads : —The Airworthiness Limitations Section is CAA approved and specifies maintenance required, unless an alternative programme has been CAA approved.¶	G23.4	

2.6 PRODUCTION APPROVALS/CERTIFICATION

Production certificate/approvals

An applicant (manufacturer) may be eligible for a production certificate or production organization approval from the CAA, subject to determination by the CAA based on its examination of supporting data and inspection of the production facilities, processes and organization, that the applicant has complied with the relevant requirements.

An applicant for a production certificate/approval should hold, for the product or part concerned:

- ❖ A current Type Certificate or other approved design (or, in the case of a production organization approval, should have applied for a Type Certificate/Design Approval); or
- ❖ A Supplemental Type Certificate (or, in the case of a production organization approval, should have applied for a Supplemental Type Certificate/Design Approval); or
- ❖ The right of access to the applicable design data of a Type Certificate/Supplemental Type Certificate for production purposes under an agreement.

Privileges and responsibilities

The holder of a production certificate/approval may:

- Obtain a Certificate of Airworthiness for an aircraft it produces without further showing when the aircraft conforms to an approved type design and is in a condition for safe operation, except that the CAA may inspect the aircraft for conformity with the type design;
- Obtain an airworthiness approval for a part, or product other than an aircraft, that conforms to the approved design data and is in a condition for safe operation, prior to that part or product leaving the production certificate holder's approved quality system. In the case of a production organization approval, the holder of a production organization approval may directly issue airworthiness approval documents for parts or products other than aircraft in accordance with the privileges of the production organization approval.

The holder of a production certificate/approval should:

- Maintain the quality system in conformity with the data and procedures approved for the production certificate/approval;
- Determine that each part and completed product conforms to the type design and is in a condition for safe operation;
- Maintain a complete and current design data file for each product produced under the production approval; and
- Maintain complete and current inspection records showing that all inspections and tests required to ensure compliance with the applicable regulations have been properly completed and documented. These records typically should be retained for five years.

Production without a production certificate or production organization approval

Prior to commencing serial production of aircraft or components for which a Type Certificate has been applied for or issued, a manufacturer normally obtains approval from the CAA in the form of a production certificate or production organization approval. A production certificate/approval is the preferred method of approving serial production of aircraft or components. In the absence of a production certificate/approval, a manufacturer may fabricate, with limitations, aircraft or parts under a Type Certificate only, with the establishment of an CAA-accepted or approved production inspection system.

Each manufacturer of a product or part fabricated under a Type Certificate only should:

- make each product and part available for inspection by the CAA;
- maintain, at the place of manufacture, all technical data and drawings necessary for the CAA to determine whether each product and its parts conform to the type design;
- establish and maintain an accepted or approved production inspection system that ensures that each product conforms to the type design and is in condition for safe operation;
- upon establishment of the accepted or approved production inspection system, submit to the CAA a manual that describes the system and the means for making the determinations required by the materials review board; and
- mark or tag each product and part in accordance with the applicable regulations

The production flight test procedure should include at least the following:

- An operational check of the trim, controllability, or other flight characteristics to establish that the production aircraft has the same range and degree of control as the prototype aircraft;
- An operational check of each part of the system operated by the crew while in flight to establish that, during flight, instrument readings are within normal range;
- A determination that all instruments are properly marked, all placards are installed in appropriate places, and flight manuals are available in the aircraft;
- A check of the operational characteristics of the aircraft on the ground; and
- A check on any other items peculiar to the aircraft being tested that can best be done during the ground or flight operation of the aircraft.

The manufacturer of aircraft engines under a Type Certificate only should subject each engine (except rocket engines for which the manufacturer should establish a sampling technique) to an acceptable test run that includes at least the following:

- Break-in runs that include a determination of fuel and oil consumption and a determination of power characteristics at rated maximum continuous power or thrust and, if applicable, at rated take-off power or thrust; and
- Five hours of operation at rated maximum continuous power or thrust. For engines having a rated take-off power or thrust higher than rated maximum continuous power or thrust, the five-hour run should include thirty minutes at rated take-off power or thrust

CHAPTER 3

AIRCRAFT REGISTRATION, CERTIFICATES OF AIRWORTHINESS AND APPROVALS FOR EXPORT AND SPECIAL FLIGHTS

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 registry, a fundamental responsibility to ensure that the aircraft is operated in an airworthy condition.

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 State will need to adopt 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 CAA will need to issue internal administrative instructions on the maintenance of the registry.

3.1 Certificate of Airworthiness

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

1. The issuance of a new Certificate of Airworthiness when an aircraft is first registered in the State
2. The renewal of a Certificate of Airworthiness issued by the State.

3. The validation by the State of a Certificate of Airworthiness issued by a foreign State.

The issuance of a Certificate of Airworthiness for an aircraft is dependent upon the aircraft being registered in the State. The procedures developed by the AID for the issuance of a Certificate of Airworthiness should cover the following requirements, the completion of some of which may be delegated to suitably approved organizations. In the case of imported aircraft, depending on the State's assessment of the adequacy of the exporting State's airworthiness code, these procedures may be adjusted.

- an application should be completed and submitted to the AID;
- The applicant should specify the design standards and airworthiness requirements according to which the aircraft type was certificated. Where a Type Certificate has been issued, the details should also be specified.
- 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;
- it should be the responsibility of the applicant to provide personnel and equipment so that these checks and inspections may be satisfactorily carried out;
- all relevant records of previously completed maintenance, Airworthiness Directive compliance and flight tests should be made available for inspection by the AID;
- 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 a suitably authorized individual 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;
- full particulars of the work done should be entered in the appropriate log book and a maintenance release should be issued;
- a report of any ground or flight testing if such tests are required by the AID; and
- the organization referred to in f) or a suitably authorized person 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 other applicable requirements of the State of Design and the AID have been carried out and certified as having been carried out.

3.2 Approvals for special flights

When an aircraft is not fully in compliance with its airworthiness requirements, the CAA airworthiness regulations may, nevertheless, make provisions for the AID to issue a special flight permit, providing the aircraft is capable of safe flight. Such occasions might include:

- ❖ relocating the aircraft to a base where maintenance is to be performed, or to a point of storage;
- ❖ delivering the aircraft; or
- ❖ evacuating the aircraft from an area of impending danger, or in cases of force majeure.

When issuing a special flight permit, appropriate limitations should be prescribed to minimize hazard to persons or property. The following limitations are considered to be essential in all special flight permits:

- ❖ a copy of the permit should be on board the aircraft at all times when operating under the terms of the permit;
- ❖ 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;
- ❖ persons or property should not be carried for compensation or hire;
- ❖ 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;

3.3 Airworthiness approvals for exports

It is very important to understand that an export certificate of airworthiness is not a Certificate of Airworthiness as defined by Article 31 of the Convention and therefore does not confer the right of international flight and cannot be validated in accordance with Annex 8, Part II, Chapter 3, 3.2.4. To fly internationally, an aircraft having an Export Certificate of Airworthiness will require a valid Certificate of Airworthiness issued by the State of Registry, or some equivalent document mutually acceptable to the exporting and importing States and accepted by any State over which the aircraft will fly on its delivery flight.

