Civil Aviation Authority of Sri Lanka

AIRWORTHINESS INSPECTORS HANDBOOK

1st Edition - 2008

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

AIRWORTHINESS INSPECTORS HAND BOOK

Control Number : 01

Record of Revision

Rev No.	Date Entered	Entered by	Rev No.	Date Entered	Entered by
01	10.04.2018				

List of Effective Pages

Chapter	Page	Effective
SECTION ONE		
Chapter 1	1-1	10-04-2018
	1-2	10-04-2018
	1-3	10-04-2018
	1-4	10-04-2018
	1-5	10-04-2018
Chapter 2	2-1	05-07-2008
	2-2	05-07-2008
Chapter 3	3-1	05-07-2008
	3-2	05-07-2008
	3-3	05-07-2008
Chapter 4	4-1	10-04-2018
	4-2	10-04-2018
Chapter 5	5-1	05-07-2008
SECTION TWO – VOLUME ONE		
Chapter 1	1-1	05-07-2008
	1-2	05-07-2008
	1-3	05-07-2008
Chapter 2	2-1	05-07-2008
	2-2	10-04-2018
	2-3	05-07-2008
	2-4	05-07-2008
	2-5	05-07-2008
	2-6	05-07-2008
	2-7	05-07-2008
Chapter 3	3-1	10-04-2018
	3-2	10-04-2018

Chapter	Page	Effective
	3-3	10-04-2018
	3-4	10-04-2018
	3-5	10-04-2018
	3-6	10-04-2018
	3-7	05-07-2008
	3-8	05-07-2008
	3-9	10-04-2018
	3-10	05-07-2008
	3-11	05-07-2008
	3-12	05-07-2008
Chapter 4	4-1	05-07-2008
	4-2	05-07-2008
	4-3	05-07-2008
Chapter 5	5-1	10-04-2018
	5-2	10-04-2018
	5-3	05-07-2008
	5-4	10-04-2018
	5-5	10-04-2018
	5-6	05-07-2008
	5-7	05-07-2008
	5-8	05-07-2008
Chapter 6	6-1	10-04-2018
	6-2	05-07-2008
	6-3	05-07-2008
	6-4	05-07-2008
	6-5	05-07-2008
	6-6	05-07-2008
	6-7	05-07-2008
	6-8	05-07-2008
	6-9	05-07-2008
	6-10	05-07-2008
	6-11	10-04-2018

Chapter	Page	Effective
Chapter 7	7-1	05-07-2007
	7-2	05-07-2007
	7-3	05-07-2007
	7-4	05-07-2007
	7-5	05-07-2007
SECTION TWO – VOLUME TWO		
Chapter 1	1-1	05-07-2008
	1-2	05-07-2008
	1-3	05-07-2008
	1-4	05-07-2008
	1-5	05-07-2008
	1-6	05-07-2008
	1-7	05-07-2008
	1-8	05-07-2008
	1-9	05-07-2008
	1-10	10-04-2018
	1-11	05-07-2008
	1-12	05-07-2008
	1-13	05-07-2008
	1-14	05-07-2008
Chapter 2	2-1	05-07-2008
	2-2	05-07-2008
	2-3	05-07-2008
	2-4	05-07-2008
	2-5	05-07-2008
Chapter 3	3-1	05-07-2008
	3-2	05-07-2008
	3-3	05-07-2008
	3-4	05-07-2008
	3-5	05-07-2008
	3-6	05-07-2008
Chapter 4	4-1	05-07-2008

Chapter	Page	Effective
	4-2	05-07-2008
	4-3	05-07-2008
	4-4	05-07-2008
	4-5	05-07-2008
	4-6	05-07-2008
	4-7	05-07-2008
	4-8	05-07-2008
	4-9	10-04-2018
Chapter 5	5-1	05-07-2008
	5-2	05-07-2008
	5-3	05-07-2008
	5-4	05-07-2008
	5-5	10-04-2018
	5-6	10-04-2018
	5-7	05-07-2008
	5-8	05-07-2008
	5-9	05-07-2008
	5-10	05-07-2008
	5-11	05-07-2008
Chapter 6	6-1	05-07-2008
	6-2	05-07-2008
	6-3	05-07-2008
	6-4	05-07-2008
	6-5	05-07-2008
	6-7	05-07-2008
	6-8	05-07-2008
	6-9	05-07-2008
	6-10	05-07-2008
	6-11	05-07-2008
	6-12	05-07-2008
	6-13	05-07-2008
	6-14	05-07-2008
	6-15	05-07-2008
	6-16	05-07-2008
	6-17	05-07-2008

Chapter	Page	Effective
	6-18	10-04-2018
	6-19	05-07-2008
	6-20	05-07-2008
	6-21	05-07-2008
	6-22	05-07-2008
	6-23	05-07-2008
	6-24	05-07-2008
	6-25	05-07-2008
	6-26	05-07-2008
	6-27	05-07-2008
	6-28	05-07-2008
	6-29	05-07-2008
	6-30	10-04-2018
	6--31	05-07-2008
	6-32	05-07-2008
	6-33	05-07-2008
	6-34	05-07-2008
	6-35	05-07-2008
	6-36	05-07-2008
Chapter 7	7-1	10-04-2018
	7-2	05-07-2008
	7-3	10-04-2018
	7-4	05-07-2008
	7-5	05-07-2008
	7-6	05-07-2008
	7-7	05-07-2008
Chapter 8	8-1	05-07-2008
	8-2	05-07-2008
	8-3	05-07-2008
	8-4	05-07-2008
	8-5	05-07-2008
	8-6	05-07-2008
	8-7	05-07-2008
	8-8	05-07-2008
	8-9	05-07-2008

Chapter	Page	Effective
	8-10	05-07-2008
	8-11	05-07-2008
	8-12	10-04-2018
	8-13	05-07-2008
	8-14	05-07-2008
	8-15	05-07-2008
	8-16	05-07-2008
	8-17	05-07-2008
	8-18	05-07-2008
	8-19	05-07-2008
	8-20	05-07-2008
	8-21	05-07-2008
	8-22	05-07-2008
	8-23	05-07-2008
	8-24	05-07-2008
	8-25	05-07-2008
Chapter 9	9-1	05-07-2008
	9-2	05-07-2008
	9-3	05-07-2008
	9-4	05-07-2008
	9-5	05-07-2008
	9-6	05-07-2008
	9-7	05-07-2008
Chapter 10	10-1	05-07-2008
	10-2	05-07-2008
	10-3	05-07-2008
	10-4	05-07-2008
	10-5	05-07-2008
Chapter 11	11-1	05-07-2008
	11-2	05-07-2008
	11-3	05-07-2008
	11-4	05-07-2008
	11-5	05-07-2008

Chapter	Page	Effective
	11-6	05-07-2008
	11-7	05-07-2008
	11-8	05-07-2008
	11-9	05-07-2008
	11-10	05-07-2008
	12-1	05-07-2008
Chapter 12	12-2	05-07-2008
	12-3	05-07-2008
	12-4	05-07-2008
	12-5	10-04-2018
Chapter 13	13-1	05-07-2008
	13-2	10-04-2018
	13-3	05-07-2008
	13-4	05-07-2008
	13-5	05-07-2008
	13-6	05-07-2008
	13-7	05-07-2008
	13-8	05-07-2008
	13-9	05-07-2008
	13-10	05-07-2008
	13-11	05-07-2008
	13-12	05-07-2008
	13-13	05-07-2008
	13-14	05-07-2008
	13-15	05-07-2008
	13-16	05-07-2008
	13-17	05-07-2008
	13-18	05-07-2008
	13-19	05-07-2008
Chapter 14	14-1	05-07-2008
	14-2	05-07-2008
	14-3	05-07-2008
	14-4	10-04-2018
	14-5	05-07-2008

Chapter	Page	Effective
	14-6	05-07-2007
	14-7	05-07-2007
	14-8	05-07-2007
	14-9	05-07-2007
	14-10	05-07-2008
	14-11	10-04-2018
Chapter 15	15-1	05-07-2008
	15-2	05-07-2008
	15-3	05-07-2008
	15-4	05-07-2008
	15-5	05-07-2008
Chapter 16	16-1	05-07-2008
	16-2	05-07-2008
	16-3	05-07-2008
	16-4	05-07-2008
	16-5	05-07-2008
	16-6	05-07-2008
	16-7	05-07-2008
	16-8	05-07-2008
	16-9	05-07-2008
	16-10	05-07-2008
Chapter 17	17-1	05-07-2008
	17-2	05-07-2008
	17-3	05-07-2008
	17-4	05-07-2008
	17-5	05-07-2008
	17-6	05-07-2008
	17-7	05-07-2008
	17-8	05-07-2008
	17-9	05-07-2008
	17-10	05-07-2008
	17-11	05-07-2008
	17-12	05-07-2008
	17-13	05-07-2008

Chapter	Page	Effective
	17-14	05-07-2008
	17-15	05-07-2008
	17-16	05-07-2008
	17-17	05-07-2008
	17-18	05-07-2008
	17-19	05-07-2008
	17-20	05-07-2008
	17-21	05-07-2008
	17-22	05-07-2008
Chapter 18	18-1	05-07-2008
	18-2	05-07-2008
	18-3	05-07-2008
	18-4	05-07-2008
	18-5	05-07-2008
Chapter 19	19-1	05-07-2008
	19-2	05-07-2008
	19-3	05-07-2008
	19-4	05-07-2008
	19-5	05-07-2008
	19-6	05-07-2008
	19-7	05-07-2008
	19-8	05-07-2008
	19-9	05-07-2008
	19-10	10-04-2018
Chapter 20	20-1	05-07-2008
	20-2	05-07-2008
	20-3	05-07-2008
	20-4	05-07-2008
	20-5	05-07-2008
	20-6	05-07-2008
	20-7	05-07-2008
	20-8	05-07-2008
	20-9	05-07-2008

Chapter	Page	Effective
	20-10	05-07-2008
	20-11	05-07-2008
	20-12	05-07-2008
SECTION THREE		
CHECKLISTS		
APPENDIX 01		

History of Revision

Revision Number	Source	Areas Subjected to change	Effective Date
01		Training and qualification of Inspectors removed and inserted to the AOPM The amended checklist Nos inserted. Standard form removed and transferred to AOPM	10 Apr 2018

TABLE OF CONTENT

SECTION ONE

GENERAL ADMINISTRATION

SECTION TWO

VOLUME ONE

AIR OPERATOR CERTIFICATION

SECTION TWO

VOLUME TWO

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

SECTION THREE

CHECK LIST

The following checklists shall be applicable with the requirement of ASN 84, ASN 85 and ASN 94 and which will be repeal when IS 145, IS 147 and IS Part M come in force

Check list 7	Requirements for the Establishment and operation of continuing Airworthiness Management Organisation
Check list 8	Maintenance Control Manual (MCM) / MME Review Document
Check list 9	Requirements for the Establishment of an Approved Maintenance Organisation(145 Approvals)
Check list 10	Maintenance Procedures Manual (MPM) / MOE Review Document
Check list 12	Requirements for the Establishment and Operation of Approved Maintenance Training Organisation

APPENDIX

Appendix 1	Declaration of Absence of any Real, Apparent or Potential Conflicts of Interest between Official Responsibilities and Private Affairs

Note

All Airworthiness Inspectors are required to complete and sign the “Declaration of Absence of any Real, Apparent or Potential Conflicts of Interest between Official Responsibilities and Private Affairs” as a mandatory requirement.

A copy of this form (CAA/OM/01/004) is attached as a specimen.

A duly completed declaration must be submitted to Director - Human Resources and Office Management. A copy should be retain in file AW/4/6/2

FOREWORD

Being a signatory to the convention on International Civil Aviation each Contracting State has an obligation to the international community to ensure that civil aviation activities under its jurisdiction are carried out in strict compliance with International Standards and Recommended Practices (SARP's) as specified in Annex 1 to Annex19 to the convention. In this regard, the following is applicable in respect of Airworthiness requirements of Aircraft.

- A Contracting State shall not issue or render valid a Certificate of Airworthiness for which it intends to claim recognition pursuant to article 33 of the Convention on International Civil Aviation, unless the aircraft complies with a comprehensive and detailed national airworthiness code established for that class of aircraft by the State of Registry or by any other Contracting State (Paragraph 2.2 Part II to the Annex 8) and is acceptable to the State of Registry.

- Continuing Airworthiness of an aircraft shall be determined by the State of Registry in relation to the appropriate Airworthiness requirements in force for the aircraft.

- The State of Registry shall develop or adopt requirements to ensure the Continued Airworthiness of the aircraft during its service life.
  (Paragraph 4.1 Part II to the Annex 8)

The foregoing emphasizes the necessity to establish an adequate organizational structure and methodology to ensure that the Operator meets requirements for safe operation of aircraft. Methodology used for this purpose is to carry out checks and inspections to ensure safe operations prior to issue of a Certificate of Airworthiness. Continuing Airworthiness of aircraft is satisfied by having comprehensive regulations, maintenance certification and licensing standards as well as a strict regulatory oversight programme. The Airworthiness Inspectors Handbook has been complied in order to help the inspectors and the Industry to achieve the objectives states above**.** It is expected that the applicant for approval will be benefited by this manual as it explains the administrative procedures involved so that the process would be independent and transparent.

The handbook is in three sections.

Section One	-	Gives an overview of the Airworthiness Section and administration.		
Section Two	-	Volume 1	-	Includes procedures to be used when recommending the issue of certificates pertaining to airworthiness and maintenance of aircraft.
		Volume 2	-	Includes description of various aspect of Air Operator / Maintenance Organization surveillance.

Section Three – Gives the more commonly used Check Lists

It is emphasized that all matters pertaining to an inspector duties and responsibilities cannot be covered in this manual. Inspectors are expected to use good judgement in matters where specific guidance has not been given. Changes in aviation technology, legislation in the Aviation industry will necessitate changes to requirements. CAASL may, without any prior notice, change the contents of this manual as appropriate, to suit the latest development of ICAO Standards and Recommended Practices and world best practices in relation to the subject matter. The structure of the manual is based on the ICAO Airworthiness Manual, Doc. 9760.

The position of Airworthiness Inspector identified in almost all the areas in this handbook is an officer who has been designated to perform inspections on aircraft, systems or its components and make recommendations to the DGCA. For the sake of administrative arrangements in CAASL, the post of Airworthiness Inspector addressed in this handbook is performed by Airworthiness Engineers. This designation change is just only confining to administrative purposes but the qualification, knowledge, experience and skills needed for the Airworthiness Engineer contained in this handbook is equivalent to that of the Airworthiness Inspector.

This Airworthiness Inspectors Handbook would serve as a guide to Airworthiness Inspectors of the Civil Aviation Authority of Sri Lanka and also could be useful reference material to air operators and aircraft maintenance organizations.

Nimalsiri

HMC Nimalsiri
Director General of Civil Aviation &
Chief Executive Officer

10 April 2018

Civil Aviation Authority of Sri Lanka
No. 152/1, Minuwangoda Road
Katunayake

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

Definitions

When the following terms are used in the Standards and Recommended Practices for operation of aircraft in international commercial air transport, They have the following meanings :

Aerial Work. An aircraft operation in which an aircraft is used for specialized services such as agriculture, construction, photography, Surveying, observation and patrol, search and rescue, aerial advertisement, etc.

Aerodrome. A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aerodrome operating minima. The limits of usability of an aerodrome for :

1) Take off, expressed in terms of runway visual range and /or visibility and, if necessary, cloud condition;

2) Landing in precision approach and landing operations, expressed in terms of visibility and /or runway visual range and decision altitude / height (DA/H) as appropriate to the category of the operation; and

3) Landing in non-precision approach and landing operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions.

Aeroplane. A power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight .

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

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

Alternate aerodrome. An aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing.

Alternate aerodromes include the following :

Take-off alternate. An alternate aerodrome at which an aircraft can land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure.

En-route alternate. An aerodrome at which an aircraft would be able to land after experiencing an abnormal or emergency condition while en route

Destination alternate. An alternate aerodrome to which an aircraft may proceed should it become either impossible or inadvisable to land at the aerodrome of intended landing.

> ***Note :*** *The aerodrome from which a flight departs may also be an en-route or a destination alternate aerodrome for that flight*

Cabin attendant. A crew member who performs, in the interest of safety of passengers, duties assigned by the operator or the pilot-in-command of the aircraft, but who shall not act as a flight crew member.

Commercial air transport operation. An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire.

Crew member. A person assigned by an operator to duty on an aircraft during flight time

Cruising level. A level maintained during a significant portion of a flight

Dangerous goods. Articles or substances which are capable of posing significant risk to health, safety or property when transported by air.

> ***Note :*** *Dangerous goods are classed in Annex 18, Chapter 3.*

Decision altitude(DA) or decision height (DH). A specified altitude or height in the precision approach at which a missed approach must be initiated if the required visual reference to continue the approach has not been established

> ***Note 1 :*** *Decision altitude (DA) is referenced to mean sea level and decision height (DH) is referenced to the threshold elevation.*

Annex 6 – Operation of Aircraft

> ***Note 2 :*** *The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to, have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In category. III operations with a decision height the required visual reference is that specified for the particular procedure and operation*.

> ***Note 3:*** *For convenience where both expressions are used they, may be written in the form "decision altitudes height" and abbreviated "DA/H".*

Emergency locator transmitter (ELT). A generic term describing equipment which broadcast distinctive signals on designated frequencies and, depending on application, may either sense a crash and operate automatically or be manually activated. An ELT may be any of the following:

Automatic fixed ELT $\{$ ***ELT (AF)*** $\}$ ***.*** An ELT which is permanently attached to an aircraft.

Automatic portable ELT $\{$ ***ELT (AP)*** $\}$ An ELT which is rigidly attached to an aircraft but readily removable from the aircraft after a crash.

Automatically deployable ELT $\{$ ***ELT (AD)*** $\}$ ***.*** An ELT which is rigidly attached to an aircraft and deployed automatically in response to a crash. Manual deployment is also provided

Survival ELT $\{$ ***ELT (S)*** $\}$ ***.*** An ELT which is removable from an aircraft, stowed so as to facilitate its ready use in an emergency and activated by survivors. Automatic activation may apply.

Flight Crew member. A licensed crew member charged with duties essential to the operation of an aircraft during flight time.

Flight duty period. The total time from the moment a flight crew member commences duty, immediately subsequent to a rest period and prior to making a flight or a series of flights to the moment the flight crew member is relieved of all duties having completed such flight or series of flights

Flight Manual. A manual associated with the certificate of airworthiness, containing limitations within which the aircraft is to be considered airworthy, and instructions and information necessary to the flight crew members for the safe operation of the aircraft.

Flight Plan. Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft.

Flight recorder. Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation.

Flight Time. The total time from the moment an aircraft first moves under its own power for the purpose of taking off until the moment it comes to rest at the end of the flight.

> ***Note :*** *Flight times as here defined is synonymous with the term “ block to block” time or “chock to chock” time in general usage which is measured from the time an aircraft moves from the loading point until it stops at the unloading point.*

General Aviation operation**.** An aircraft operation other than a commercial air transport operation or an aerial work operation

Instrument approach and landing operations. Instrument approach and landing operations using instrument approach procedures are classified as follows :

Non-precision approach and landing operation. An instrument approach and landing which does not utilize electronic glide path guidance.

Precision approach and landing operations. An instrument approach and landing using precision azimuth and glide path guidance with minima as determined by the category of operation.

Categories of precision approach and landing operations :

Category I - (CAT I) Operation. A precision instrument approach and landing with a decision height not lower than 60 m (200 ft) and with either a visibility not less than 800 m or a runway visual range not less than 550 m

***Category II - (CAT II) Operation*.** A precision instrument approach and landing with a decision height lower than 60 m (200 ft), but not lower than 30 m (100 ft), and a runway visual range not less than 350 m

Category III A - (CAT III A) Operation. A precision instrument approach and landing with :

a) a decision height lower than 30 m (100 ft) or no decision height; and
b) a runway visual range not less than 200 m

Category III B - (CAT III B) Operation. A precision instrument approach and landing with :

a) a decision height lower than 15 m (50 ft) or no decision height; and
b) a runway visual range less than 200 m but not less than 50 m

Category IIII C - (CAT III C) Operation. A precision instrument approach and landing with no decision height and no runway visual range limitations.

Note : *Where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach and landing operation would be conducted in accordance with the requirements of the most demanding category (e. g. an operation with a DH in the range of CAT III A but with an RVR in the range of CAT III B would be considered a CAT III B operation or an operation with a DH in the range of CAT II but with an RVR in the range of CAT II would be considered a CAT II operation.*

Instrument meteorological conditions (IMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, * less than minima specified for visual meteorological conditions.

Note : *The specified minima for visual meteorological conditions are contained in Chapter 4 of Annex 2.*

Large aeroplane. An aeroplane of a maximum certificated take-off mass of over 5700 kg.

Master Minimum Equipment List (MMEL). A list established for a particular aircraft type by the manufacturer with the approval of the State of Manufacturer containing items, one or more of which is permitted to be unserviceable at the commencement of a flight. The MMEL may be associated with special operating conditions, limitations or procedures.

Maximum mass. Maximum certificated take-off mass.

Minimum descent attitude(MDA) or minimum descent height(MDH). A Specified altitude or height in a nonprecision approach or circling approach below which descent must not be made without the required visual reference.

> ***Note 1 :*** *Minimum descent altitude(MDA) is referenced to mean sea level and minimum descent height (MDH) is referenced to the aerodrome elevation or to the threshold elevation if that is more than 2 m(7ft) below the aerodrome elevation. A minimum descent height for a circling approach is referenced to the aerodrome elevation.*

> ***Note 2 :*** *The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made as assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In the case of a circling approach the required visual reference is the runway environment.*

> ***Note 3 :*** *For convenience when both expressions are used they may be written in the form "minimum descent altitude height "and abbreviated "MDAIH".*

Minimum equipment list (MEL). A list which provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the MMEL established for the aircraft type.

Night. The hours between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise, as may be prescribed by the appropriate authority

> ***Note :*** *Civil twilight ends in the evening when the centre of the sun's disc is 6 degrees below the horizon and begins in the morning when the centre of the sun's disc is 6 degrees below the horizon.*

Obstacle clearance altitude (OCA) or obstacle clearance height (OCH). The lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

> ***Note 1 :*** *Obstacle clearance altitude is referenced to mean sea level and obstacle clearance height is referenced to the threshold elevation or in the case of non-precision approaches to the aerodrome elevation or the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. An obstacle clearance height for as circling approach is referenced to the aerodrome elevation.*

Note 2 : *For convenience when both expressions are used they may be written in the form "obstacle clearance altitude height" and abbreviated "OCAIH".*

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

Operational flight plan. The operator's plan for the safe conduct of the flight based on considerations of aeroplane performance, other operating limitations and relevant expected conditions on the route to be followed and at the aerodromes concerned.

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

Operator. A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Pilot-in-command. The pilot responsible for the operation and safety of the aircraft during flight time.

Pressure-altitude. An atmospheric pressure expressed in terms of altitude, which corresponds to that pressure in the standard Atmosphere **.

Required navigation performance (RNP). A statement of the navigation performance accuracy necessary for operation within a defined airspace.

Rest period. Any period of time on the ground during which a flight crew member is relieved of all duties by the operator.

RNP type. A containment value expressed as a distance in nautical miles from the intended poison within which flights would be for at least 95 per cent of the total flying time.

Example – RNP 4 represents a navigation accuracy of plus or minus 7.4 km (4NM) on a 95 per cent containment basis.

Runway visual range. The range over which the pilot of an aircraft on the centerline of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

Small aeroplane. An aeroplane of a maximum certificated take-off mass of 5700 kg or less.

State of registry. The state on whose register the aircraft is entered.

Note : *In the case of the registration of aircraft of an international operating agency on other than a national basis, the States constituting the agency are jointly and severally bound to assume the obligations which, under the Chicago Convention, attach to a State of Registry. See, in this regard, the Council Resolution a 14 December 1967 on*

Nationality and Registration of aircraft operated by International Operating Agencies (Doc 8722).

State of the operator. The State in which the operator's principal place of business is located or, if there is no such place of business, the operators permanent residence.

Synthetic flight trainer. Any one of the following three types of apparatus in which flight conditions are simulated on the ground :

A flight simulator. Which provides an accurate representation of the flight deck of a particular aircraft type to the extent that the mechanical, electrical, electronic, etc., aircraft systems control functions, the normal environment of flight crew members, and the performance and flight characteristics of that type of aircraft are realistically simulated;

A flight procedures trainer**.** Which provides a realistic flight deck environment, and which simulates instrument responses, simple control functions of mechanical, electrical, electronic, etc., aircraft systems, and the performance and flight characteristics of aircraft of a particular class;

A basic instrument flight trainer. Which is equipped with appropriate instruments, and which simulates the flight deck environment of an aircraft in flight in instrument flight conditions.

Visual meteorological conditions (VMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, * equal to or better that specified minima.

Note : The specified minima are conditioned in Chapter 4 of Annex 2.

* As defined in Annex 2
** As Defined in Annex 8

GLOSSARY

This chapter contains descriptions of some of the expressions used in this manual. The descriptions marked * are definitions appearing in Annex 6, Part I or Annex 8. The other descriptions are appropriate to the use of the terms in this document only.

ACTUAL WORK DOCUMENTS

Records ("dirty fingerprint records") that describe the maintenance actually accomplished on a particular airframe, engine, propeller, rotor, or appliance and that are signed by the person performing or approving the work.

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 power-unit is not considered to be an aeroplane system.

AIRWORTHINESS DIRECTIVE (AD)

Airworthiness directives identify aeronautical products in which an unsafe condition exists and/or where the condition is likely to exist or develop in other products of the same type design. They prescribe corrective actions to be taken or the conditions or limitations under which the products may continue to be operated.

> Note : The Airworthiness directive is the most commonly encountered form of the "mandatory continuing airworthiness information" mentioned in Annex 8.

AIRWORTHINESS DIRECTIVE (AD) METHOD OF COMPLIANCE

An explanation of what action is actually taken by the operator to comply with the requirements of the AD. The specific method of compliance must be stated since an AD or a referenced manufacturer's service bulletin may permit the use of more than one method of compliance.

CERTIFICATION MAINTENANCE REQUIREMENT

A recurring flight crew or ground crew check 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.

CONTINUED SAFE FLIGHT AND LANDING

The capability for continued controlled flight and landing, possibly using emergency procedures, but without requiring exceptional pilot skill or strength. Some aircraft damage may be associated with a failure condition, during flight or upon landing.

CURRENT STATUS OF LIFE-LIMITED PARTS

The current status of the part is a record indicating the part life limitation; total number of hours or accumulated cycles and the number of hours or cycles remaining before the required retirement time of the component is reached. This record must also include any modification accomplished in accordance with airworthiness directives, service bulletins or product improvements by the manufacturer or operator that affects or changes the life limit.

EXTENDED RANGE OPERATIONS (ETOPS) CONFIGURATION MAINTENANCE AND PROCEDURES (CMP) STANDARDS

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 range operation.

EXTENDED RANGE OPERATIONS (ETOPS)

Any flight by an aeroplane with two turbine power-units where from any point on the route the flight time at the one power-unit inoperative cruise speed to an adequate en-route alternate aerodrome is greater than the threshold time approved by the State of the Operator.

FAILURE CONDITION

The effect on the aeroplane and its occupants, both direct and consequential, caused or contributed to by one or more failures, considering relevant adverse operational or environmental conditions. Failure conditions may be classified according to their severity as follows:

a. **Minor –** Failure conditions which would not significantly reduce aeroplane safety, and which involve crew actions that are well within their capabilities. Minor failure conditions may include, for example, a slight reduction in safety margins or functional capabilities, a slight increase in crew workload, such as routine flight plan changes, or some inconvenience to occupants.

b. **Major –** Failure conditions which would reduce the capability of the aeroplane or the ability of the crew to cope with adverse operating conditions to the extent that there would be, for example, a significant reduction in safety margins or functional capabilities, a significant increase in crew workload or in conditions impairing crew efficiency, or discomfort to occupants, possibly including injuries.

c. **Hazardous –** Failure conditions which would reduce the capability of the aeroplane or the ability of the crew to cope with adverse conditions to the extent that there would be :

    i. a large reduction in safety margins or functional capabilities;
    ii. Physical distress or higher workload such that the flight crew cannot be relied upon to perform their tasks accurately or completely; or
    iii. Serious or fatal injury to a relatively small number of the occupants

d. **Catastrophic –** Failure conditions, which would prevent continued safe flight and landing.

IN-SERVICE HISTORY RECORD

Records from which the "current status "of life – limited parts can be determined. These records document each time a life-limited part is placed in service or removed from service and should clearly identify the part, show the date and place of installation and removal and show the date, hours and or cycles(as appropriate) at installation and removal. Any other events that would affect the life limit such as a modification that alters the life limit or changes the limiting parameter must also be included in the in-service history record.

Note – Not all modifications and alterations would necessary be pertinent to the life limit of the part.

LATENT FAILURE

A latent failure is one, which is inherently undetected when it occurs, i. e. there is no natural indication of failure.

LIFE-LIMITED PART

Any parts for which retirements time, service life limitation, part retirement, retirement life limitation or life limitation exists. A life-limited part must be permanently removed from service when, or before, its operating limit (hours, cycles and/or calendar time) is exceeded.

MAINTENANCE

Any one or combination of overhaul, repair, inspection, replacement, modification or defect rectification of an aircraft/aircraft component.

MASTER MINIMUM EQUIPMENT LIST (MMEL)

A list established for a particular aircraft type by the manufacturer with the approval of the Status of Manufacture containing items, one or more of which is permitted to be unserviceable at the commencement of a flight. The MMEL may be associated with special operating conditions, limitations or procedures.

MINIMUM EQUIPMENT LIST (MEL)

A list which provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the MMEL established for the aircraft type.

MODIFICATION

A modification to an aeronautical product means a change to the type design which is not a repair.

a. **Major –** A major modification means a type design change not listed in the aircraft, aircraft engine or propeller specifications :

i. that might a.ppreciably affect the mass and balance limits, structural strength, performance, powerplant operation, flight characteristics or other qualities affecting airworthiness or environmental characteristics;

ii. that will be embodied in the product according to non-standard practices.

b. **Minor –** A minor modification means a modification other than a major modification.

Note – Some states use the term "alteration" instead of modification. Throughout this part alteration and modification are intended to be synonymous.

OPERATOR

A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

PROPULSION SYSTEM

A system consisting of a power-unit and all other equipment utilized to provide those functions necessary to sustain, monitor and control the power/thrust output of any one power-unit following installation on the airframe.

REPAIR

A repair to an aeronautical product means a design change intended to restore it to an airworthy condition after it has been damaged or subjected to wear.

a. **Major –** A major repair means a design change, which is intended to restore an aeronautical product to an airworthy condition :

i. Where the damage being repaired might appreciably affect the structural strength, performance, powerplant operation, flight characteristics or other qualities affecting airworthiness or environmental characteristics or

ii. That will be embodied in the product using nonstandard practices

b. **Minor –** A minor repair means a repair other than a major repair.