Some States may have adopted more detailed export airworthiness approval procedures, covering not only the issue of an Export Certificate of Airworthiness for a complete aircraft but also encompassing the issue of export certifications for engines, propellers and other component parts. For the purpose of such procedures, the item being exported may be placed within a particular —Class, for example:

- ☐ Class I product – a complete 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.
- ☐ Class II product – a major component of a Class I product such as a 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.
- ☐ Class III product – any part or component which is not a Class I or Class II product or a standard part.

For products other than a Class I product, the export airworthiness certification may be issued in the form of certificates or identification tags, which will confirm that the product in question meets the approved design data, is in a condition for safe operation and complies with any special requirements as notified by the importing State.

APPENDIX A. APPLICATION FOR ISSUE OF A CERTIFICATE OF AIRWORTHINESS – CONTENT

An applicant for the issue of a Certificate of Airworthiness will be required to provide sufficient detail concerning the aircraft, its engines and, if applicable, its propellers in order to enable the CAA to make an initial judgment concerning the aircraft's immediate history, current status, equipment fit, modifications embodied and potential certification status. The form to be completed in support of the application is therefore intended to provide basic details. Subsequent surveys of the aircraft, its logbooks and other supporting documentation by staff of the CAA's AID or by its delegated representatives will allow detailed consideration concerning whether the aircraft conforms with the requirements of the State for the issue of a Certificate of Airworthiness. An application form therefore needs to require sufficient information to be provided for the initial assessment to be made but not to seek the essential but very detailed information which is readily obtainable later in the process. The form should therefore typically require the following information:

I. Contact information for the owner/applicant

II. Basic information regarding the aircraft, such as:

1. The category of Certificate of Airworthiness, if applicable, the applicant requires.
2. Aircraft designation, including type and series, manufacturer's name, aircraft serial number and year of manufacture.
3. Current airframe hours and cycles.
4. Engine and propeller type and serial numbers.
5. Current location of the aircraft and details of the individual or organization acting on behalf of the registered owner who will be responsible for presenting the aircraft for inspection.

III. Other detailed information required with the application, such as:

1. Flight Manual, or equivalent, reference.
2. Details of the current Certificate of Airworthiness and/or Export Certificate of Airworthiness. (It is probably sufficient to require only copies of these documents at this stage; the originals can be viewed at a later stage in the issue process)
3. Basic details of any major modifications or major changes incorporated since initial certification.
4. Details of equipment installations intended for particular operational roles, e.g. towing,

APPENDIX B. APPLICATION FOR THE RENEWAL OF A CERTIFICATE OF AIRWORTHINESS

The extent of information required to be provided by an applicant for the renewal of a Certificate of Airworthiness will depend on whether the State has a direct —hands-on— requirement for involvement in the renewal process or relies on certified statements of compliance provided by an organization or individual approved by the CAA.

Where there is extensive involvement by the CAA in the renewal process the application may consist only of a simple statement of, for example, the applicant's name and address, the aircraft type and registration, the date of expiry of the current Certificate of Airworthiness, and where the aircraft and supporting documentation will be made available for inspection by

the CAA's airworthiness inspection division (AID): in effect a simple administrative application intended to set in motion a formal inspection by the AID.

- I. Contact information for the applicant
- II. Basic information regarding the aircraft, such as:
 1. Aircraft designation including type and series, manufacturer's name, aircraft serial number and year of manufacture.
 2. Current airframe hours and cycles.
 3. Engine and propeller types, serial numbers, hours and cycles.
- III. A certified statement of compliance with the following:
 1. Airworthiness directives and any other requirements made mandatory by the CAA.
 2. Continued compliance with the type certificate data sheet (TCDS).
 3. Current maintenance programme reference and compliance status.
 4. Current mass and balance report.
 5. Flight Manual or equivalent amendment status.
- IV. Depending upon the particular requirements of the CAA the form may also typically require details of:
 1. Any flight test required to be completed in support of the renewal.
 2. Any major modifications or major changes incorporated since the Certificate of Airworthiness was issued or last renewed.
 3. Date on which the aircraft was last weighed.

APPENDIX C. APPLICATION FOR THE ISSUE OF AN EXPORT CERTIFICATE OF AIRWORTHINESS

An applicant for the issue of an Export Certificate of Airworthiness will be required to provide sufficient detail concerning the product (e.g. aircraft, engines, or propellers) in order to enable the CAA to make a determination that the product conforms

with the approved design data, is in a condition for safe operation, and complies with the requirements of the importing State. The form to be completed in support of the application is intended to provide enough information to allow the CAA's AID or its delegated representative to make the determination of conformity to the applicable airworthiness requirements.

The form should therefore typically require the following information:

I. Contact information for the exporter and foreign purchaser, as well as country of destination.

II. Basic information regarding the product, such as:

1. Type of product (e.g., aircraft, engine, or propeller).
2. Make and model.
3. Identification number.
4. Serial number(s).
5. Operating time in hours since overhaul and total operating time.
6. Is the product new, used (for aircraft), or newly overhauled.
7. If applicable, the status of the current Certificate of Airworthiness.

III. Information Regarding the Airworthiness Requirements, such as:

1. Does the product comply with all applicable CAA regulations and Airworthiness Directives?
2. Have the applicable special requirements of the importing country been complied with?
3. Additional remarks with regard to either the applicable CAA regulations or special requirements of the importing country (e.g. exceptions to the approved data or special requirements).

Introduction to the concept of continuing airworthiness

Under the control of the respective CAAs of the State of Design, the State of Registry and, when appropriate, the State of the Operator, continuing airworthiness includes the following:

- ❖ design criteria which provide the necessary accessibility for inspection and permit the use of established processes and practices for the accomplishment of maintenance;
- ❖ information that identifies the specifications, methods, and procedures necessary to perform the continuing airworthiness tasks identified for the aircraft and the tasks necessary to maintain the aircraft, as developed, by the type design organization; and publication of this information in a format that can be readily adapted for use by an operator;
- ❖ adoption by the operator into its maintenance programme, the specifications, methods, and procedures necessary to perform the continuing airworthiness tasks identified for the aircraft and the tasks necessary to maintain the aircraft, using the information provided by the type design organization;
- ❖ the reporting of faults, malfunctions, and defects and other significant maintenance and operational information by the operator to the type design organization in accordance with the requirements of the State of Registry and the State of the Operator;
- ❖ the reporting of faults, malfunctions, and defects and other significant maintenance information by the maintenance organization to the type design organization in accordance with the requirements of the State having jurisdiction on the maintenance organization;
- ❖ the analysis of faults, malfunctions, defects, accidents and other significant maintenance and operational information by the type design organization, the State of Design and the State of Registry and the initiation and transmission of information and recommended or mandatory action to be taken in response to that analysis;
- ❖ consideration of the information provided by the type design organization and action on the information as deemed appropriate by the operator or the State of Registry, with particular emphasis on action designated as —mandatory
- ❖ Adoption and accomplishment by the operator of all mandatory requirements with particular emphasis on fatigue life limits and any special tests or inspections required.