Guidance is presented in the appendix to Part V to assist in determining whether a particular modification or repair is major or minor.

SIGNIFICANT LATENT FAILURE

A significant latent failure is a latent failure, which would, in combination with one or more specific failures or events result in a hazardous or catastrophic failure condition.

STATE OF DESIGN

The State having jurisdiction over the organization responsible for the type design.

STATE OF THE OPERATOR

The State in which the operator’s principle place of business is located or, if there is no such place of business, the operator’s permanent residence.

STATE OF REGISTRY

The State on whose register the aircraft is entered.

SECTION ONE

CHAPTER 1 - THE AIRWORTHINESS SECTION

1.1 INTRODUCTION

The Airworthiness Section has been formed to perform the CAASL task of maintaining regular safety oversight of all of the airworthiness aspects of civil aviation in this country, which includes Air Transport Operators, Approved Maintenance Organizations, Maintenance Training Organizations and oversight of any other person or organization involved in the design/production/modification/repair/ maintenance of aircraft and training aspects of personnel engaged in civil aviation. Effective safety oversight will help to ensure high standards are maintained and will fulfill the states' obligations under the Convention on International Civil Aviation. The Section will also be responsible to carry out Auditing of the system. The personnel of this Section are responsible for carrying out all of the Safety Oversight Responsibilities assigned by the Convention on International Civil Aviation and its Annexes except for those elements that pertain to determining whether or not there is a need for a service and for determining the financial viability of an operator or a potential operator.

In order to accomplish these tasks, qualified Airworthiness Inspectors will be appointed to the Authority against established posts, who will conduct Surveillance/ Inspection/ Checks as per the policies laid down by the DGCA.

1.2 OBJECTIVE

The Airworthiness Section is organized as a part of the authority. It is authorized by the Director General of Civil Aviation to carry out all airworthiness functions.

The activities of the Airworthiness Section will be governed by the following:

a. Air Navigation Act, for exercising the duties and function under the Air Navigation Regulations [ANRs], Standards and Procedures

b. Airworthiness Inspector Handbook for Airworthiness Inspectors, Sections One (General Administration), Section Two (Operator/Maintenance Oversight), Section Three (Check List) respectively.

c. Aviation Safety Notices/Implementing Standards / Directives

d. Other relevant circulars and instructions that may be issued from time to time by the DGCA or the Director of the Airworthiness Section on delegation of powers by the DGCA.

e. Airworthiness Office Procedures Manual, SLCAP 6100

1.3 STAFFING REQUIMENTS

1.3.1 General

a. Staffing of the Airworthiness Section with a sufficient number of Airworthiness Inspectors, who has experienced, qualified and capable of accomplishing the wide range of activities covered in the Airworthiness Inspector Hand-book for Airworthiness Inspectors, is paramount to the success of the Safety Oversight Programme of the Civil Aviation Authority.

b. Airworthiness Inspectors (AwIs) must not only have the knowledge, experience and qualifications to carry out their duties in a professionally sound manner, but also possess the personality to win the respect and confidence of the operations. This would require a reasonable level of tact, understanding, firmness, impartiality, integrity and an exemplary conduct. How well they do this, will be the real measure of their success as Airworthiness Inspectors.

1.3.2 Authorized Strength Of Airworthiness Inspectors

a. The level of and the growth of aviation in the country will determine the number of Airworthiness Inspectors required. A periodical review will take place from time to time as required to determine whether or not there needs to be a change in the number of Inspectors authorized.

b. Based on the duties of Airworthiness Inspectors (Para 1.5 of Section 1; Chapter 1) ICAO Assessment report and the situation in the country, the following guidelines are considered to be the minimum number that is reasonable for Airworthiness Inspectors to carry out their tasks.

   i. One Inspector per approximately ten aircraft of a particular type.
   ii. Because of the diversity of aircraft operating in general aviation, the ratio mentioned in the above may not be feasible. In these cases, a ratio of one Inspector for five aircraft (by judiciously combining two or more types) is considered suitable. Where qualified inspectors are not available for a particular type, any airworthiness Inspector may carry out any required check.

1.3.3 Requirements for an Airworthiness Inspector

a. Should be available to do field work and work flexible hours

b. Possess qualities of initiative, tact, tolerance and patience In cases where suitable personal fulfilling the above criteria are not available, the Director General of Civil Aviation may, at his discretion, relax the requirements, taking into consideration seniority, past performance and experience.

1.4 DUTIES & RESPONSIBILITIES OF STAFF

Duties of the In-charge of Airworthiness Section

The following are the duties and responsibilities of the In-charge of Airworthiness Section:-

a. He/She is to ensure that the Airworthiness Section is organized staffed and equipped to perform its functions as required by the ANRs and the DGCA.

b. He/She is to attend to the administration of the Airworthiness Inspector in order to ensure there smooth and efficient functioning.

c. He/She is to programme the performance of the Inspections as per the guidelines lay down in this Manual.

d. He/She is to supervise the activities of the Airworthiness Inspectors

e. He/She is to liaise with the operators to ensure smooth and efficient execution of the inspection programmers.

f. He/She is to ensure that the activities of the inspections conform to rules and regulations laid down for the conduct of inspections.

g. He/She is to participate in the inspection(s) as and when possible.

h. He/She is to ensure that documents and records are maintained.

i. He/She is to submit periodic and other analytic report to the DGCA, of the results of the inspections.

j. He/She is to advise Airworthiness Inspectors maintain the currency of their licenses and arrange for any update and refresher training as required

k. He/She is to liaise with the other section of the Authority and provide them with specialized advise on all operational matters. The expertise of the Airworthiness Inspectors is to be used liberally for this.

i He/She is to advise the DGCA on all airworthiness matters relevant to air safety and help in investigation of accidents/incidents involving aircraft.

m. He/She is to organize regular meetings to ensure continuous interaction with the operators and other departments

n. He/She is to approve the movements of Airworthiness Inspectors both duty and leave

o. He/She is to keep the DGCA informed of all-important activities of the section.

1.5 DUTIES OF AIRWORTHINESS INSPECTORS

The duties and responsibilities of Airworthiness Inspectors are laid down in the Airworthiness Inspector Handbook

Airworthiness Inspectors are required to;

c. Evaluate and monitor Approved Maintenance Organizations performance of aircraft maintenance, commercial and private Aircraft operations, aircraft Flight Training Units, Aircraft Maintenance Training Organizations. Approve or reject any applications made by individuals or companies for any of the above privileges.

b. Inspect and evaluate private and commercial aircraft and aeronautical products and their documentation to determine their condition and assess their compliance with safety standards. Conduct, in co-operation with members of the CAASL Operations Section, operator certification inspections;

c. Monitoring airworthiness certifications and ensuring that they are carried out by persons who are properly authorized, and that the certifications made are for the purpose and in accordance with the requirements of the applicable airworthiness regulations. Evaluate and approve or reject any application made for Aircraft Maintenance License examinations.

d. undertaking liaison with other inspectors regarding recommendations in respect of issue and renewal of Certificates of Airworthiness, checking all documents associated with the above including the flight manual amendment status and airframe and engine log books. Checking that all relevant work carried out, and authorizing release for test flight of aircraft and avionics installation, ensuring that the resulting reports are satisfactory and in accordance with the CAASL requirements. Issue export airworthiness certificates and flight permits.

e. Evaluate and approve aircraft Maintenance programme to ensure regulatory compliance.

b. Evaluate and approve any deviation to approved maintenance programme.

c. Evaluation of design of minor modification to recommend for approval.

d. Carry out ramp surveillance of foreign and locally registered aircraft as detailed by the In-charge of Airworthiness Section.

e. Serve as Team Member, Team Leader of any audit team convened by the Director General of Civil Aviation or an authorized officer by him.

f. Serve as the Team Leader or a member of an aircraft accident investigation team appointed by the Director General Civil Aviation

g. Draw up and forward the yearly work plan for the In-charge of Airworthiness

h. All orders/ notices/ circulars issued by the In-charge of Airworthiness Section are adhered to and responded to promptly where necessary.

i. Use their initiative to pursue any matter that needs to be attended to by the Authority in the interest of air safety, morale and efficiency of the system.

j. Ensure that the confidentiality of matters dealing with the reputation of individuals is always maintained.

k. Maintain a constant dialogue with operators and officials in the aviation industry on professional matters in order to keep up to date with latest developments.

l. Enforce compliance with airworthiness regulations and directives;

m. Report breaches of regulations and directives to the appropriate authority within the CAASL;

n. Report defects noted to aircraft operators / owners / type certificate holders and approved airworthiness organizations for remedial action;

o. Conducting inspections of operator’s route station facilities. Inspection of aviation fueling equipment and procedures;

p. Evaluate applications, prepare question papers and conduct examination for issue of Aircraft Maintenance Licences;

q. Any other duties assigned by the In-charge of Airworthiness Section.

SECTION ONE

CHAPTER 2 - INSPECTOR RESPONSIBILITIES, ADMINISTRATION AND CONDUCT

2.1 GENERAL RESPONSIBILITIES

This chapter addresses many, but not all, of the responsibilities, standards of conduct, and credentials of Airworthiness Inspectors (AwIs) assigned to Airworthiness job functions. This section describes the general responsibilities of the Airworthiness Inspector (AwI). AwIs of the Airworthiness Section play a key role in ensuring that the Sri Lanka aviation system continues to be one of the safest. This responsibility for safety of aircraft covers almost every facet of airworthiness, including the certification of aircraft, maintenance facilities and personnel authorizing for maintenance; the operation and maintenance of aircraft; aircraft manufacturing organization; and the approval for aircraft design organizations. Within the Airworthiness Section of the CAASL, AwIs may be are divided by specialty; and subdivided by specific position description.

2.2 ADDITIONAL FUNCTIONS OF AIRWORTHINESS INSPECTORS

An additional role is the investigation of aircraft accidents/incidents in cooperation with the safety Investigation board (SIB), the agency primarily responsible for investigating accidents/incidents. Airworthiness Inspectors (AwIs) may also speak to student groups about career opportunities in the field of aviation, and may also, from time to time, be called upon to conduct seminars and briefings on pertinent aviation topics. Inspectors may also, from time to time be called upon to testify in administrative hearings and trials.

2.2.1 INVESTIGATIONS

Three areas that AwIs are responsible for investigating are accidents, incidents, and enforcements.

a. **Accidents:** AwIs may be required to conduct on-site accident investigations when serious injuries or fatalities have occurred. The inspector may work closely with the SIB or be solely responsible for the investigation if the SIB to the Authority has delegated it.

d. **Incidents:** AwIs are responsible for the investigation of incidents, as appropriate. Some of the incidents that require investigation are as follows:

- Foreign air carrier incidents
- Reports of emergency evacuation
- Incidents involving hazardous materials
- Noise complaints
- Damage caused by a civil aircraft

e. **Enforcement:** AwIs are required to investigate, analyze and report enforcement findings. In situations that involve alleged non – compliance AwIs are required to make recommendations concerning enforcement action.

2.2.2 SURVEILLANCE

a. Maintenance Surveillance: AwIs are responsible for the surveillance of maintenance engineers and Technicians who have been certified under the ANRs.

b. Aircraft Surveillance: A number of surveillance activities that AwIs shall perform are as follows:

i. AwIs shall conduct the following:

- Ramp inspections
- Operator main base inspections
- Spot inspections of aircraft undergoing maintenance

ii. AwIs shall inspect the following:

- Operators' Technical Logs
- Operators' training programmes
- Operators' line stations
- Operators' main base
- Operators' deicing programmes
- Operators' manuals
- Operators' maintenance records

SECTION ONE

CHAPTER 3 - PERSONAL ETHICS AND CONDUCT

3.1 PURPOSE

This section contains direction and guidance for Airworthiness Inspectors (AwIs) pertaining to principles of ethics and conduct as they affect the performance of duties.

Although some outlines are listed in this section, all circumstances an Inspector may encounter could not possibly be covered. As Inspectors are always in the public eye, they are expected to exercise good judgment and professional behavior at all times while on an off duty.

a. Unique Responsibilities of Airworthiness Inspectors; AwIs are exposed to a number of circumstances that are critical to their positions and which are not pertinent to the Sri Lanka Civil Aviation authority job functions. The Inspector has the critical position of frequently interpreting and evaluating the quality of training programmes, Airworthiness and Maintenance Exposition, Engineer/Technician/ Mechanic performance, and overall safety activities. It is imperative that all Inspectors are sensitive to the responsibilities and demands of their positions and be objective and impartial while performing their duties. Inspectors must also be sensitive to actual as well as perceived appearances of any conflict that could disrupt the effectiveness or credibility of the CAASL mission.

b. Sri Lanka Civil Aviation Authority Requirements; Inspectors are required to comply fully with the letter and spirit of the standards of conduct as set forth by this section; and with those set forth in compliance with the government service Rules. The Authority’s policy on employee conduct is designed to encourage employees to maintain a level of professionalism that will promote the efficiency of the CAASL and conform to accepted principles of conduct.

3.2 ON-THE-JOB ETHICS AND CONDUCT

The conduct of an AwI has a direct bearing on the proper and effective accomplishment of official job functions and responsibilities. Inspectors are required to approach their duties in a professional manner and to maintain that attitude throughout their activities. Through their conduct, inspectors working in direct contact with operators, and with the public, bear great working in direct contact with operators, and with the public, bear great responsibility in the determination of public perception of the CAASL.

Rules of conduct: all inspectors must observe the following rules of conduct:

- Report for work on time and in a condition that will permit performance of assigned duties

- Render full and industrious service in the performance of their duties
- Maintain a professional appearance, as appropriate, during duty hours
- Respond promptly to directions and instructions received from their supervisor.
- Exercise courtesy and tact in dealing with co-workers, supervisors, and members of the public
- Obtain approval of all absences from duty
- Conserve and protect Authority property, equipment, and materials, (Inspectors may not use or permit others to use personnel for other than official business.)
- When duties concern the expenditure of public funds, have knowledge of and observe all applicable legal requirements and restrictions
- Safeguard classified information and unclassified information that should not be given general circulation as provided by Authority order (Inspectors shall not disclose or discuss any classified information or “official use only” information unless specifically authorized to do so.)
- Observe the various laws, rules, signs, and instructions relating to personal safety
- Uphold with integrity the public trust involved in the position to which assigned
- Report known or suspected violation of law, regulations, or policy through appropriate channels
- Not engage in private activities for personal gain or any other unauthorized purpose while on authority property
- Give any supervisor or official conducting an official investigation or inquiry all information and testimony about all matters inquired of , arising under the law, rules, and regulations administered by the Authority
- Not use illicit drugs or abuse alcohol or other substances (No one known to do so will be permitted to perform any duties related to aviation safety until the Authority is satisfied that any such person is no longer a risk to public safety.)
- Not participate in telephone eavesdropping (Advance notice must be given whenever any other person is placed on the line for any purpose whatsoever). An advance verbal warning must be given when and automatic recording device or a speaker telephone is used. The use of recording devices, portable or otherwise; on telephones shall be limited to areas involving air safety.)
- Not make irresponsible, false, or defamatory statements that attack, without foundation, the integrity of other individuals or organizations (Inspectors are accountable for the statements they make and views they express.)