Organization responsible for the type design

•Annex 8, Part II, Chapter 4 refers to the transmittal of information relating to the continuing airworthiness of the aircraft to the type design organization of that aircraft. Normally, this organization will be the holder of the Type Certificate for the aircraft type; in some cases

(prior to Amendment 98 of Annex 8), it will be the holder of an equivalent document certifying approval of the type design by the certificating authority.

- The reference to transmittal of this information to such an organization necessitates that:

- for aeroplane over 5 700 kg maximum certificated take-off mass and helicopters over 3 175 kg certificated take-off mass engaged in international civil aviation, an organization holding the Type Certificate (or equivalent document) will exist throughout the operational life of the aircraft type; and

- the holder of the Type Certificate (or equivalent document) will be in possession of the type design and type certification data and have the competence to use that data as necessary for the continuing airworthiness of the aircraft.

Transfer of the Type Certificate to a new holder

Following the successful transfer of a Type Certificate, the CAA that has jurisdiction over the new holder must:

- issue a Type Certificate to the new holder; and
- Notify, in a timely manner, Contracting States that have the aircraft type on its registry of the new type design organization responsible for receiving information on faults, malfunctions, defects and other occurrences that are required to be reported for purposes of continuing airworthiness.

Structural integrity programme

- The material for this section applies to aeroplanes of over 5 700 kg maximum certificated take-off mass. It is intended to provide guidance to type design organizations responsible for the type design and to operators on a continuing structural integrity programme which would include information to ensure that the structural integrity will be maintained over the operational life of the aeroplane.

- As a minimum the continuing structural integrity programme should include, dependent upon the structural design criteria:

1. Supplemental inspections.;
2. corrosion prevention and control;
3. structural modifications and associated inspections;

4. repair assessment methodology; and
5. Widespread fatigue damage (WFD) review.

•The corrosion prevention and control programme should be initiated as early as possible in the service life of the aeroplane and should preferably be available when the aeroplane is introduced into service. The other elements of the continuing structural integrity programme should be developed once sufficient service experience has been accumulated; normally they should be initiated by the time that the lead aeroplane has reached the half-design-life goal for the type and be reviewed periodically.

Procedures and methods

•It is recognized that each operator should have a maintenance programme when the aeroplanes enter service. In addition, the type design organization is responsible for conducting a continuing assessment of the structural integrity of its type designs over their operational life, taking into account the original design objectives and assumptions, advancements in technology and the behaviour of the structure in service. From this assessment, the type design organization and the operators are jointly responsible for developing and issuing information to supplement the ongoing operator maintenance programmes for the purpose of detecting structural damage before it becomes a serious problem in the fleet. This inspection information should be based on analysis supported by test evidence and operator experience, and should be included in a continuing structural integrity programme.

•The methods, principles and data underlying the continuing assessment of structural integrity and the development of the continuing structural integrity programme should be available for review by the certificating authority. It should be emphasized that the inspections, modifications and replacements described in the programme are additional to the original maintenance programme.

•Service experience is a vital ingredient requiring the cooperation of all operators. Each operator should revise the maintenance programme to include, as appropriate, the data contained in the continuing structural integrity programme and should also provide an adequate system for recording and reporting in a timely way to the type design organization the operational usage, the structural discrepancies experienced in service and, where available, the results of initial analysis. These data should include a description and the

location of the damage, identification of the aeroplane, relevant data on its modification status and operating history, time since beginning operations, time since the last maintenance check, the means by which the discrepancy was detected and its probable cause. It should be recognized that each operator has to make an individual determination as to how the data that are in the continuing structural integrity programme should be incorporated in the maintenance programme owing to the differences in the various operators' maintenance programmes, operating environment and fleet modification status.

• Where an operator wishes to introduce into service an aeroplane of a type for which a structural integrity assessment has been made, the operator should determine that the continuing structural integrity programme acceptable for the particular aeroplane type is available and that a statement of special additions necessary to cover any particular features of significant structural repairs or modifications is also available. The operator should also have access to sufficient past maintenance records of the aeroplane to determine the time at which the structural inspection/modification would be required.

****Typical repair parameters to be established by inspection of records or aircraft by the operator are:**

- location;
- proximity to other repairs;
- condition;
- corrosion protection;
- size of damage or cut out;
- patch material and thickness;
- embodiment date;
- ratio of original to repaired thickness;
- fastener details for original and repair type, diameter, pitch, number of rows, edge margin; and
- extent of wear.

Exchange and use of continuing airworthiness information

• Mandatory airworthiness information to be transmitted by the State of Design 4.4.2.1.1

Annex 8, Part II, 4.2.1.1 states:

The State of Design of an aircraft shall ...transmit to every Contracting State which has in accordance with 4.2.3a) advised the State of Design that it has entered the aircraft on its register, and to any other Contracting State upon request, any generally applicable information which it has found necessary for the continuing airworthiness of the aircraft, including its engines and propellers when applicable, and for the safe operation of the aircraft (herein called mandatory airworthiness information) .

- The type, model and serial number of the aircraft, engine, propeller, equipment or instrument affected shall be included in the contents of the mandatory continuing airworthiness information. The mandatory information may require additional or more frequent inspections or maintenance or modifications, and usually with a time limit for compliance in terms of a date, flying hours or number of landings.
- The State of Design, in determining the time limit for compliance should, without prejudice to safety considerations, take into account the availability of modification kits, tools, material, etc. It should also take into account the service experience in other States and should not limit its evaluation to the service experience in its own State. Time limits for conducting initial inspections, as well as conducting recurrent inspections, are frequently tailored to the inspection methods being used.
- States with maintenance organizations approved for aircraft types not registered or not operated in that State, or approved for parts or equipment not used in that State, should request the State of Design to provide all mandatory airworthiness information on those types and parts.
- When the State of Design of the engine or propeller is different to the State of Design of the aircraft, the State of Design for the aircraft should review mandatory airworthiness information from the State of Design for the engine or propeller and either promulgate that information as being applicable to the aircraft type in question, or supplement it to take account of the specific installation in the aircraft. The aircraft type design organization should assist in this review.
- When the State of Design of a modification is different from the State of Design of the product being modified, the State of Design of the modification must transmit the mandatory continuing airworthiness information to the State of Design of the product and to States that

have the modified product on their Registries. A State may fulfil this obligation by transmitting mandatory continuing airworthiness information to:

- Contracting States that are known (by the State of Design of the modification) to have the modification embodied on aircraft on their register; or
- Contracting States that have notified under 4.2.3(a) with respect to aircraft types for which the modification is eligible; or
- All Contracting States.

The intent of Annex 8 requirement is to ensure that States of Registry receive any relevant continuing information that impact aircraft on their registries. However, State of Design for a modification may not have information available as to the location of the modified aircraft. Therefore, several options for transmission of information are available to the State of Design for a modification. The smallest group of States that covers the known population of aircraft should be targeted in order to reduce the administrative burden as far as practicable.