3.3 OFF-THE –JOB ETHICS AND CONDUCT

a. **General** - The CAASL expects AwIs to conduct themselves off duty in a manner that will not adversely reflect on the CAASL’s ability to discharge its mission. AWIs must conduct themselves while off duty in a manner that will not cause the public to question their reliability and trustworthiness in carrying out their responsibilities as employees of the CAASL.

b. **Subversive Activity** - No inspector shall become a member of any organization that the inspector knows advocates the overthrow of the government of Sri Lanka, or that seeks by force of violence to deny other persons their right under the Constitution of Sri Lanka.

c. **Meeting Financial Obligations** - All AwIs are expected to meet their private financial obligations in a proper and timely manner. Failure without sufficient excuse or reason to honor valid debts, including claims based on courts judgments and tax delinquencies, or to make and adhere to reasonable arrangements for settlement, will constitute grounds for disciplinary action.

f. **Inaugural and Ceremonial Events.** AwIs shall not accept invitations from airlines, aircraft manufacturers, or other aviation-related businesses, that are subject to CAASL regulations, or for free transportation in connection with roll-outs and similar ceremonial events.

3.4 OUTSIDE EMPLOYMENT, FINANCIAL INTERESTS, AND GIFTS

a. **Business Interests:** AwIs and their immediate families should seek clarification and guidelines before engaging in any airline or other business activity for which the CAASL has oversight responsibility. If an Inspector holds any interest that may give the appearance of impropriety, the inspector should immediately consult the DGCA for a determination.

b. **Conflict of Interest:** Inspectors who wish to participate in outside aviation activities (such as instruction, commercial flying, or any other aviation-related activity) should seek clarification and approval from the DGCA.

c. **Public Speaking:** Inspectors may not receive payment for speaking on issues that deal with their official jobs functions. Teaching or instructing at colleges, universities, or vocational schools may be acceptable, but should be coordinated and approved by the DGCA.

d. **Fund Raising:** AwIs may not participate in fund raising or soliciting donations from any business or activity for which their office is assigned oversight responsibility. Exceptions to this requirement may exist for prizes for aviation safety seminars by the aviation safety programme. They should be coordinated through the DGCA.

g. **Gifts:**
Avoiding Conflict of Interest: Gifts should be accepted only when inspector knows that the gift will not give the appearance of a conflict of interest.

Note: Inspectors shall exercise the utmost discretion when giving or receiving gifts.

SECTION ONE

CHAPTER 4 - AIRWORTHINESS INSPECTORS CREDENTIALS

4.1 GENERAL

This section contains information for inspectors concerning the types of Airworthiness Inspector (AwI) credentials and the inspector eligibility requirement and application procedures for those credentials. This section also contains direction and guidance to be used by inspectors when employing AwI credentials during the performance of inspector task.

4.2 TYPES OF CREDENTIALS

AwIs are issued two types of credentials:

i. Authority Inspector Identification that identifies as an “Authorized Inspector” for the purpose of performing duties and exercise the powers vested in ANR; and

ii. Functionary Identification from Airports Security which provides for access to different areas of Airports in Sri Lanka (under present context Airport and Aviation (SL) Limited provides for access to different areas of Sri Lanka, Bandaranaike International Airport, Ratmalana Airport and Mattala Rajapakse International Airport) and aircraft, as indicated on the credential.

4.3 ELIGIBILITY REQUIREMENTS

Airworthiness Inspectors currently assigned to positions involving air transportation inspections and surveillance are eligible to receive the CAASL credential; however, the inspector must have also completed a “Basic Airworthiness Inspector” course. To be eligible for the Airport credential, the AWI must possess (or be concurrently issued) the CAASL credential; have fulfilled the requirements set forth in this handbook and SLCAP 6100 authorizing the conduct of ramp inspections; have a job function that requires the conduct of inspections.

4.4 APPLICATION PROCEDURES

Inspectors shall apply for the two credentials by completing an application for an authority inspector credential and an Airport Security credential in accordance with the procedures. To expedite the issue of the credentials, the application may be initiated before the inspector meets the training and qualification requirements outlined in SLCAP 6100, Airworthiness Office Procedures Manual.

4.5 USE OF CREDENTIALS

Although the credentials contain the general authorization for the inspector to conduct CAASL work functions, specified work functions may only be performed after the inspector has been authorized by the DGCA appropriately and has satisfied the training and qualification requirements. The work functions for the two credentials are as follows.

a. CAASL inspector credential. The authority inspector credential identifies as individual as an "authorized inspector" for the purposes of the Air Navigation Act and Regulations and authorizes that individual to perform the duties and exercise the powers under the rules. These official duties include the conduct of ramp inspections.

b. Airport Security pass Credential. The Airport Functionary credential contains authorization for an inspector to be given free and uninterrupted access to restricted areas at airports governed by the ANRs (in this case the Airport and Aviation (SL) limited. The AASL functionary credential or Bandaranaike international airport or Mattala or Ratmalana access permit contains authorization for an inspector to airport areas as specified on the credential while the inspector is performing official duties. These official duties include these types of inspections such as ramp inspections etc. An inspector must display this credential on an outer garment to be permitted entry airport secured areas, and while working in these areas. While employing the Airport functionary credential, inspector should consider the following procedures:

- Physical Barriers: although this credential is an authorization for inspectors to be in secured areas, for physical barriers such as locked doors and gates, an inspector may need to seek local assistance to gain access. Inspectors should ask at the time of entry if the operator has any specific security programme practices and procedures that need to be followed.

- Passenger Screening Points: inspectors approaching passenger screening points may not bypass that screening: however, if the inspector is unable to afford the delay that may be involved in passenger screening, then arrangements should be made with the airport or operator personnel to enter the secured areas at other entry points.

Lost or stolen credentials. If either one or all of these credentials are lost, stolen, or damaged, the inspector should report the occurrence immediately to the In-charge of Airworthiness Section.

SECTION ONE

CHAPTER 5 - INSPECTOR FEEDBCK

5.1 INFORMATION CURRENCY

The Head of the Airworthiness Section is responsible for the revision process and to ensure that the information contained in this Handbook is correct and update. Any comments regarding its content, whether to point deficiencies or suggest improvements, should be directed to the Head of Airworthiness Section. All comments will be reviewed, and the Handbook will be amended as appropriate.

The suggestions for the amendments could be submitted in a Memo format developed by the Civil Aviation Authority internally. The incorporation of amendment to this manual is on annual basis and any amendment remains as temporary revision until incorporation.

SECTION TWO

VOLUME 1

AIR OPERATOR CERTIFICATION

CHAPTER 1 - PRE-APPLICATION AND FORMAL APPLICATION

1.1 THE CERTIFICATION PROCESS

The Air Navigation Regulations requires a person intending to operate an aircraft for private, aerial work, charter or regular public transport services to obtain an authorization from the Director General of Civil Aviation (DGCA), which is hereinafter referred to as an Air Operator Certificate (AOC). AOC specifies the nature and scope of operations granted to an air operator together with the terms, conditions and limitations applicable to such operations. An operator is required and expected to ensure that all operations undertaken are well within the requirements specified in the AOC. The process involved in issuing AOC is called the certification process. The certification process requires the CAASL to ascertain through a systematic process whether or not a prospective applicant has both the required aptitude and resources to comply with the applicable legislative requirements and to fulfil the applicant's actual and potential obligations for operation of safe, secure, efficient and regular public air transport services as proposed. The CAASL performs this task in fulfilling one of its primary obligations to the members of the public in regard to the entry certification of prospective applicants for air services operations in order to ensure provision of safe and dependable air services. This process involves six distinct phases as detailed below:

- Pre-application
- Formal application
- Preliminary financial, economic, and legal assessment of the application
- Preliminary technical assessment of the application including document review
- Operational inspections
- Decision on application and award of AOC and operations specifications (or equivalent document)

Information concerning the above step follows in this section of the Handbook.

1.2 PRE-APPLICATION PHASE

This phase includes all of the preliminary contact with the prospective operator prior to the submission of a formal application. During this time, the Authority will make the potential operator aware of the regulatory requirements which must be met in order to obtain an AOC and of the exact steps in the certification process which must be accomplished before the AOC may be issued. It is essential that the applicant has a clear understanding of the form, content, and documents required for the formal application. To this end, SLCAP 4100 – Air Operator Certification Manual, which describes the process in detail, will be provided to the potential applicant.

1.3 FORMAL APPLICATION

The formal application will consist of a letter to the Director General of Civil Aviation, Civil Aviation Authority containing the following information:

A. The name and address of the applicant and the main base of the proposed operations;

B. Description of the applicant's business organization, corporate structure, and names and addresses of those entities and individuals having a major financial interest;

C. Information on management organization and key staff members, including their title, name, background, qualifications and experience;

D. Detailed information on flight operations under the following headings:

1. Type of aircraft, communication and navigation equipment, instruments, equipment and flight documents to be used;
2. State of Registry of the aircraft - if foreign registered a copy of the lease agreement (wet lease) should be provided;
4. Data concerning each flight crew member including types of certificates or license number, ratings, medical certificate and evidence of currency in assigned aircraft;
5. Arrangements for crew and ground personnel training and qualification;
6. Installations and equipment available;
7. Proposed routes, including geographical tracks, minimum flight altitudes, destination and alternate aerodromes to be used including data on instrument approach procedures, proposed aerodrome operating minima, navigation and communications facilities;
8. Details of operational control and supervision methods to be used; and
9. Nature of operations - passenger/cargo/mail, day, night, VFR or IFR, etc.;
10. Arrangements for maintenance and inspection of aircraft and associated equipment;

E. The following specific Maintenance documents should be supplied (*as applicable to the operation)

1. General Maintenance Manual (GMM) (This manual may be combined with the GOM for certain operators.)
2. Continuing Airworthiness Maintenance Exposition/Manuals
3. Weight and Balance Procedures
4. Maintenance Programme/Manual
5. Minimum Equipment List (MEL)
6. Configuration Deviation List (CDL)

7. Maintenance Reliability Programme (*optional for small aircraft)
8. Continuous Analysis and Surveillance System (*required for 10 or more passengers under some rules)

F. Detailed description of how the applicant intends to show compliance with each provision of the applicable code of the Aviation Act/regulations;

G. Specified financial data; and

H. Desired date for operation to commence.

SECTION TWO

VOLUME 1

AIR OPERATOR CERTIFICATION

CHAPTER 2 - PRELIMINARY ASSESSMENT OF THE APPLICATION

2.1 GENERAL

The importance of a thorough and careful preliminary assessment of the application cannot be overemphasized. The more thoroughly the applicant's competence is established at the initial stage, the less will be the likelihood of having serious problems in the operational inspection phase or during the course of subsequent operations. Such an assessment is essential at an early stage to reveal any critical deficiencies in the applicant's proposals and enable the operator to prepare alternative proposals. If deficiencies are found which are such that they can be rectified, the applicant should be given a reasonable opportunity to do so; otherwise the application should be rejected.

This preliminary assessment consists of two phases:

- Financial, economic and legal assessment
- Technical Assessment/Document review

2.2 PRELIMINARY FINANCIAL, ECONOMIC, AND LEGAL ASSESSMENT

In assessing the application prior to a detailed operational inspection it will be necessary for the Inspector to make a preliminary investigation with total satisfaction that the applicant has:

- Sufficient financial resources;
- A route structure for the proposed operation;
- An intended level of service that meets a need or demand and is in the public interest;
- Proposed a type and level of operation that is in accordance with bilateral or multi-lateral air transport agreements relating to traffic rights, frequencies, capacity, routes, etc., to which the State is a party;
- Presented traffic studies or other data indicating that the proposed operation should be economically successful; and
- Management structure and suitable personnel, equipment, facilities, manuals, buildings, service agreements, etc., or will be able to obtain them.

Frequently, the financial viability of the operation is the critical factor in reaching a decision as to whether an AOC should be awarded. Sufficient financial resources must be available to the operator so that the operator is able to obtain all required equipment, facilities and manpower and be able to fully support operations in the early stages when revenues are difficult to predict and may in any case be very low. Marginal or severely limited resources frequently result in an adverse effect on safety and efficiency. Experience indicates that operators may tend to short cut such vital matters as required maintenance, acquiring adequate spare parts, training of personnel and other similar matters with safety implications. The determination of financial resources of the applicant is usually based on an audit of the operator's assets and liabilities and a thorough evaluation of financial and statistical records and other pertinent data such as proposed arrangements for the purchase or lease of aeroplanes and major equipment.

In recent years the leasing of aircraft with or without flight crew or cabin crew has come into widespread use on an international basis. Thus, in many instances the lease will involve aircraft on the register of one State leased to an operator having the nationality of another State. Unless suitable arrangements are made by the State of Registry and the State of the Operator, complex legal problems as well as safety problems, particularly in respect of the continuing airworthiness and operations supervision, may result. Consequently, the assessment of any proposed leasing arrangements should be carried out in detail. The overall subject of lease and interchange of aircraft is discussed in Volume 2 Chapter 13 of this manual and IS 91. If the proposed operation is not considered to be viable in respect of the financial, economic and legal factors, further action should be suspended until it is determined whether the deficiencies can be rectified.

2.3 PRELIMINARY TECHNICAL ASSESSMENT - DOCUMENT REVIEW

2.3.1 After CAASL has determined that the proposed operation meets the necessary financial, economic, and legal criteria enumerated in the preceding chapter, a preliminary technical assessment of the operation will be undertaken. Before this assessment can commence, the operator will be required to submit CAASL the following documents or their equivalent(s):

- Aircraft Flight Manual(s)
- Basic Operations Manual
- Flight Attendant Manual
- Minimum Equipment Lists and Configuration Deviation Lists
- Flight Operations Officer or Dispatcher Manual
- Weight and Balance Manual
- Route Manual
- Training Manual
- Dangerous Goods Manual
- Continuing Airworthiness Management Exposition / Maintenance Management Exposition (MME) or Maintenance Procedure Manual (MPM)/ as the case applicable to the organisation.
- Maintenance Training Programme/Manual (depending on applicability)
- Maintenance Programme including Maintenance Schedule and Reliability Programme (*optional for small aircraft)
- Continuous Analysis and Surveillance System (*required for 10 or

more passengers under some rules)

It must be emphasized that the company manual or manuals must be sufficiently detailed to provide a comprehensive account of practically every aspect of the operator's organization, policies, and procedures. The primary focus of the preliminary technical assessment will be upon the information provided by the prospective operator in these manuals. However, it will be necessary for CAASL inspectors to meet regularly with appropriate applicant officials in order to:

- Become fully informed concerning the nature and extent of the proposed operation, the types of aircraft to be utilized, the organizational structure, management philosophy, established lines of authority and the duties and responsibilities of key personnel;
- Develop a firm understanding regarding the applicant's proposed maintenance and inspection programme for aircraft and related equipment;
- Develop a firm understanding of the applicant's proposed system for establishing and maintaining all required company operational, maintenance and personnel records;
- Confirm the various phases of the applicant's ground school, maintenance, and flight training programmes in order to make a general assessment of their adequacy and conformity with the Authority policies relative to training;

2.3.2 Based upon a preliminary review of the content of the operator's manual system, the information contained in the application, and additional information obtained during meetings with appropriate operator's officials, the CAASL must make the following general determinations:

A. The applicant has aircraft which are suitable for the proposed operation. In this regard the following questions should be considered:

1. Are the aircraft to be operated at realistic power settings and speeds?
2. Is the aircraft's operating mass likely to be critical for the proposed operation?
3. Are operating flight levels, stage lengths and aerodrome dimensions within the aircraft's performance capability?
4. Can the aircraft be properly maintained, inspected and supported with the available maintenance and spare parts resources?
5. Are the aircraft suitably instrumented and equipped for the proposed operation?

B. The applicant has the potential overall ability to conduct the proposed operation. In this regard the following questions should be considered:

1. Can the operation as outlined, be safely executed with the resources available?
2. Is the flight crew establishment sufficient to enable the proposed operation to be carried out without infringement of flight or duty time limitations?
3. Is the requirement for aircraft utilization reasonable?
4. Does the plan of operations permit compliance with aircraft maintenance schedules?