Airworthiness actions by State of Design and design organization

The State of Design of an aircraft shall ensure that, in respect of aeroplanes over 5700 kg and helicopters over 3 175 kg maximum certificated take-off mass, there exists a system for.

- The type design organization should respond to the reporting operator and should include in the response advice on the actions needed for the reported service difficulty to ensure continuing airworthiness. The type design organization should also inform other affected operators.
- Whenever there is evidence that its product is unsafe because of a manufacturing or design defect, the type design organization should investigate the reason for the defect and report to the State of Design the results of its investigation and any action being taken or proposed to correct the defect. If action is required to correct the defect, the type design organization should submit the data necessary for the issuance of appropriate mandatory airworthiness information.
- When the State of Design considers that the issuance of mandatory airworthiness information is necessary to correct the unsafe condition, the type design organization should

propose the appropriate design changes and/or required inspections and submit details of these proposals for approval. Following the approval of the proposed design changes or inspections, it should make available to all operators appropriate descriptive data and accomplishment instructions. The organization responsible for type design should also make updates to user documents not subject to approval by the CAA, such as the aircraft service manual, illustrated parts catalogue, etc.

Airworthiness Directives

A primary safety function of the airworthiness organization within the CAA is to require correction of unsafe conditions found in an aircraft, aircraft engine, propeller, equipment or instrument or when such conditions develop in other products of the same design. The unsafe conditions may be due to design deficiencies, manufacturing defects, maintenance programme deficiencies, or other causes. Airworthiness Directives (ADs) usually are the means used to notify aircraft owners and other interested persons of unsafe conditions and to prescribe the conditions under which the product may continue to be operated.

ADs are divided into two categories:

- a) Those of an urgent nature requiring immediate compliance upon receipt; and
- b) Those of a less urgent nature requiring compliance within a relatively longer period.

The contents of ADs include the aircraft, engine, propeller, equipment or instrument type, model and serial numbers affected. Also included are the compliance time or period, a description of the difficulty experienced, and the necessary corrective action. A large number of States operate aircraft that have been manufactured or certificated in another State. In order to continue to maintain such aircraft at a level of airworthiness equivalent to that achieved at type certification, the State in which such aircraft are currently registered needs to regularly obtain all information, particularly ADs, service bulletins, etc. issued by the type certification authority, by the type design organization or, on rare occasions, by the airworthiness authority of any other State in which the same type of aircraft are registered, particularly where such information pertains to the continuing airworthiness and the prevention of recurring defects in aircraft and its components and equipment. It is therefore necessary that each State receive all continuing airworthiness information relating to aircraft on its registry, no matter what State originates the information. It is equally necessary, to

facilitate coordinated corrective measures, for the State of Design to receive continuing airworthiness information originated in any other State relating to aircraft it has certificated. With the introduction of the Internet, some States, together with commercial organizations, provide information regarding ADs via this medium.

CHANGES TO APPROVED TYPE DESIGN

A Type Certificate issued in accordance with Annex 8, Part II, and Section 1.4 is evidence of approval of a type design of an aeronautical product in its configuration as of the date of Type Certificate issuance or approval. After issuance of an initial or original Type Certificate, there are many activities that can be performed or required by the Type Certificate holder, the State of Design, a State of Registry, aircraft operators, and other design organizations that will result in the modification of an aeronautical product. For example, the Type Certificate holder may want to develop a model derivative of the same aeronautical product, or an operator may want to replace an aircraft's existing navigation systems with state-of-the-art technology. Incorporating a modification to an aircraft will invalidate its conformity to a Type Certificate, until such time that the modification is approved and recorded as part of an approved type design for that specific aircraft. The intent under Annex 8, among other things, is to ensure that the aircraft Type Certificate remains valid, and that an approved type design exists, throughout the service life of the aircraft.

A Certificate of Airworthiness, at the time of its issuance by a State of Registry in accordance with Annex 8, is conditional on the aircraft having an approved type design or Type Certificate. The Certificate of Airworthiness remains valid as long as the aircraft is airworthy, i.e. the aircraft continues to conform to its approved type design and is in a condition for safe operation. Considering that a modification is a change in the approved type design, it follows that any modification to the aircraft must be approved in order for a Certificate of Airworthiness to remain valid. Both Annex 8 (Part II, Section 4.2) and Annex 6 specify various requirements for keeping an aircraft in an airworthy condition and, among other things, ensuring the continued validity of the Certificate of Airworthiness.

A major modification to an aircraft should be accomplished in accordance with design data approved by, or on behalf of, or accepted by the airworthiness authority of the State of Registry, such that the modification conforms to applicable standards of airworthiness. This relationship between modifications to aircraft and the Certificate of Airworthiness is clearly

explained by the following three requirements that form part of several general provisions on maintenance in Annex 6

- a) An operator must ensure that the Certificates of Airworthiness on aircraft they operate remain valid;
- b) An operator must keep records of appropriate details of modifications incorporated on aircraft;
- c) Modifications shall comply with airworthiness requirements of, or acceptable to, the State of Registry, and procedures shall be established to ensure that the substantiating data supporting compliance with the airworthiness requirements are retained.

CHAPTER 4

STRUCTURE AND RESPONSIBILITIES OF STATES

4.1 AIRWORTHINESS RESPONSIBILITIES OF THE STATE

The Convention on International Civil Aviation was signed in Chicago in 1944, and it created the International Civil Aviation Organization (ICAO), which in 1947 became a specialized Organization of the United Nations. The Convention focuses on international civil aviation. It does not necessarily apply to domestic operations, but provides an accepted model for the regulation of civil aviation, and it is sensible for States to have one set of rules that cover both domestic and international aviation. Thus the ICAO Standards apply to international aviation and have a de facto application to domestic aviation.

- Article 33 of the Convention provides that Certificates of Airworthiness and licences issued by a Contracting State are recognized as valid by other Contracting States, provided the certificates and licences satisfy ICAO Standards.
- Article 37 of the Convention requires each Contracting State to collaborate in securing the highest degree of uniformity in all matters where uniformity will facilitate and improve air navigation.
- Article 54 of the Convention allows ICAO to issue Standards and Recommended Practices (SARPs), and to designate them as Annexes to the Convention.
- The two Annexes covering the airworthiness of aircraft are.
 - a) Annex 6 — Operations of Aircraft, and
 - b) Annex 8 — Airworthiness of Aircraft.

The basic aircraft is certificated, manufactured and issued a Certificate of Airworthiness in accordance with Annex 8, then operated in accordance with Annex 6.

- This Airworthiness Manual was amended and restructured by the ICAO Airworthiness Panel. It is approved by the Secretary General of ICAO and published under his authority. The objective of this manual is to provide guidance on the implementation of the airworthiness and maintenance provisions of Annex 6 and Annex 8. The material in the manual will assist Contracting States in enhancing consistency in their application of these Annexes and assist them in carrying out their safety oversight obligations.

Obligations under the Convention

- 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).
- The minimum airworthiness Standards for these certificates are contained in Annex 8. 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.
- National airworthiness regulations and rules must specify that the State of Registry is the sole authority responsible for ensuring that every aircraft on its registry conforms in all essential respects with the type design certificated in accordance with the airworthiness code it has adopted for that class of aircraft. Although the methods of discharging the foregoing State airworthiness responsibilities may vary, such arrangements do not relieve the State of Registry from its overall responsibility. The only exception is where the State of Registry has executed an Article 83bis agreement with another State for a particular aircraft, in which case all or part of its functions and duties as State of Registry in respect to that aircraft under Articles 12, 30, 31, and 32(a) of the Convention are transferred to the other State. The State of Registry shall be relieved of responsibility in respect to the functions and duties transferred.
- A Certificate of Airworthiness as required by the Convention should normally not be issued unless there exists a valid Type Certificate for the aircraft type and model that has been issued by a Contracting State. It is also necessary to determine that the aircraft was produced under a valid production approval to ensure the aircraft conforms to its type design.

Discharge of State responsibilities

- 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.

- 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 increasing the cost and time for manufacturing and repairs, and confusing the obligations of operators to be responsible for their actions. Such a system would, in any case, require the establishment of a large inspection and enforcement organization which could hardly be justified.
- 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.
- The essential elements to be covered by an airworthiness regulatory system include:
 - aircraft type certification;
 - approval of modifications and repairs;
 - manufacture of aircraft and aviation products under a production approval;
 - registration of aircraft;
 - airworthiness certifications;
 - continuing airworthiness;
 - approval of aircraft maintenance organizations;
 - certification of operators; and
 - licensing of personnel.
- 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 safety 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 separate non-government entity.

Airworthiness responsibilities in Annex 6

- Annex 6 includes additional functional requirements that must be incorporated into aircraft for particular types of operation. The aircraft may therefore satisfy the airworthiness requirements of Annex 8, but not be usable for a specific operational task without meeting the additional requirements of Annex 6. This has special significance where the requirements of Annex 8 are generally applied only to new certification projects, and new requirements in Annex 8 will only appear in aircraft after some time. Any additional requirements of Annex 6 must also meet the airworthiness approval requirements of Annex 8.
- Annex 6 also includes requirements for continuing airworthiness of aircraft, including such issues as application of a maintenance programme, and the approval of data used for incorporating modifications and repairs. These requirements are intended to ensure that aircraft remain in a safe condition for operation and conform to approved design data throughout the operational life of the aircraft. There may also be an overlap of considerations between the two Annexes requires the State of Registry to implement a system whereby information on defects is transmitted to the organization responsible for type design of the aircraft. The systems implemented for aircraft maintenance procedures required to satisfy Annex 6, Part I, Chapter 8 provides the details necessary to satisfy the requirement for submission of defect reports.

4. 2: STATE REGULATORY SYSTEM Introduction

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

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

The basic aviation law of the State should

- Authorize the establishment of a CAA to be headed by a Director of Civil Aviation (DCA). (States may choose other titles for the head of the organization, but this title will be used throughout this manual);

- Make provisions for the adoption of airworthiness regulations based on the provisions of the Annexes to the Convention on International Civil Aviation; authorize the DCA to:
 - register aircraft and maintain a national registry;
 - issue or validate Type Certificates;
 - issue Production Approvals, as the State of Manufacture;
 - issue, renew or validate Certificates of Airworthiness;
 - issue, amend, cancel and suspend airworthiness approvals, licences and certificates;
 - develop, issue and amend Airworthiness Directives (AD), bulletins, orders, etc., consistent with its airworthiness regulations; and
- make provisions for the enforcement of the airworthiness regulations;
- make provisions for authorized personnel to have the right of access to places as necessary to carry out airworthiness functions as provided for in the State's regulation..

Airworthiness regulations

The airworthiness regulations adopted by the State should include provisions for:

- mandatory registration of all aircraft;
- implementation of the airworthiness provisions meeting the requirements of the Convention and the Annexes;
- all aircraft on the State's registry to meet relevant airworthiness criteria adopted by the State;
- the issuance or validation of the Type Certificate for aircraft intended to be entered on the State's registry;
- the issuance of production certificates or approvals of production organizations;
- the issuance, renewal and validation of certificates of airworthiness;
- the issuance of ADs, bulletins, orders, etc., consistent with the airworthiness regulations;

Structure of the CAA

- Pursuant to delegated authority, the DCA should establish an effective organization and employ the necessary qualified personnel to carry out the responsible functions. Although the scope of the Director's responsibilities should not vary substantially from State to State, the structure and size of the CAA's 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.

- In light of the number and size of potential air operators in the State. The DCA should consider the level of civil aviation activity and the size of the State's aviation manufacturing industry when establishing the organizational structure. 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 certification division (ACD) and an aircraft inspection division (AID). Some States may find it necessary to establish a separate Production Division (PD). The establishment and functioning of these three divisions are discussed in Chapter 3 of this Part. To be effective, the CAA should provide an adequate level of administrative support, including comprehensive information technologies, for members of the organization.
- It is also recognized that a State or group of States may elect to discharge their responsibilities through agreements with a multinational organization or agency. It is essential that the agreements clearly define the respective functions each party is to perform, so as to ensure that all obligations of the States are fully discharged. Responsibility for proper execution of ICAO responsibilities remains with the Contracting State.
- 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 may not require a separate ACD. 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 responsibilities of the DCA may be fulfilled 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 issue of Certificates of Airworthiness, it may be advantageous to enter into an arrangement for another State or a competent person to perform work on behalf of the State of Registry.

- In any event, the DCA will need to consider carefully the public interest when establishing the airworthiness inspection organization. The DCA must ensure that the CAA retains effective control of important inspection functions. Functions should not be delegated in such a manner that commercial operators, aircraft manufacturers, maintenance facilities and general aviation aircraft owners, in effect, regulate themselves in airworthiness matters. Regardless of the organizational arrangements established, the DCA must bear in mind that the obligations of each State to comply with the requirements of Annexes 6 and 8 remain unchanged.
- The Convention requires that a number of approvals be issued by the State, but the CAA may wish to authorize an organization or a person to make approvals on behalf of the CAA. A system of delegations implemented by the CAA will generally satisfy this requirement, providing it incorporates the following features:
 - the standards to be achieved are clearly documented by the CAA. A delegate can only apply a documented standard approved by the CAA.
 - The delegates are required to meet technical and regulatory competency requirements and are authorized to make approvals only in areas of their demonstrated competence.
 - The CAA has an interest in the continuing proficiency of the delegates, and monitors their continued training so that they remain competent in the fields of their authorization.
 - The delegate's procedures have been approved by the CAA, and the CAA audits the delegates to ensure they follow those procedures. The procedures should clearly identify where an approval is made, and will normally include a clear differentiation between the development of data, and the approval of that data.
 - The basis of making the approval is clearly documented.
 - the delegates make approvals for and on behalf of the CAA

AIRWORTHINESS ORGANIZATION

In order to meet its responsibilities, the airworthiness organization must be staffed with qualified and experienced personnel capable of successfully undertaking the wide variety of required tasks. CAAs should ensure they attract and retain technically competent staff with the credibility and competence to interact with industry in an efficient and effective manner.