C. Selected routes or areas of operation and minimum flight altitudes can be navigated safely with the navigation equipment available;

D. The applicant has a full appreciation for the responsibilities under the regulatory requirements including the obligations as a potential holder of an AOC;

E. The applicant has an overall fitness to safely conduct the proposed operation; this should include a comprehensive review of the background of the individuals who hold responsible positions in management or any position of significant control over the applicant's activities. As a minimum, the background and qualifications of the Directors or board members and management and executive staff should be evaluated;

F. There are provisions for the establishment of an accident prevention and flight safety programme.

G. The company's organizational structure and management practices and philosophy are adequately described so as to enable all employees to carry out their duties safely and in a standardized manner;

2.3.3 In conjunction with the above, during the course of the preliminary technical assessment, the Authority will:

A. Advice and counsel appropriate applicant personnel regarding problems and questions that arise concerning certification procedures and requirements, including explanations concerning Authority regulations and accepted methods of compliance;

B. Explain to the applicant the type of AOC that is contemplated, the significance of any limitations that may be prescribed and the operations specifications that will be issued in conjunction with the AOC;

C. Confirm, in a letter addressed to the applicant, any commitments made or serious difficulties noted during the course of the preliminary assessment;

When the preliminary assessment is completed, the Authority should be in possession of sufficient information to determine, with a reasonable degree of certainty, the ability of the applicant to satisfactorily conduct the proposed operation. If the assessment is favorable, the applicant should be encouraged to proceed with its plans with the assurance that an AOC will be issued subject to satisfactory completion of the compliance statement and operational inspection.

2.4 SCHEDULE OF EVENTS

The Schedule of Events is a list of events and activities that must be concluded, and aircraft and/or facilities that must be available to the applicant, and the dates on which any inspection items will be ready for inspection by the CAASL. The list should be prepared by he operator including the following items as well.

B. Dates when crew members will begin:

- Basic indoctrination training; and
- Aircraft systems training; and
- Simulator training; and
- Aircraft flight training; and
- Flight attendant training

C. Dates when Authority staff commences training, if applicable

D. Dates when maintenance management personnel training will begin

E. Dates when continuing airworthiness management facilities will be ready for Authority inspection

F. Dates when each of the required manuals will be available for assessment

G. Dates when aircraft will be ready for inspection

H. Date of emergency evacuation and ditching demonstrations

I. Date when terminal facilities will be ready for inspection.

J. Date when proving flights will begin

K. Date when proposed operations will begin.

L. Date of proposed assessment of head of training and checking and other approved persons.

The Schedule of Events will enable the project teams to plan workloads so as to achieve certification by the required date. Each team should examine the Schedule of Events to determine manpower requirements. Where resources are inadequate, it will be necessary to re-negotiate the schedule with the applicant. FOIs should examine the schedule to check for possible conflicts (for example, a proving flight scheduled before the FOI has completed his or her type-specialist training, or before the destination terminal facilities are ready), and negotiate changes immediately with the applicant.

Once the CAASL has accepted the Schedule of Events at the formal application meeting, every effort should be made to keep to the schedule, provided safety aspects are not compromised. The Project Manager must ensure that adequate team members are available to meet the schedule.

Since all required manuals must be reviewed and accepted or approved, the Schedule of Events must allow sufficient time to accomplish these tasks prior to the beginning of proving tests. The timing of other events, such as training, aircraft conformity checks, emergency evacuation demonstrations, should also be assessed to determine the reasonableness of the schedule. It may be necessary to advise the applicant that the proposed schedule is unrealistic and that additional time will be required to accomplish the required reviews and inspections. This will normally be done at the formal application meeting.

The applicant must be advised that any deficiencies found during the review of the manuals and other documents will require their return for re-drafting. Such action could cause delays in the certification process and this may ultimately affect the Schedule of Events. Failure by the applicant to meet proposed dates on the Schedule of Events and/or unsatisfactory inspections and demonstrations could also result in delays in the certification process. The applicant should be cautioned against premature advertising of the commencement date of operations.

The time required to train Inspectors must be considered when accepting the Schedule of Events. Should the Authority not have staff qualified on the specific type of aircraft, then the training of at least one FOI and two Airworthiness Inspectors will be required. The review of Flight Operations Manuals and CAME cannot be completed until CAASL Inspection personnel are qualified. Surveillance of crew training, which is required before proving flights commence, will also require qualified CAASL personnel.

The applicant should also be advised that non-compliance can be resolved by the granting of exemptions only where legislation allows for such exemptions. Applicants may seek short-term exemptions, without demonstrating ‘equivalent safety’, in order to commence operations at the planned date, with a proposal that compliance will be achieved at a later date. Such exemptions cannot be granted, since the legal frame work requires the CAASL to be satisfied, prior to issuing the certificate, that the applicant has, at the commencement of operations, complied with, or has the capability to comply with, all of the provisions of the Act, and the Regulations that relate to safety .

2.5 COMPLIANCE STATEMENT

The Act requires that the CAASL is satisfied that the applicant has complied with, or is capable of complying with, the provisions of the Act, Regulations that relate to safety. The compliance statement is a tool for the applicant to construct a document that provides sufficient detail to convince the CAASL that he/she both understands the requirements and has put in place the appropriate instructions, procedures and practices to ensure compliance. A properly prepared compliance statement is of benefit to the applicant both directly and indirectly. It provides a system for both the applicant and the CAASL to ensure that their obligations under the Act are completely discharged.

The Compliance Statement should be in the form of a list of provisions of the Act, and Regulations and those sections will be applicable to the proposed operation. The listing should be in sufficient detail to make reference to applicable provisions of the Act or Regulations. Next to each item the applicant must provide a brief narrative description of the means of compliance or a reference to a specific section of a manual or other document which shows the manner of compliance.

If the method of compliance has not been fully developed, the applicant should provide a brief statement indicating his or her intent. It is expected that an adequately prepared applicant will have considered in detail how he or she proposes to comply with all regulatory requirements, and consequently there should be few, if any, areas in which the applicant is unable to put forward precise information.

The Compliance Statement should be reviewed to confirm that the applicant has a clear understanding of the legislative requirements applicable to the proposed operation. The manner in which the applicant describes compliance with the specific legislation should be reviewed for adequacy, and any deficiencies discussed with the applicant. Where it is possible and reasonable to specify a particular means of complying with legislation, the applicant is expected to do so by including this in the Flight Operations Manual, or other document, and provide a reference in the Compliance Statement.

In some cases it will be sufficient for the applicant to state “The Board is aware of this limitation” or “The Company acknowledges this requirement” or similar words according to the particular case. An example of such a case may be the Regulation which requires the nationality mark and registration marks of the aircraft to be permanently affixed and kept clean and visible at all times

SECTION TWO

VOLUME 1

AIR OPERATOR CERTIFICATION

CHAPTER 3 - AIRWORTHINESS INSPECTIONS

3.1 GENERAL

The preliminary assessment of the application is a multidisciplinary approach and the preceding chapter provides the CAASL approach on the subject of Airworthiness, with a general appreciation of the scope of the proposed operation and the potential ability of the applicant to conduct it. However, before authorizing the issuance of the AOC, the CAASL will need to investigate thoroughly the operating ability of the applicant. This important and relatively more detailed phase of the investigation will require the applicant to demonstrate through day-to-day administration and operations, including in some cases a series of proving flights over the proposed routes, the adequacy of facilities, equipment, operating procedures and practices, and the competence of administrative, flight and ground personnel.

Airworthiness inspections and required demonstrations will normally be conducted in the following sequence:

a. Organizational Structure/Management Evaluation
b. Maintenance management
c. Aircraft Requirement
d. Records Inspection
e. Issue Airworthiness Certificate for an Aircraft
f. Line Station Facility Inspection
g. Main Base Facility Inspection
h. Training Programme Inspection
i. CAME /Maintenance Control Manual Review
j. Proving Flights including Line Stations

Detailed information regarding the conduct of these inspections and demonstrations is detailed in the following sections.

3.2 ORGANIZATIONAL STRUCTURE AND MANAGEMENT EVALUATION

The applicant's organizational structure, managerial style, direction and philosophy must be further evaluated to ensure that necessary and proper control is exercised over the proposed operation and the personnel involved. The preliminary assessment of this area which was conducted in accordance with the preceding chapter mainly ensured that these organizational elements were clearly spelled out in the operator's manuals and instructions. During the airworthiness inspection portion of the approval process, the inspector will have the opportunity to verify that these written policies are fully understood and implemented throughout the organization.

Through discussions with key management personnel and observations, the inspectors must determine whether clear lines of authority and specific duties and responsibilities of subordinate elements and individuals are established. These duties and responsibilities must be clearly outlined in the applicant's operations and maintenance related manuals and other company documents, and it should also be determined that acceptable procedures are established, and followed, for conveying such company procedures and operating instructions to keep affected personnel currently informed. The authorities, tasks, responsibilities and relationships of each key position must be clearly understood and followed by individuals occupying these positions.

The applicant's staffing must be investigated to determine whether an adequate number of personnel are employed at the executive and other levels to perform necessary functions. The number and nature of personnel will vary with the size and complexity of the organizations. Through a sampling questioning process, the CAASL inspector must make a finding that management personnel are qualified, experienced and competent to perform their assigned duties.

At all levels applicant personnel must be thoroughly integrated into the operation and be made fully aware of the channels of communication to be used in the course of their work and of the limits of their authority and responsibility.

3.3 MAINTENANCE MANAGEMENT

3.3.1 Personnel responsible for the inspection and maintenance organizations should possess the qualifications required in (National Regulation). If an operator/applicant elects to contract out all maintenance, the positions defined above are still required. The positions that are required include the following:

- The Continuing Airworthiness Manager, responsible for administering the operator/applicant's maintenance Programme
- The Quality Manager (In some small aircraft operations, the required service could be hired but the mechanism shall be acceptable to the CAASL) responsible for managing the operator/applicant's inspection Programme.

3.3.2 Consolidated Positions

Depending upon the needs of the maintenance organization, management positions may be consolidated with other positions. However Maintenance management and Quality Assurance shall not be consolidated.

Before allowing an individual to serve in consolidated positions, consideration must be given to other duties performed by that person. For example, if that person also plans to serve as a flight crew member, the Airworthiness Inspector (AwI) must ensure those duties will not interfere with the responsibilities as CAM or Quality Manager.

3.3.3 Separation of Maintenance and Quality Assurance Functions

A Quality manager is required for all kind of aircraft operators. Large aircraft operators may have a maintenance organization that ensures separation of production and Quality departments within the organization.

For light aircraft operators/applicants, a CAM (or equivalent) is necessary to ensure separation of quality inspection and maintenance functions. In case of hired quality assurance system is in place with the CAASL approval, the CAM serves as administrative controller with overall responsibility for separating quality inspections and Continuing Airworthiness functions.

3.3.4 Part time and Full time Positions

Although large aircraft operator/applicants should have full time management personnel, light aircraft operators may use part time personnel. Both full time and part time maintenance management personnel must have the necessary prerequisite qualifications to fulfill the responsibilities of the position.

The AwI should determine if the light aircraft operator/applicant will use part time management personnel. Each person employed on a part time basis must be readily available to fulfill all responsibilities of the position consistent with the CAMO organization’s operations.

3.3.5 Deviations; The DGCA may authorize a deviation of management personnel. A request for deviation should be processed as follows:

1. The operator/applicant's request should be submitted to the Director General of Civil Aviation and should contain the following information:

   a. The type and number of aircraft operated and the maintenance Programme(s) utilized by the certificate holder

   b. A resume of the individual for whom the deviation is requested, including:
      - Dates of experience
      - Types of aircraft
      - Specific areas of experience
      - Aeronautical experience
      - Types of management positions previously held
      - AML number
      - The dates the certificate and each rating were issued

2. The In-Charge of AW Section must review the information.

   a. The individual involved should be interviewed to verify aeronautical experience and qualifications.

   b. The person's AML should be verified through central records to verify the dates of original issuance and added ratings.

   c. The results of the data review, interview, and the AwI's recommendation or denial will be included in the submission to the Director General of Civil Aviation.

NOTE: Deviations may be granted from the minimum experience requirements. It is essential, however, that appropriate certificates and ratings be held.

3.4 AIRCRAFT REQUIREMENT

3.4.1 The type of aircraft intended to use for the operation shall receive prior approval from the DGCA. The applicant shall follow the separate instructions issued by the CAASL in this regard. In this attachment, evidence should be provided that the aircraft, facilities and service will be available to conduct the proposed operations. Evidence should be in the form of proof of purchase, formal contracts or financial lease agreements. The Operator should have at least one aircraft, which will be used for intended operations, registered in Sri Lanka to be certified as an Operator. It shall be noted that the validity of the AOC becomes null and void automatically in the event that the operator does not have at least one Sri Lanka registered aircraft in its fleet. If the formal documents are not available at this stage, letters showing the agreements will be satisfactory until the formal documents are available. It will also be necessary to provide documents showing details of the insurance for the aircraft, its occupants and third parties. The insurance scheme should be in compliance with the applicable convention(s) and / or local legislation.

3.4.2 Registration of Aircraft; Eligibility

- The aircraft shall have an approved Type Certificate equivalent to EASA Part 21/FAR Part 21 or any other aircraft certification standards which complies with ICAO Annex 8 standards and recommended practices and acceptable to the DGCA and not currently registered in any State.
- The aircraft is either owned or to be operated by a citizen of Sri Lanka or a body corporate incorporated under the law as of Sri Lanka having its principal place of business in Sri Lanka; or
  The aircraft is either fully owned or to be operated by the Government of Sri Lanka or any Public Corporation; or

In the case of leased aircraft, if it is to be operated under an AOC issued by DGCA or the applicant has applied to DGCA for issue of an AOC; or
It is owned or to be operated by any person approved by Cabinet of Ministers.

- The Aircraft shall be in Maintenance Steering Group (MSG) -03 for large Aircraft (MTOW>5700Kg) .
- The aircraft confirms to all the requirements published by the CAASL in regard to communications, navigation and surveillance equipment, safety and emergency equipment on board as per regulatory requirements in place

3.4.3 Registration Process

a. For registration of an aircraft, an application shall be made to the DGCA as appropriate. The application form is available on CAASL Sri Lanka website: www.caa.lk.
b. Along with the duly perfected application form, the applicant should supply the following documents to proceed with the application.
c. Proof of cancellation of registration certificate (de-registration certificate) if it was registered with any other state.
d. Proof in regard to eligibility of the Person/Firm in whose name the aircraft will be registered.
e. Proof of ownership of the aircraft and any other legal interest in the aircraft such as mortgage and security
f. Copy of the certificate of insurance
g. Copy of the import permit
h. If the aircraft is leased, an attested copy of the lease agreement
i. The appropriate fee as prescribed in fees schedule.
j. Upon receipt of the application form and the respective documents, the Airworthiness Section will evaluate the form for completeness; consultation of the legal section will be obtained wherever needed.
k. The aircraft should not be registered if the following conditions exist:

   - There is any doubt about the eligibility of registration of the aircraft.
   - It would not be in the public interest to register the aircraft.

3.4.4 Issue of Certificate of Registration;

- The Certificate of Registration shall be issued in the standard format given in ICAO Annex 7.
- The registration number shall be allocated as per order in the register in the format, 4R-XXX, where 4R is the designated Nationality Mark for Sri Lanka and XXX stands for letters of registration mark issued by CAASL to a particular aircraft in consultation with the operator. It shall be ensured that no

registration mark will be repeated with the existing marks in the register.

NOTE : The respective Check List of Certificate of Registration is in check list CL/AW/CL/12 to the Section 3 of Airworthiness Office Procedures manual.