It is essential that the staff be selected with considerable care. Some specialized skills may be obtained from external sources as needed.

- Staff should possess a high degree of integrity, be impartial and tactful, and have good interpersonal communication and behaviour skills.
- The CAA should have a programme for induction of new personnel that includes training in organizational responsibilities, appropriate airworthiness standards and policy, organizational working procedures, and the role of a regulator.
- The CAA should have a structured programme to educate the staff on appropriate new CAA standards, policies, and procedures as they are being implemented.
- The staff needs to keep abreast of new industry developments in the design, construction and maintenance of aircraft and associated equipment. A programme should be developed that provides for the staff, at regular intervals, to visit appropriate facilities and attend technical training and symposia to gain first-hand knowledge of new developments, including management principles. As a general policy, it is not desirable for individual staff members to obtain technical training or licenses from those entities under their direct regulatory jurisdiction.
- In order for the CAA to benefit from the retention of experienced staff on the job and to maintain the necessary continuity of the organization, it is important that staff members are provided with conditions of service and remuneration reasonably consistent with that of industry, given the same education, technical knowledge, experience, and the responsibilities of their position.
- It is preferable that staff should also possess aeronautical licenses, certificates or academic degrees commensurate with their job responsibilities (e.g. engineering degrees, technician/engineer/mechanic certificate with airframe and power plant ratings, electronics technician ratings).

Environmental Standards

In addition to the Annex 8 airworthiness requirements, Annex 16 — Environmental Protection, requires States to perform certification of certain environmental aspects of civil aircraft and engines intended for use or operation in international air navigation. States may

assign the responsibilities for establishing, and finding compliance with, the environmental standards to their airworthiness organization or to another organization.

Aircraft certification division responsibilities

- In those States with a significant aviation manufacturing industry, it will be necessary to establish an aircraft certification division (ACD) within the CAA airworthiness organization. The size and structure of the ACD should be appropriate to the aviation manufacturing industry and the various types of aircraft on the State's registry. The ACD's activity will normally be directed toward type certification, evaluation of repairs and modifications proposed by manufacturers or operators to correct deficiencies in aircraft already in service or to enhance their usefulness, and continuing airworthiness of type certificated products.
- Within the ACD, it may be useful to organize along functional areas of expertise. Specifically, these could include structures, propulsion, electrical/mechanical systems (including software), cabin safety, performance, flight test, 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 in the proximity of the aviation industry. In such cases, it is essential that proper lines of communication and responsibility exist between headquarters and field offices.

Approvals and certificates

The ACD should:

- approve design organizations and ensure they have the technical competency and organization to enable them to show compliance with the appropriate design requirements;
- issue Type Certificates or design approvals for aircraft, engines, propellers, equipment, and materials;
- ensure that the type data necessary to support the Type Certificate of aircraft on the registry of the State is maintained;
- validate Type Certificates or approvals issued by another State; and
- Approve the design of modifications and repairs.

Continuing airworthiness functions

The ACD should:

- Ensure that a system is in place through which the operator will report malfunctions, failures, and defects to the type design organization and that the type design organization will review those reports and takes corrective action.
- monitor service bulletins from the manufacturer (both foreign and domestic) to determine likely effects on the continuing airworthiness of aviation products and to establish procedures to avoid or correct service difficulties;
- mandate actions to correct any unsafe conditions and disseminate the information to all operators and to CAAs located in States that have the affected product on their national registry;
- ensure that a structural integrity programme is in place for each aeroplane above 5 700 kg and monitor its effectiveness.

Liaison functions

The ACD should:

- provide technical advice on matters relating to production, inspection, and flight operations as required;
- work with the organization responsible for accident/incident investigations to ensure that recommendations are adequately addressed; and
- work with the aviation industry, other governmental organizations, and the public in safety matters

Production division responsibilities

- Approvals and certificates

The PD should:

- issue a Production Certificate/approval for a manufacturer that produces in aeronautical products or parts;
- amend a Production Certificate/approval as necessary;
- approve manufacturing organizations to ensure the proper communication with the design organization, the adequacy of manufacturing and test facilities, the competence of skilled

personnel, and the existence of satisfactory quality control systems, including coverage of suppliers;

- survey and evaluate aircraft for issuance of an Airworthiness Certificate and maintenance of that certificate for aircraft on the registry of the State, or in preparation for export to another State;
- issue Authorized Release Certificates for airworthy aeronautical products and parts; and
- issue Special Flight Permits for aircraft that do not meet applicable airworthiness requirements, but are capable of safe flight (e.g. prototype aircraft or production flight tests).

Surveillance, investigations, and enforcement

The PD should perform regular surveillance of manufacturing activities and series production to ensure the manufacturer's compliance with airworthiness requirements and associated manufacturing specifications. This includes:

- ensuring the manufacturer's compliance with approved production drawings and manufacturing procedures;
- evaluation of any changes to a Production Certificate/approval to ensure continued compliance with the applicable airworthiness requirements;
- coordination of manufacturer's requests for deviations from specifications, and ensuring adequate manufacturer's treatment, in coordination with the ACD, for those deviations from specifications;
- 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;
- manufacturer's reporting of problems, which threaten timely and satisfactory achievement of the objectives with recommendations for corrective action; and
- witnessing of critical tests performed by the manufacturer and approval of testing methods and test reports in coordination with the ACD.
- investigate unsatisfactory manufacturing occurrences, which may result in a determination, with the manufacturer, of necessary corrective actions.

CHAPTER 5

INTERPRETATION OF RESULTS:

The government has taken steps in the direction of structural policy reforms and is coming out with new policies which are liberal and encourage public-private partnerships. The government has embarked on a mission to create infrastructure with ambitious projects.

At this point, it is worth noticing that policy formulation is one aspect while smooth implementation of it is another. India has a history of having rules and regulations in place but not putting emphasis on implementation of the same which has impacted its own interests many a times. Routing development through public-private partnerships presents different challenges in terms of delineation of responsibilities, effective monitoring and evaluation procedure in place and final transfer of rights. The future plan of action would leverage on the past experience with a priority to upgrade the infrastructure to accommodate further expansion. Given the size and the population of the country, air travel penetration is relatively low, providing an opportunity to sustain the growth rate witnessed in the aviation sector over the past few years. Role of private sector In India, due to policy changes and reforms, Public Private Partnerships (PPPs) have increasingly become the preferred mode for construction and operation of airport infrastructure. Private sector is presently actively involved in airlines and airports and their contribution are expected to rise substantially in the coming years. PPP offers distinct possibility for increasing total investments by using a limited amount of public resources to leverage a much larger amount of private investment. Such PPPs accordingly could also increase economic efficiency and lower the capital requirement, provided that regulatory mechanisms are adequate.

In order to meet its responsibilities, the airworthiness organization must be staffed with qualified and experienced personnel capable of successfully undertaking the wide variety of required tasks. CAAs should ensure they attract and retain technically competent staff with the credibility and competence to interact with industry in an efficient and effective manner. It is essential that the staff be selected with considerable care. Some specialized skills may be obtained from external sources as needed.

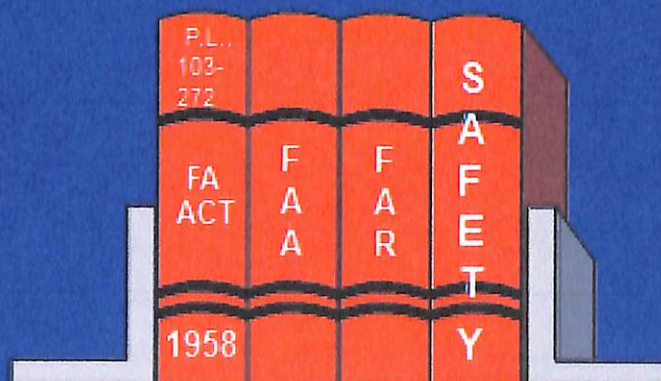
The staffs needs to keep abreast of new industry developments in the design, construction and maintenance of aircraft and associated equipment. A programme should be

developed that provides for the staff, at regular intervals, to visit appropriate facilities and attend technical training and symposia to gain first-hand knowledge of new developments, including management principles. As a general policy, it is not desirable for individual staff members to obtain technical training or licenses from those entities under their direct regulatory jurisdiction.

The State of Design should approve certain minimum maintenance requirements that an operator needs to accomplish when the aeroplane is initially placed in service. The authority normally approves initial minimum maintenance requirements that are proposed by selected specialists in airworthiness requirements, continuing airworthiness and aeroplane design. The State of Design may also invite participation from authorities of the States of the intended operators. A group of these specialists is referred to as the MRB. The MRB also ensures that the design organization and manufacturer provide the necessary technical training to MRB, ISC and WG members. The MRB reviews reports, provides notification of potential problem areas and offers guidance and assistance to the ISC and WG. Upon successful review, the regulatory authority approves the MRB report or revision.

AIRWORTHY MEANS AN AIRCRAFT MEETS ITS TYPE DESIGN AND IS IN A CONDITION FOR SAFE OPERATION.

THIS DEFINITION IS TAKEN FROM PUBLIC LAW 103-272, PREVIOUSLY THE FEDERAL AVIATION ACT OF 1958, AND IS ALSO FOUND ON THE FACE OF EACH AIRCRAFT'S STANDARD AIRWORTHINESS CERTIFICATE.



Two conditions must be met before an aircraft can be considered “airworthy”:

1. The aircraft must conform to its type certificate (TC); that is, when the aircraft configuration and the components installed are consistent with the drawing, specifications, and other data that are part of the TC, and include any supplemental TC and field-approved alterations incorporated into the aircraft.
2. The aircraft must be in condition for safe operation; this refers to the condition of the aircraft relative to wear and deterioration.

5.1 GENERAL

- (a) The owner or operator of an aircraft is primarily responsible for maintaining that aircraft in an airworthy condition, including compliance with part 39 of this chapter.
- (b) No person may perform maintenance, preventive maintenance, or alterations on an aircraft other than as prescribed in this subpart and other applicable regulations, including part 43 of this chapter.
- (c) No person may operate an aircraft for which a manufacturer's maintenance manual or instructions for continued airworthiness has been issued that contains an airworthiness limitations section unless the mandatory replacement times, inspection intervals, and related procedures specified in that section or alternative inspection intervals and related procedures set forth in an operations specification approved by the Administrator under part 121 or 135 of this chapter or in accordance with an inspection program approved under §91.409(e) have been complied with.

GLOSSARY

Aeroplane system: An aeroplane system includes all elements of equipment necessary for the control and performance of a particular major function. It includes both the equipment specifically provided for the function in question and other basic related aeroplane equipment such as that required to supply power for the equipment operation. The engine is not considered to be an aeroplane system.

Airworthiness directive (AD): A regulatory document which identifies aeronautical products in which an unsafe condition exists and where the —unsafell condition is likely to exist or develop in other products of the same type design. It prescribes corrective actions to

be taken or the conditions or limitations under which the products may continue to be operated. The AD is the common form of mandatory continuing airworthiness information mentioned in Annex 8.

Airworthiness Standard: For purposes of type certification, these are the detailed and comprehensive design and safety criteria applicable to the category of the aeronautical product (aircraft, engine, and propeller) that satisfies, as a minimum, the applicable Standards of ICAO Annex 8. These design standards are detailed in nature and cover aspects such as, but not limited to: flight performance and characteristics, structural strengths and durability, general design and construction, power plant and systems, aircraft and systems architecture, equipment specifications, overall function and reliability criteria, tests and inspections methods, and operating limitations and information.

Certification basis: The applicable airworthiness and environmental standards established by a State as the basis by which the type design of an aeronautical product, or change to that type design was approved or accepted. The certification basis may also include special conditions of airworthiness, findings of equivalent level of safety, and/or exemptions when determined by the State to apply to the type design.

Certification maintenance requirement: Maintenance that is required by design to help show compliance with the appropriate type certification requirements by detecting the presence of, and thereby limiting the exposure time to, a significant latent failure.

Comprehensive and detailed airworthiness code: The collective requirement that consists of, but not limited to, the approval or acceptance of the type design to an airworthiness standard, conformity to production or manufacturing standards, performance of inspection, maintenance, repair and modification in accordance with standards that ensure the continuing airworthiness of the aircraft, and a system of surveillance or monitoring of safety by the Contracting State.

Environmental Standard: The specifications and maximum levels defined in Annex 16 — Environmental Protection for the certification of aircraft noise and engine smoke and gaseous emissions, including the Standards for the prevention of intentional fuel venting into the atmosphere.

Exemption: A relief from compliance with the requirement of airworthiness or environmental standards, or operating rules, based on the determination by a civil aviation authority that granting such relief will not adversely affect safety.

Extended diversion time operations: Any flight by an aeroplane where the flight time at the one engine inoperative cruise speed (in international standard atmosphere and still air conditions), from a point on the route to an adequate alternate aerodrome, is greater than the threshold time approved by the State of the Operator or any flight operated in an area designated by the State as an area of extended diversion time applicability.

Extended diversion time operations, configuration, maintenance and procedures (CMP) standard: The particular aeroplane configuration minimum requirements including any special inspection, hardware life limits, master minimum equipment list (MMEL) constraints, and maintenance practices found necessary to establish the suitability of an airframe-engine combination for extended diversion time operation.

Equivalent level of safety: As used in type certification, a finding where literal compliance with a specific airworthiness requirement cannot be demonstrated but compensating factors exist in the type design that can be shown to provide a level of safety equivalent to that intended by the certification basis.