3.5 RECORDS INSPECTIONS

3.5.1 Review the Applicant's CAME /Maintenance Control Manual

a. Ensure that the necessary procedures exist in the applicant's manual to ensure a suitable system for creating, preserving and retrieving required records. The procedure pertaining to review Maintenance Control Manual is given in the Chapter 6 to this section of the manual.

b. Ensure that all records will contain the following information, as applicable:

- Description of the work performed (or reference to data acceptable to the Director General of Civil Aviation)
- Name of the person(s) performing the work when the personnel are not employed by the applicant's organization
- Name or other positive identification of the individual approving the work

3.5.2 Review the Applicant's CAME Procedures.

Review the applicant's record keeping procedures to ensure that the requirements are met for the following:

1. Airworthiness Release Records. Ensure the following:

    a. Airworthiness release records will be retained for one year after the work is performed or until the work is repeated or superseded

    b. The applicant's manual identifies the person(s) authorized to sign an airworthiness release

2. Flight Maintenance Records.
Ensure that procedures provide for the following entries:

a. Flight discrepancies to be entered at the end of each flight

b. Corrective actions and sign-off, per manual procedures

c. Minimum Equipment List (MEL) deferment per the manual procedures

3. Total Time In Service Records

a. Evaluate the method of recording total time in service of airframes. This record must show the current time in service in hours.

b. Ensure that procedures are in place to retain the records until the aircraft is sold and that the records will then be transferred with the aircraft.

4. Life-Limited Parts Status

a. Ensure that the applicant has procedures for tracking the current status of life-limited parts for each airframe, engine, propeller, rotor, and appliance, to include the following information:

- Total operating hours (including calendar time) / cycles accumulated
- Life limit (total service life)
- Remaining time/cycles
- Modifications

b. Ensure that procedures are in place to retain the records until the aircraft is sold and are then transferred with the aircraft.

5. Time Since Last Overhaul Records. Ensure that the manual includes a method/procedure for updating this document from the overhaul records and ensuring that this document accompanies the aircraft upon sale

6. Overhaul Records

a. Ensure that the manual describes how the applicant will document the last complete overhaul of each airframe, engine, propeller, rotor and appliance. The overhaul record should include the following information:

- Disassembly data
- Dimensional check data
- Replacement parts list
- Repair data
- Reassembly/test data
- Reference to data including overhaul specifications

b. Ensure that these records will be retained until the work is superseded by work of equivalent scope and detail.

7. Current Aircraft Inspection Status

a. Evaluate the method the applicant will use to record the time in service since the last inspection.

b. Determine if procedures ensure that these records are retained until the aircraft is sold and are then transferred with the aircraft.

8. Airworthiness Directive (AD) Compliance. Evaluate how the applicant will comply with the record keeping requirements of the ADs. The procedures must generate a record that contains the following data:

a. Current status. Ensure that the current status data will include the following:

- A list of all ADs applicable to the aircraft
- The date and time of compliance
- The time and/or date of next required action (if a recurring AD)

b. Method of compliance. Ensure that this data will include either a record of the work performed or a reference to the applicable section of the AD.

NOTE: This data must be retained until the aircraft is sold and transferred with the aircraft.

9. Major Modification Records

a. Evaluate the manual procedures to ensure that the applicant prepares and maintains a list of current major alterations to each airframe, engine, propeller, rotor, and appliance.

b. Ensure that the list includes the following information:

- The date of the alteration
- A brief description of the alteration

10. Major Repair Records. Evaluate the manual procedures to ensure that the applicant prepares and maintains a report of all major repairs to each airframe, engine, propeller, rotor, and component.

NOTE: 1. The inspection procedure in respect of establishment of maintenance facilities and equipment will be further explained in Chapter 4 of Volume 2 to this section.
2. The inspection checklist and the record-keeping system will be further described in the Chapter 7 of Volume 2 to this Manual.

3.6 ISSUE CERTIFICATE OF AIRWORTHINESS FOR AN AIRCRAFT

Aircraft manufactured as per of FAR / EASA Part 23, 25, 27, 29 airworthiness codes or any other aircraft certification standards which complies with ICAO Annex 8 standards and recommended practices and acceptable to the DGCA for issue of Sri Lankan C of A. The aircraft imported into the country is accompanied by an export Certificate of Airworthiness which ensures that the aircraft has been manufactured with approved type certificate and meets the airworthiness requirements of the country of manufacture and the country of export. This however, does not mean that an aircraft can straight away commence flying in Sri Lanka. For the purpose of flight, the aircraft would have to be inspected and should also meet the additional CAASL Sri Lanka requirements prescribed in various regulations/ notices.

NOTE: The inspection Checklist and the requirements to be fulfilled for the acceptance of an aircraft to issue C of A further described in the Chapter 5 of this Manual.

3.7 LINE STATION FACILITY INSPECTIONS

Each aerodrome which the operator intends to use must be inspected prior to the first revenue flight to that aerodrome, in order to ensure that the operator has the organization, facilities, and staffing to handle his aircraft at that destination. Station facility inspections may be accomplished during proving flights. However, if no proving flight is scheduled to a proposed operator destination, the Authority and the operator must make arrangements to travel to and inspect that facility by another means.

NOTE : Information on station facility inspections along with the appropriate checklist / report form is contained in Section 3 Check List CAA/AW/CL/13 of Airworthiness Office Procedures manual.

3.8 MAIN BASE FACILITY INSPECTION

A. Reviews the application for accuracy and from it determine ratings and location applied for. Also determine if any maintenance functions will be contracted out.

B. Evaluate facilities. Inspect the following:

1. Housing and shop areas to ensure the following:

   a. Adequate hangers includes sufficient work space for maintenance functions to be accomplished

   b. If requesting an airframe rating, that housing includes:

      - Suitable permanent hanger for at least one of the heaviest aircraft within the weight class of the rating being sought
      - If climatic conditions allow, a permanent work dock that meets the requirements of the regulations

   c. Proper storage and protection of:

      - Materials
      - Parts
      - Supplies

d. Proper identification and protection of parts and subassemblies during:

- Disassembly
- Cleaning
- Inspection
- Repair
- Modification
- Assembly

e. Segregation of the following:

- Incompatible work areas, e.g., metal shop, battery charging area, or painting area next to an assembly area
- Parts cleaning areas

f. proper ventilation, lighting, and temperature and humidity for the type and complexity of work being accomplished

2. Technical documents to ensure that documents:

a. Are in compliance with national requirements

b. Are appropriate for the maintenance to be performed

c. Are current, accurate, and complete and in the maintenance organizations possession

d. Are easily accessible to personnel

e. Include a method to ensure revisions are made

3. Equipment, tools, and test equipment, per rating sought, to ensure:

a. Required types and quantities are available and under the control of the organization.

b. All required items are serviceable and within calibration criteria, to include traceability to one of the following:

- The National Standards
- Standard established by the item's manufacturer
- If foreign manufactured, the standards of the country where manufactured, if approved by the Director General of Civil Aviation
- A record keeping system of calibration results

NOTE: If the maintenance org. utilizes an engine test cell, it must be correlated to the manufacturer's specifications.

C. Review Personnel list. Ensure that:

1. Personnel directly in charge of maintenance functions are appropriately licensed or approved in accordance with appropriate legislation.

2. The maintenance organization/applicant has sufficient number of supervisory and inspection personnel that list at least one appropriately licensed mechanic in a supervisory position.

3. The maintenance organization/applicant's staff list includes inspectors authorized to make final airworthiness determinations

   NOTE: In component repair shops, technical supervisory personnel may be licensed mechanics or otherwise approved mechanics, if appropriately experienced.

3.9 TRAINING PROGRAMME INSPECTION

3.9.1 Effective training is the basis for the development of a successful maintenance/inspection Programme. Although many procedures for maintaining and inspecting aircraft may be similar, the equipment, procedures, and task documentation used may all be unique to the operator/applicant's specific Programme.
Maintenance/inspection training Programmes are the most efficient manner to inform personnel of the requirements of the operator/applicant's Programme.

3.9.2 The training Programme could be described in detail in the maintenance control manual or in a training manual, as part of the maintenance control manual but issued as a separate volume. The choice will generally depend upon the extent of the operation and the number and types of aircraft in the operator's fleet. Most applicants find it convenient to set forth their training Programmes in a training manual to facilitate easy applications and updating. Depending on the scope and complexity of the proposed operation the required training Programmes may be carried out under the direct control of the applicant or conducted by other training facilities under contract to the applicant or a combination thereof. In this case, the applicant will be required to provide a comprehensive description of the contracted training for approval by the CAASL. In any event the AwI will carry out a thorough analysis of all phases of the applicant's training Programmes. This analysis should permit a determination as to whether the training methods, syllabus, training aids/devices, training standards, related facilities and record keeping are adequate. The qualifications of personnel and relevant recurrent professional training for the training instructors should be established as well as evaluation of their effectiveness.

For the purposes of initial approval of training Programmes for issuance of an AOC, the CAASL may require the applicant to formalize in detail only those training courses which must be accomplished prior to the first revenue flight of the airline. Other courses, may be fully developed after the commencement of regular operations and before heavy maintenance is required

3.10 EMERGENCY EVACUATION DEMONSTRATION

In order to demonstrate that the airplane seating configuration, location and operation of emergency exits, and crew training and procedures will permit a successful evacuation of passengers in an emergency situation, the applicant will have to perform an emergency evacuation demonstration, prior to issuance of an AOC, for each aircraft type which operator intends to operate. In case the existence of separate cabin safety section, the activity should carryout jointly with the cabin safety section.

3.11 PROVING FLIGHTS

As a final demonstration that the operator has the proper organization, facilities, equipment, and training to successfully carry out revenue flights, the applicant will be required to perform a series of proving flights in accordance with the guidance contained in Air Operator Certification Manual (SLCAP 4100)

SECTION TWO

VOLUME 1

AIR OPERATOR CERTIFICATION

CHAPTER 4 - ISSUANCE OF THE AOC AND OPERATIONS SPECIFICATIONS

4.1 GENERAL

When properly conducted and documented, the assessment and inspection Programme outlined in the foregoing chapters will enable CAASL to determine if the applicant has fulfilled all technical safety and regulatory requirements for the issuance of an AOC. The Programme will have provided specific information related to:

A. the scope of the applicant's proposed operation;

B. the adequacy of the organization and resources;

C. the adequacy and effectiveness of company policies, directives, operating instructions and procedures prescribed by the applicant to be followed by the personnel in the conduct of the operation; and

D. the applicant's willingness and ability to implement the State's operating regulations and rules applicable to the proposed operation.

It will also reveal any deficiencies related to the operation and provide opportunities during the assessment and inspection phases for the applicant to remedy any such deficiencies to the satisfaction of the CAASL.

4.2 DETERMINATION ON THE APPLICATION

Following the completion of the assessment and inspection Programme, the Inspectors will be in a position to recommend to the DGCA that the applicant is either:

A. properly equipped and capable in all respects of conducting the proposed operation safely, efficiently and reliably in accordance with the AOC's operations specifications or limitations; or

B. is not, or is not yet (pending correction of specified deficiencies), capable of conducting the proposed operation in an acceptable manner.

In those cases where the application is successful, the CAASL will prepare an Air Operator Certificate accordingly. The format and the relevant detailed information to be included in AOC and Specifications are explained in SLCAP 4100 - Air Operator Certification Manual. Operations specifications and limitations which will be applicable to the certificate will also be prepared for the operator as described in 4.4 below.

Should the applicant be considered not yet capable of conducting the proposed operation in the required manner, an AOC will not be issued and the applicant will be advised appropriately by a letter, indicating the reasons for the lack of approval.

4.3 ISSUANCE OF THE AIR OPERATOR CERTIFICATE

Provided that the DGCA is satisfied with the reports of the CAASL inspectors and has determined that there is no economic or legal bar to the proposed operation, it should proceed with the issuance of an AOC and the associated operations specifications.

In accordance, the AOC will contain or make reference to the following information:

- Operator's identification (name, location);
- Date of issue and period of validity;
- Description of the types of operations authorized;
- The type(s) of aircraft authorized for use; and
- Authorized areas of operation and routes.

When the AOC is issued the operator should be provided at the same time with officially authenticated copies of the approved operations specifications. The operator should also be advised as to the procedure to prepare and process future requests for amendments of operations specifications.
Once the operator has received the AOC and the approved operations specifications, the operator may inaugurate the flight operations authorized. Thereafter, the operator is responsible for conducting all operations in full compliance with these authorizations and the applicable provisions of the applicable regulations. From that moment, CAASL will establish a continued audit on the operator to ensure that the required standards of operation are maintained, in accordance with Chapter 1 of Volume 2 of this manual.

4.4 ISSUANCE OF OPERATIONS SPECIFICATIONS

4.4.1 Operations specifications (or an equivalent document) and limitations applicable to an AOC will be issued in conjunction with the issue of the certificate. These operating specifications and limitations hereinafter referred to as operations specifications are utilized to supplement the general provisions of the basic certificate and to list authorizations and limitations not specifically covered by Authority regulations. The combined issuance of the AOC and the operations specifications constitute Authority approval of the operation.

4.4.2 For purposes of standardization and administrative convenience, operations specifications may be divided into separate parts as follows:

Part A - General Provisions

Part B - En-route authorizations and limitations
Part C - Aerodrome authorizations and limitations
Part D - Maintenance
Part E - Mass and balance
Part F - Interchange of equipment operations
Part G - Aircraft leasing operations

SECTION TWO

VOLUME 1

AIR OPERATOR CERTIFICATION

CHAPTER 5 - AIRWORTHINESS CERTIFICATION

(a) ISSUE & RENEWAL OF CERTIFICATE OF AIRWORTHINESS

Note. For the purpose of the procedures describe in this section, the term "Aircraft" is intended to include its engines, propellers, and instruments and equipment.

5.1 GENERAL

5.1.1 All aircraft engaged in flight operations must have a valid Certificate of Airworthiness issued or rendered valid by the State in which the aircraft is registered. The recommended procedure to be followed in the issuing or rendering valid Certificate of Airworthiness is given in this chapter.

5.12 In the issue of Certificates of Airworthiness the Airworthiness Section will need to consider three basic situations:

A. The issuance of a new Certificate of Airworthiness when an aircraft is First registered in the State. This can be a newly manufactured aircraft or an aircraft coming from a foreign State;

B. The renewal of a Certificate of Airworthiness issued by the State; and

C. The validation of a Certificate of Airworthiness issued by a foreign state for an aircraft to be entered on the State register (this function is ceased under the present context).

5.2 ISSUE OF A CERTIFICATE OF AIRWORTHINESS

5.2.1 The Certificate of Airworthiness should cover the following Requirements:

A. An application should be completed and submitted together with duly completed check list CAA/AW/CL/11 on Section 3 of Airworthiness Office Procedures manual to the AW Section;

B. The applicant should specify the design standards/airworthiness requirements according to which the type aircraft was certificated;

NOTE: The Airworthiness Section may, from time to time, stipulate special requirements to be met before a Certificate of

Airworthiness is issued. These should be listed as special conditions and communicated to the applicant.

C. The applicant should make the aircraft available, at a time and place acceptable to the AwI, for such checks and inspections considered necessary by the AW Section;

D. It should be the responsibility of the applicant to provide personnel and equipment so that these checks and inspections may be satisfactorily carried out;

E. All relevant records of previously completed inspection, Maintenance, flight test and calibration should be made available for inspection by the AW Section;

F. All work required to be done on the aircraft for the issue of a Certificate of Airworthiness should be carried out under the supervision of an organization approved by, or acceptable to, the AW Section and should be carried out in a proper manner and conform to the requirements, specifications, drawings and instructions relating to the approved design of the subject aircraft;

G. Full particulars of the work done should be entered in the appropriate logbook and a maintenance release should be issued;

H. When the particulars of the work done occupy so much space that it is not practical to record all details in the space provided in the log book, the details should be entered in a separate maintenance record which should be numbered for identification purposes, the certificate in the same manner as that required for the relevant entry in the log book. The reference number of such record should be entered in the log book, together with a brief description of the work to which the record relates;

I. The applicant should carry out a flight test to prove satisfactory functioning of the avionics;

J. The performance and handling qualities of the aircraft should be tested in flight, if required, to schedules approved by the AW Section; and

K. The organization referred to at item F should provide a certification that the aircraft is fit to fly as far as can be reasonably determined from inspections of the aircraft and its records and manuals, and that all applicable Airworthiness Directives and mandatory modifications and inspections of the State of Design and the Airworthiness Section have been carried out and/or certified to have been carried out.