Failure condition: The effect on the aircraft and its occupants, both direct and consequential, caused or contributed to by one or more failures, considering relevant adverse operational or environmental conditions.

Instructions for continued airworthiness: A set of descriptive data, maintenance planning and accomplishment instructions, developed by a design approval holder in accordance with the certification basis for the product, providing operators with the necessary information for development of their own maintenance programme and accomplishment instructions.

Type design: The set of data and information necessary to define a product type for the purpose of airworthiness determination to any later product of the same type.

Chapter 6

CONCLUSIONS AND SCOPE FOR FUTURE WORK

The Indian aviation sector has witnessed outstanding growth amid fears of global slowdown. The year has been full of activities wherein authorities have sought ways to sustain and maintain the growth rate on a long term basis and the market players to look for and appropriately respond to the opportunities which are coming up. The Indian aviation growth trend has resulted in many lucrative business opportunities for players in the aviation industry.

In spite of this, many of global aviation industry players have remained insular to being a part of India's aviation growth story. This has been largely on account of lack of proper market potential assessment, not being able to find the right business partners, not understanding the legal and policy implications or concern of continuity of growth of aviation sector. In times of current US slowdown and fear of recession, the role of developing economies like India assumes greater significance with their thrust for capacity and capabilities enhancement and are looked upon as the prime movers of growth. The Indian government has initiated several reforms and steps to keep the momentum going. In view of the above, we present, in this section of the report, an overview of strategic assessment of the opportunities offered by Indian aviation growth.



Currently India has total of 1,123 aircrafts of different classes and sizes .There are at present 399 aircrafts (scheduled operations) and the number is expected to cross the 900 mark by

2012. Based on the growth trend witnessed in Indian aviation industry, leading commercial aircraft manufacturers - Boeing and Airbus, expect to sell another 935 airplanes to India over the next twenty years. According to National Aerospace Laboratories (NAL), there will be requirement of 200 aircrafts having 50-70 seat capacity in India over the next five years and the demand will increase over the next 25 years. Despite the increased connectivity, frequency of flights and availability of seats between city pairs, only 45% of the major city pairs in India have direct connectivity via air. The situation is rather worse for tier II and tier III cities' pairs which needs to be addressed for sustaining the growth

Airworthiness may be defined as the fitness of an aircraft to fly when it meets the minimum conditions laid down in its type certificate. This includes the design and construction (in accordance with specific certification codes). An airworthy aircraft is one that is fit to fly. Additionally it must be operated within the limits laid down; an aircraft which exceeds any limit may be judged to become un-airworthy. In service, an aircraft must also be maintained to specific requirements for it to remain airworthy; the latter case is referred to as Continuing Airworthiness. A process of aircraft Type Certificate issue which allows the work which is carried out to achieve it to be documented in such a way that it can remain an accessible foundation for the continued airworthiness of the aircraft type thereafter. A full understanding of the human factors issues involved in aircraft engineering and aircraft maintenance.

The achievement of standards of flight crew training, proficiency and CRM which can minimise the number of instances where the effects of the onset of an in-flight reduction in airworthiness are worsened rather than effectively managed by the actions of a flight crew. The control of in service aircraft is both complex and vital. While day to day flying continues, maintenance technicians rectify any problem reported by the pilot as well as those found by inspection. In addition, other technical staff are monitoring every aspect of the aircraft, from its flight hours, through the performance of its engines and systems down to less obvious things such as planning the cleaning of the exterior and interior to preserve condition and appearance. An airline with more than a small number of aircraft will operate a maintenance control centre on a 24 hour basis. This technical centre (often called —Maintrol) has much of the data relevant to each aircraft at its fingertips and also keeps in constant touch with aircraft via radio and data downlink. It is their job to minimise operational technical disruption as well as ensuring that day to day maintenance is performed at, or prior to, the period set in the Maintenance Programme.

Yet more staff are involved in providing support to front line maintenance technicians in solving complex problems and acting as liaison with airframe and power plant manufacturers. A further level of oversight is provided in many countries by the regular scrutiny of maintenance history compared to the requirements of the Maintenance Programme including Mandatory tasks. This process is termed maintenance review and periodically will need the issue of a Certificate of Maintenance Review (CMR). The performance of this task needs a technician of great experience both of the aircraft involved and of the organisation which is doing the work. Much of what the regulator requires in terms of continuing airworthiness is dealt with by the foregoing activity which will include its oversight by a Quality Assurance system.

This decision highlights the responsibility pilots have for confirming the airworthiness of their aircraft before they fly. If pilots, or aircraft buyers, are going to trust representations by others, as the airman did in this case, they will also need to take reasonable steps to confirm those representations. Similarly, aircraft owners need to comply with the requirements of the aircraft registration regulations on a timely basis to ensure proper registration of their aircraft while they are flying. Although the requirements are simple and straightforward, they need to be met to avoid the consequences suffered by the airman in this case.

FAR 43.11, RECORD ENTRIES FOR INSPECTIONS

The person approving or disapproving for return to service after any inspection performed IAW Part 91, 123, 125, & 135 shall make an entry in the maintenance record the following.

- The type of inspection and a brief description of the extent of the inspection
- The date of the inspection and the total time in service.
- The signature, the certificate number, the kind of certificate held by the person approving or disapproving for return to service.

Bibliography

Websites:-

www.flyafac.com

www.iata.com

www.google.com

www.dgca.nic.in

www.livemint.com

www.planningcommission.nic.in

www.rediff.com

www.tcil.com

www.goibibo.com

www.domain-b.com

www.economictimes.com

www.faiindia.in

www.ficci.com

www.financialexpress.com

www.hyderabad.aero

www.ibef.org

www.indianmba.com

www.jetairways.com

REFERENCES

- Airworthiness – Fillipo De Florio
- Aviation Maintenance Management – Harry A Kinnison
- Aircraft Structures 3rd Edition – T H G Megson
- Aircraft Structures 4th Edition – T H G Megson
- Aircraft Systems – David A Lombardo

APPENDIX

Abbreviations:

AFM – Aircraft Flight Manual

AII - Airports Authority of India

ATC - Air Traffic Control

AMEs - Aircraft Maintenance Engineers

CASG - The Civil Aviation Safety Group

CAT - Category

CDL - Configuration deviation list

DCA - Director of Civil Aviation

DGCA Directorate General of Civil Aviation

EASA - European Aviation Safety Agency

FAA – Federal Aviation Administration

FID Flight Information Display System

ICA - Instructions for continued airworthiness

ICAO - International Civil Aviation Organization

MASG - The Military Aviation Safety Group

MEL - Minimum Equipment List

MRB - Maintenance review board

NACIL - National Aviation Company of India Limited

RMS - Risk Management System

RNFC - Route Navigation Facility Charges

RTA - Regional Transport Aircraft

SPV - Special Purpose Vehicle

TCB - Type Certification Board

VCCS - Voice Communication and Control System

VLJ - Very Light Jet

WFD - Widespread fatigue damage