L. The aircraft to be inspected by an Airworthiness Inspector in accordance with the guidelines of acceptance of aircraft check list Airworthiness Office Procedures manual to the AW Section.

5.2.2 Documents for examination:

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

5.2.3 Documents for retention.

The applicant should be required to provide the following documents for examination and retention by the AW Section:

A. A copy of the Type Certificate and the Type certificate technical data sheets or acceptable equivalent documents;

B. A copy of the Certificate of Airworthiness for Export issued by the state of Manufacture, and the current certificate of Airworthiness;

C. A copy of the flight Manual or acceptable equivalent document;

D. A copy each of the manufacture's maintenance, overhaul and repair manuals and illustrated parts catalogues;

E. A complete set of all manufacturer's service bulletins or equivalent documents issued in respect of the aircraft;

F. A copy of the crew operations manual;

G. A copy of the mass and balance report;

H. A flight test reports for the avionics systems;

I. A flight test report for the aircraft;

J. A copy of "maintenance planning data";

K. An electrical load analysis covering all services;

L. Unless held by the applicant and available for examination – a complete set of wiring diagrams covering all electrical and radio installations; and

M. Where applicable, a copy of the Master Minimum equipment List (MMEL).

5.2.4 The applicant should be required to make the necessary arrangements with aircraft and engine manufacturers for the provision to the AW Section of amendments to the manuals together with any service bulletins that may e issued from time to time.

5.3 RENEWAL OF A CERTIFICATE OF AIRWORTHINESS

5.3.1 An application for renewal of a Certificate of Airworthiness should be completed and submitted to the AW Section at least thirty days prior to the expiry of the Certificate.

5.3.2 The procedures and directives developed by the AW Section for the renewal of certificate of Airworthiness should cover the following requirements :

A. The applicant should be required to make the aircraft available, at a time and place acceptable to the AwI, for such checks and inspections required by AW Section. The operator should submit the duly completed check list in CAA/AW/CL/15 in Section 3 of Airworthiness Office Procedures manual to the AW Section;

B. The applicant should be required to provide the necessary personnel and equipment so that required checks and inspections may be satisfactorily carried out;

C. All relevant records of previously completed inspection, maintenance, flight test and calibration should be made available for inspection by the AW Section;

D. All work for the maintenance of Airworthiness of the aircraft should be carried out under the supervision of appropriately licensed aircraft maintenance personnel or of an organization approved by, or acceptable to, the AW Section and should be carried out in a proper manner and conform to the requirements, specifications, drawings and instructions relating to the approved design of the subject aircraft;

E. Full particulars of the work accomplished should be entered in the appropriate log book and maintenance release should be issued;

F. In those cases where it is not practical to record all details of work accomplished in the space provided in the log book, the details should be entered in a separate maintenance record which should be numbered for identification purposes, and certified in the same manner as that required for the relevant entry in the log book. The reference number of such a record should be entered in the logbook, together with a brief description of the work to which the record relates;

G. The weight of the aircraft should be determined as required by the AW Section;

H. The applicant should carry out a flight test to prove satisfactory functioning of the avionics or previous flight report confirming same to be submitted; and

I. The performance and handling qualities of the aircraft should be tested in flight to schedules approved by the AW Section or previous flight report confirming same to be submitted.

5.3.3 The applicant for renewal of a Certificate of Airworthiness should be required to provide the following documents for AW Section examinations:

A. A copy of an inspection report giving brief details of the work done since the last renewal of the Certificate of Airworthiness. This report should be in the form of a schedule and should include the following documents:

i. A record of the work accomplished since the last renewal of the certificate;

ii. A record showing details of major checks carried out since the last renewal of the certificate;

iii. A record of airframe, engine and propeller flying hours as follows:

- the total flying hours for the airframe since new and the flying hours since the last renewal;
- the total flying hours for the engine(s) since new and the flying hours since the last overhaul;
- the total flying hours for the propellers since new and the flying hours since the last overhaul;

iv. A record showing compliance with service bulletins, modifications and Airworthiness Directives or their equivalent; and

v. A record of major component changes;

B. A Weight and Balance report carried out in compliance with regulatory requirements. The report should include a copy of the mass determination record, the mass and centre of gravity schedule and a list of the basic equipment.

C. A flight test report for the avionics system or statement of no discrepancies; and

D. A flight test report for the aircraft or previous flight report if no significant maintenance has been accomplished since then

NOTE : Required inspection checklist of C of A Renewal is in the Section 3 checklist CAA/AW/CL/15 of Airworthiness Office Procedures manual to the AW Section.

5.4 VALIDATION OF A CERTIFICATE OF AIRWORTHINESS

5.4.1 ICAO Annex 8 requires that when a State of Registry renders valid a Certificate of Airworthiness issued by another Contracting State it shall provide a suitable statement of authorization to be carried with the former Certificate of Airworthiness. The validity of the authorization shall not extend beyond the period of validity of the Certificate of Airworthiness. However, whenever the period of validity of the Certificate of Airworthiness is renewed, the authorization may be renewed or another authorization issued by the State of Registry for a period not exceeding the period of validity of the Certificate of Airworthiness. The CAASL has ceased this privilege as a current practice.

5.5 AIRWORTHINESS FLIGHT TEST

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

A. Aircraft under investigation for the issue of a Certificate of Airworthiness which have previously been issued with a Certificate of Airworthiness by a Contracting State;

B. Aircraft being flown for an airworthiness flight test for renewal of a Certificate of Airworthiness; and

C. Aircraft under investigation for the approval of modifications incorporated after the issue of a Certificate of Airworthiness.

5.5.2 Flight Tests – Issue of a Certificate of Airworthiness

When an application is made for the issue of a Certificate of Airworthiness, Flight tests should have been completed (Customer Acceptance Manual could be used) in the originating State to a Flight Test Schedule acceptable to the AW Section to establish compliance with:

A. The airworthiness requirements of the originating State;

B. Such other conditions prescribed by the AW Section as special conditions for the issue of a Certificate of Airworthiness;

C. In certain circumstances the AW Section may require special flight tests to be carried out to determine conformity with the national airworthiness requirements. If this procedure is necessary, the applicant should be notified and should arrange for the tests to be conducted by personnel acceptable to the AW Section;

D. The flight test schedules for the special test should be prepared by the applicant and should require the approval of the AW Section; and

E. The applicant should submit to the AW Section the results of the special tests in a flight test report acceptable to the AW Section.

5.5.3 Flight tests – Renewal of a Certificate of Airworthiness

Flight tests associated with the renewal of a Certificate of Airworthiness should be conducted in accordance with an Airworthiness Flight Test Schedule prepared for the aircraft type and approved by the AW Section The flight tests are required to ensure that the aircraft flight characteristics and the functioning in flight of the aircraft do not differ significantly from the normal performance for the type. Flight performance should be checked against the appropriate sections ‘of the Flight Manual which is fully amended to current standards.

5.5.3.1 At the conclusion of an airworthiness flight test in connection with renewal of the Certificate of Airworthiness, the test report should be prepared in a manner acceptable to the AW Section and should include the results of tests specified in the Airworthiness Flight Test Schedule, including a statement of observed performance versus Flight Manual performance for the same configuration and atmospheric conditions.

5.5.3.2 Airworthiness Flight Test Reports should be submitted to the AW Section. If any phase of the tests needs to be repeated, the AW Section should give notification of requirements.

5.5.4 Flight test - modification

If in the opinion of the AW Section, a modification is likely to affect the flight characteristics, performance or functioning in flight of the aircraft, the AW Section may decide that special flight tests are required. If so decide, the Flight Test Schedule should include:

A. Tests necessary to established compliance with the appropriate airworthiness requirements. In particular cases other tests, not confined to flight tests, may be necessary to prove that the modification has not adversely affected airworthiness requirements; and

B. Flight tests necessary to provide information for inclusion in the Flight Manual, and other documents associated with the Certificate of Airworthiness.

At the conclusion of a flight test, a flight test report should be prepared in an approved from which should include the results of the tests specified in the Flight Test Schedule for the aircraft concerned.

Flight Test Reports should be submitted to the AW Section for approval. IF examination of a Flight Test Report reveals that certain tests need to be repeated, the AW Section should give notification of requirements.

5.5.5 Flight test - personnel

The airworthiness flight tests specified above should be carried out by pilots and crew approved for the purpose by the AW Section. They should be appropriately licensed for the particular type of aircraft concerned and competent to conduct the tests laid down in the Airworthiness Flight test schedule.

SECTION TWO

VOLUME 1

AIR OPERATOR CERTIFICATION

CHAPTER 6 - COMPANY MANUAL (CONTINUING AIRWORTHINESS MANAGEMENT EXPOSITION / MAINTENANCE CONTROL MANUAL)

AIR OPERATOR AND MAINTENANCE ORGANIZATION ADMINISTRATION

6.1 OBJECTIVE

This chapter provides guidance for evaluating an operator/applicant's company manual (maintenance control) or revision to ensure that policies, procedures, and technical criteria meet state regulatory requirements.

The organization’s manual (CAME/MCM) should provide clear guidance to personnel on how the activities included in the approval are managed, their personal responsibilities and how compliance with the appropriate continuing airworthiness requirements is achieved. It should also include a statement of the organization’s policies and objectives. If this manual is used also to comply with the maintenance manual requirements of Annex 6, Part 1, 11.3, and IS Part M section M.A.302 the Aircraft Maintenance Programme should be included.

6.2 GENERAL

A. A company manual (CAME/MCM) should enable the operator's maintenance and servicing personnel and maintenance management personnel to carry out their duties at a high level of safety. The complexity of the manual will vary with the complexity of the operation. The manual should cover specific items in accordance with Applicable State Regulations, but may include additional items at the discretion of the applicant.

B. Manual approval can be a cause of delay in the certification process, in case;

1. If the operator/applicant does not have experienced and qualified personnel to prepare an acceptable manual, the use of a consultant may be appropriate. A consultant can be used in an advisory position only.

2. The applicant shall compile the manual based on compliance checklist guidance .The manual should be reviewed against the checklist developed by CAASL for this purpose. After the review, the Manual should be returned to the operator/applicant with a list

of any discrepancies found. The operator/applicant should be informed that final certification will not be completed until discrepancies are corrected. Inspectors should be concerned primarily with ensuring regulatory compliance.

6.3 REVIEWING OPERATOR/APPLICANT'S MANUAL

A. The manual is an administrative tool used to control and direct personnel. It should define all aspects of the maintenance management operation.

1. The policies and procedures section should address organizational matters.
2. The maintenance section should address policies and procedures for administering the inspection and maintenance requirements, test flight requirements, and other subjects, as applicable.

B. The manual should include detailed instructions or specific references for accomplishing inspections and maintenance functions. It should also include forms, instructions, and references for recurring non routine requirements such as engine changes and inspections following abnormal occurrences (hard landings, lightning strikes, severe turbulence, high brake energy stops, etc.).

C. Manufacturers' technical manuals provide instructions for accomplishing specific tasks. These documents also establish methods, technical standards, measurements, and operational test procedures. The policy and procedures section of the operator's manual should describe areas of application for the pertinent technical documents.

D. The following are examples of manual sections and titles. The list which follows is not exhaustive, but includes the principal topics which need to be considered for inclusion as procedures in the manual. The operator should not be required to follow the order laid out below however all topics listed below should be included in this manual. If this manual is used also to comply with the company manual (maintenance control) requirements of Annex 6, Part I, 11.3, b) which states that the manual shall contain: an aeroplane maintenance Programme, approved by the DGCA, containing airworthiness maintenance tasks and intervals at which these tasks are to be performed; the aircraft maintenance programme should be included.

Suggested contents of the Manual: Pls refer CAME compliance checklist xxx

Part I - Management

1.1 Corporate commitment by the accountable manager
1.2 Background Description of the organisation
1.3 Management Organisation Chart
1.4 Duties and responsibilities of management personnel

1.5 Training Policy
1.6 List of certifying staff
1.7 General description of facilities at each approved location
1.8 Scope of work under the approval
1.9 Notification procedures to the airworthiness authority regarding changes to the organization's activities/approval/location/personnel.
1.10 Amendment procedures for the manual

Part 2 - Maintenance Procedures

2.1 Supplier evaluation procedure.
2.2 Acceptance/inspection of aircraft components and material from outside contractors.
2.3 Storage, labelling/tagging and release of aircraft components and material to aircraft maintenance.
2.4 Return of defective aircraft components to store.
2.5 Control of defective components sent to outside contractors for overhaul, etc.
2.6 Sub-contract procedures
2.7 Acceptance of tools and equipment.
2.8 Calibration of tools and equipment.
2.9 Use of tooling and equipment by staff (including alternate tools).
2.10 Cleanliness standards of maintenance facilities.
2.11 Technical Maintenance Data for aircraft/aircraft components including manufacturers service information and updating and availability to staff.
2.12 Airworthiness directives procedure
2.13 SB/Optional modification procedure.
2.14 Repair procedure.
2.15 Weight & balance control
2.16 Procedures for compliance with an operator's aircraft maintenance Programme
2.17 Maintenance documentation in use and completion of same.
2.18 Technical record control.
2.19 Records for the operator (if the organization is not an operator itself).
2.20 Control of computer maintenance record systems
2.21 Rectification of defects arising during base maintenance.
2.22 Release to service procedures to include:
  a. Issue of the maintenance release required by Annex 6, Part 1, 8.5;
  b. Certification as airworthy after overhaul, component replacement, inspection, modification or repair.
2.23 Reporting of defects and other occurrences as required by the airworthiness authority.
2.24 MEL revision and control of MEL.

Part 3 - Line Maintenance Procedures (when applicable)

3.1 Line maintenance control of aircraft components tools, equipment, etc.
3.2 Line maintenance procedures related to servicing/fuelling/de-icing, etc.

3.3 Line maintenance control of MEL, defects and repetitive defects.
3.4 Line procedure for pooled parts and loan parts.
3.5 Line procedure for return of defective parts removed from aircraft.
3.6 Reference to specific maintenance procedures such as:
engine running procedures;
aircraft pressure run procedures;
aircraft towing procedures;
aircraft taxiing procedures

Part 4 - Quality System Procedures

4.1 Quality audit of organization procedures.
4.2 Quality audit of aircraft.
4.3 Quality audit remedial action procedure.
4.4 Analyzing the effectiveness of the Maintenance Programme
4.5 Reliability Programme
4.6 The qualification and training procedures for personnel issuing certifications in respect of airworthiness after overhaul, etc., and for release to service ("certifying staff")
4.7 Records of certifying staff
4.8 The qualification and training procedures for quality audit personnel
4.9 The qualification and training procedures for mechanics
4.10 Exemption process control
4.11 Concession control or deviation from organization's procedure
4.12 Qualification procedure for specialized activities such as non-destructive testing (NDT), welding.
4.13 Control of manufacturer's working teams based at the premises of the organization, engaged in tasks which interface with activities included in the approval
4.14 Quality audit of sub-contractors (or acceptance of accreditation by third parties, e.g. use of NDT organizations approved by a State regulatory body other than the airworthiness authority).

Part 5 - Examples of standard documents used by the organization

5.1 Manuals should be easy to revise and should show the date of last revision on each page. The manuals must have a page control system showing the number of pages and including the latest revision. The page control system is usually identified as a list of effective pages.

5.2 The operator/applicant is responsible for ensuring that manuals present adequate guidance to meet all regulatory requirements. The operator/applicant must understand and accept this responsibility early in the certification process.

5.3 An Airworthiness Inspector (AwI)) may, when necessary, formally request revision to any part of the maintenance control manual when such revision is in the interest of safety, or when the manual does not meet regulatory requirements. An Airworthiness Inspector (AwI) also may formally request revision to any part of the maintenance control manual when such revision is in the interest of safety, or when the manual does not meet the requirements of the applicable standards of CAASL. This authority should be used only when the need for revisions is adequately substantiated by safety considerations or by the appropriate state regulatory requirements and when informal discussions with the operator fail to accomplish the necessary revision.

6.4 EVALUATE MANUAL CONTENTS

6.4.1 GENERAL

The following paragraphs expands the summary of manual contents as listed in the item D of the above paragraph.
The manual should contain:

A. Definitions. Any terms contained in the manual that are unique to the operator's operation must be defined.

B. Manual revision and distribution procedures. The certificate holder's manual must describe the revision control procedures and how the distribution of manuals will be controlled.

- Manuals must be easy to revise and have the date of last revision on each page. The manuals must have a page control system that shows the number of pages and ensures that the latest revision is included. The page control system is usually identified as a list of effective pages.

- Manuals must have a distribution system that ensures that all applicable staff has a copy, or have ready access to the manual and incorporate amendments into it when issued. Manuals issued in media other than paper must be supplied with appropriate reading equipment

C. Copies of operations specifications (or similar document such as Scope of Approval) are normally included in the manual. The operator may decide, however, to insert pertinent excerpts from these documents.

D. References to appropriate Civil Aviation Regulations are required to be in the manual as appropriate.

6.5 MANAGEMENT ORGANIZATION

The manual should contain;

A. A chart or description of the certificate holder’s organization. The organizational chart must describe, at a minimum, the management personnel and major functions. However, it is recommended that the chart cover the operator’s entire organization.

B. The duties responsibilities and authority of management and inspection personnel.

C. A general description of the facilities at every approved location

D. Scope of work authorized by the CAASL

E. A list of Contract Organizations. This list should include organizations with whom the certificate holder has arranged to perform any of its maintenance, including a general description of the work and how quality is monitored.

6.6 MAINTENANCE PROCEDURES

The manual should contain:

A. Procedures that should be followed while performing any maintenance of the certificate holder’s aircraft, including airframes, aircraft engines, propellers, rotors, components, and emergency equipment These procedures should ensure that:

- All maintenance is performed in accordance with the method described in the certificate holder’s manual
- Competent personnel, adequate facilities, and equipment are provided for accomplishing maintenance
- Each aircraft released to service is airworthy and properly maintained
- Those items of maintenance that must be inspected are designated. The designations should include at least those items which, if maintenance is not performed properly or if improper parts or materials are used, could result in a failure, malfunction, or defect endangering the safe operation of the aircraft.
- Methods of performing required inspections and the occupational title(s) of persons authorized to perform each required inspection are in the manual.
- Procedures are included for re inspecting work performed under previous inspection findings (rejected item procedures)
- Procedures, are included which state the standards, and limits for the acceptance or rejection of inspected items

- Instructions are included to prevent any person who performs work on any item from performing the duplicate or required inspection of that work
- Procedures are included to ensure that all required inspections are performed
- Procedures are included to ensure that any maintenance not completed, as a result of employee shift changes or similar work interruptions, are properly completed before the aircraft is released to service
- Instructions and procedures for all maintenance is included
- A list of required maintenance related forms and the requirements for preparation

6.7 RECORD KEEPING

Time limitations or standards for determining time limitations for overhauls, inspections, and checks of airframes, engines, propellers, appliances, and emergency equipment are included

A suitable system, which may include a coded system, providing for preservation and retrieval of information in a manner acceptable to the Director General of Civil Aviation and which provides the:

- A description of the work performed or reference to data acceptable to the Director General of Civil Aviation
- The name of the person performing the work if the work is performed by a person outside the organization of the certificate holder
- The name or other positive identification of the individual approving the work

A Computerized record keeping system must have back-up and security procedures acceptable to the CAASL. (refer to Volume 2, Chapter 7 of this manual)

6.8 CONTROL & CALIBRATION OF PRECISION TOOLS

Procedures, standards, and limits necessary for periodic inspection and calibration of precision tools, measuring devices, and test equipment shall be are included in the manual. The manual shall include details of the following:

- Recording system
- Method of identifying calibrated items
- Method of identifying calibration due dates
- Calibration intervals
- Calibration standards
- The person responsible for carrying out the calibrations, and
- The responsibilities of all staff in ensuring that only calibrated tools are used during maintenance which requires the use of calibrated tools.

Procedures for ordering accepting and control of specialized tooling required for the maintenance of aircraft and components.

6.9 FUELING

Procedures for aircraft refueling, and defueling including:

- elimination of fuel contamination and checking procedures
- fire protection (including electrostatic protection)
- supervision and protection of passengers during refuelling

6.10 TRAINING

The manual should include training Programmes to ensure that each person who performs, supervises, or certifies maintenance is competent and is fully informed about procedures, techniques, and new equipment in use.

Training Programmes should include:

- Programme description
- Maintenance refresher training on current aircraft and equipment
- Frequency of training.
- New equipment training
- Inspection procedures & techniques for maintenance and inspection staff

6.11 MAINTENANCE LOG

The manual should provide procedures for the reporting and correction of mechanical irregularities. in the maintenance log and elsewhere These procedures should address the following:

- The recording of defects and irregularities in the aircraft maintenance
- The method of ensuring that the aircraft maintenance log is readily accessible to each flight crew member
- The Minimum Equipment List (MEL). Procedures for actioning MEL items
- Placarding those items declared to be MEL items.
- Deferred maintenance

6.12 MAINTENANCE RELEASE

A. The manual must provide Maintenance release procedures, and procedures for making maintenance record entries in the aircraft log. The procedures shall include a certification that:

   - Work was performed in accordance with the requirements of the manual
   - All items required to be inspected were inspected
   - No known condition exists that would make the airplane unairworthy

- So far as the work performed is concerned, the airplane is in condition for safe operation

NOTE: Rather than restate the above requirements each time a maintenance release is executed, the operator/applicant may provide a statement in the manual that the signature of a properly authorized person constitutes that certification.

B. The manual shall also include:

- The qualifications and authorization of persons authorized to issue maintenance releases
- Definition of when a maintenance release is required
- The form and manner in which a maintenance release will be documented
- Provision of a copy to the pilot in command

6.13 APPROVED PARTS PROCEDURES

A. The manual must provide procedures to ensure that approved parts and materials are used, including:

- Evaluation of suppliers
- Dispatch of components to outside repair agencies – ensuring required maintenance is described & carried out.
- Receiving inspection, including acceptable incoming documents and records control
- Shelf time control
- Preservation of parts
- Parts identification system
- Disposition of failed/scrap/surplus parts
- Parts robbing and swap
- Parts pooling/borrowing

6.14 TECHNICAL SERVICES

The manual must provide modification and repair procedures which shall ensure that:

- All Airworthiness directives are actioned in a timely manner,
- All manufacturers optional service bulletins and other service information is evaluated and appropriate action taken,
- All damage is repaired in accordance with approved data.
- Any modification is carried out in accordance with approved data.

6.15 TECHNICAL PUBLICATIONS

The manual must provide procedures which will ensure that all technical publications used for maintenance are up to date, controlled, and are available to applicable staff.

6.16 WEIGHT AND BALANCE CONTROL

Methods and procedures for maintaining the aircraft's weight and center of gravity within approved limits are included

6.17 OPERATOR'S CONTINUING ANALYSIS AND AUDITING PROGRAMME

The manual must provide the specifics of the operator's continuing analysis and surveillance Programme, including:

- Quality audit of organization procedures.
- Quality audit of aircraft.
- Quality audit remedial action procedure.
- The qualification and training procedures for personnel issuing certifications in respect of airworthiness after overhaul, etc., and for release to service ("certifying staff").
- Records of certifying staff.
- The qualification and training procedures for quality audit personnel.
- The qualification and training procedures for mechanics.
- Concession control for deviation from organization's procedures.
- Qualification procedure for specialized activities such as non-destructive testing (NDT), welding, etc.
- Control of manufacturer's working teams based at the premises of the organization, engaged in tasks which interface with activities included in the approval.
- Quality audit of sub-contractors (or acceptance of accreditation by third parties, e.g. use of NDT organizations approved by a State regulatory body other than the airworthiness authority).
- Mechanical performance and Reliability Programmes.

6.18 TEST AND FERRY FLIGHTS

The manual shall contain:

A. Test flight requirements and limitations are required to be in the manual. These include:

   - Items requiring test flight
   - Procedures for performing test flight

B. Ferry flight limitations and procedures

6.19 MANDATORY REPORTING

The manual should provide the following reporting procedures:

- Reporting the occurrence or detection of each failure, malfunction or defect of mechanical reliability
- Reporting each interruption to a flight, unscheduled change of aircraft enroute, or unscheduled stop or diversion from a route

caused by known or suspected mechanical
- Submitting required aircraft and engine utilization reports to the CAASL
- Ensuring that all major alteration reports are submitted to the CAASL
- Ensuring that reports of major repairs are prepared and retained by the operator (these may be in the form of engineering orders, if the operator/applicant is so structured)

6.20 LINE MAINTENANCE PROCEDURES

The manual should also contain other procedures, including:

- Parking aircraft in high winds
- Short term storage
- Long term storage
- Seasonal operation
- Removing ice and snow from aircraft
- Towing
- Emergency procedures
- Run-up/taxi personnel authorizations
- Aircraft ground run-up
- Taxiing aircraft
- Ramp signals and procedures
- Jacking, lifting, and hoisting
- Use of landing gear down locks
- Use of external gust locks
- Aircraft cleaning, including materials used for cleaning and flame proofing materials after dry cleaning
- Engine change
- Propeller change
- Cylinder change
- Engine and propeller over speed
- High oil consumption
- Oil leaks
- Engine and propeller troubleshooting
- Oxygen and nitrogen servicing and storage

6.21 CAT II OR III OPERATIONS & ETOPS

The manual should include additional maintenance for Category II or Category III operations and ETOPS, as applicable.

NOTE :

The compliance checklist for review of CAME is in checklist CAA/AW/CL/01, in section 3 of Airworthiness Office Procedures manual

SECTION TWO

VOLUME 1

AIR OPERATOR CERTIFICATION

CHAPTER 7 – INSPECTION OF FACILITIES AND EQUIPMENT

7.1 OBJECTIVE

This chapter provides guidance to CAASL Airworthiness Inspectors for evaluating a maintenance organization facility for original certification, renewal of certification, change in rating, change in scope and limitations, change in location or facilities. This chapter can be applied to an AOC holder or an Approved Maintenance Organization.

7.2 GENERAL

A. When determining the suitability of permanent housing for the maintenance of airframe, the Airworthiness Inspector (AwI) should consider climatic conditions. This is to determine if worker efficiency will be adversely affected by high or low temperatures, excessive dust or sand, or other conditions. The AwI should also consider the maintenance being performed to determine if work processes are affected by conditions.

B. Because of the requirements for biannual testing of system of aircraft operating under IFR and other specialized services such as X-ray, magnaflux, etc., there may be a need for a station to have the capability to move from location to location.

- Certificate holder / applicants may move any or all of their material, equipment and technical personnel from place to place for the purpose of performing their functions. The address shown on the maintenance organization application will be considered the station’s permanent location.

- If the station wishes to establish a location different than that shown on the application, the applicant should apply for sub-base certification.

C. Applicants for Accessory or instrument ratings must possess the equipment and have the capability to inspect, test, and where necessary calibrate the items that will be worked on.

7.3 SUB-BASE MAINTENACE ORGANIZATIONS INSPECTIONS

A. Approved maintenance organization may apply for certification of additional facilities or locations as sub –bases of a parent organization. This enables the parent facility to control inspection procedures at each facility and location. Each such station must satisfy all regulatory requirements for each rating sought. A sub-base facility inspection is conducted in the same manner as a maintenance organization facility inspection.

B. A letter must accompany the application. This letter must:

- Request the application be processed
- Indicate when the facilities and equipment will be ready for inspection
- Show the certificate number of the present station.

C. An application for the sub-base station need not be limited to the ratings held by the parent organization. The ratings sought by the sub-base must be on the application.

D. A maintenance organization wishing to operate a sub base maintenance facility in a foreign country must apply for a foreign maintenance organization certificate, not a sub-base certificate.

7.4 FOREIGN MAINTENANCE ORGANIZATION INSPECTIONS

A. The supervisory personnel of a foreign maintenance organization must be able to understand Air Navigation Regulations of Sri Lanka and the maintenance and service instructions of the articles to be worked on. These personnel are not required to hold national AML licenses or approvals.

1. If no certificate is held, determination of performance qualification is made by using oral tests, practical tests, or any method acceptable to DGCA.

2. Supervisory personnel or personnel responsible for the final certification of work on an aircraft of Sri Lanka at a foreign maintenance organization must be able to read, write, and understand English

B. Although foreign maintenance organizations are not required to comply with all Civil Aviation regulations, they are required to make report and keep records in compliance with CAA - SL Regulations

7.5 CONTRACT MAINTENANCE FACILITIES

A. Air Navigation Regulations of Sri Lanka requires an applicant for a Certificate of Approval for a maintenance organization to provide a list of maintenance functions to be performed by other organizations / persons. To ensure the original certification criteria will continue to be met, the certificate holder must submit a revised listing when changes occur. It is the inspector's responsibility to ensure that Air Navigation Regulations allow the work to be contracted out. This listing must be retained in the Airworthiness Section.

B. If work is contracted out to a non certificated person; the certificate holder/applicant is responsible for ensuring that all work is performed in accordance with regulatory requirements.

C. If a certificated maintenance organization intends to perform job functions that were previously contracted out, Airworthiness Inspectors should plan to observe these Functions during surveillance. If this requires the addition of facilities or equipment to perform these functions, they must be inspected prior to use.

7.6 EVALUATION OF BASE / SUB-BASE / FOREIGN MAINTENANCE ORGANIZATION FACILITIES

A. Receive/Review Application Documents/Maintenance Procedures Manual. Review the application for accuracy and a determination of ratings or location applied for. Also determine if any maintenance functions will be contracted out.

B. Evaluate Housing and Facilities. Inspect the following:

1. Housing and shop areas to ensure the following:

a. Adequate housing includes sufficient workspace for maintenance functions to be accomplished

b. If requesting an airframe rating, that housing includes:

- Suitable permanent housing for at least one of the heaviest aircraft within the weight class of the rating being sought
- If climatic conditions allow, a permanent work dock that meets the requirements of Air Navigation Regulations.

c. Proper storage and protection of:

- Materials
- Parts
- Supplies

d. Proper identification and protection of parts and subassemblies during:

- Disassembly
- Cleaning
- Inspection
- Repair
- Alteration

- Assembly

e. Segregation of the following:

- Incomplete work areas, e.g., metal shop, battery charging area, or painting area next to an assembly area
- Non portioned parts cleaning area

f. Proper ventilation, lighting, and temperature and humidity for the type and complexity of work being accomplished

2. Technical documents to ensure that documents:

a. Are in compliance with Air Navigation Regulations and Standards

b. Are appropriate for the maintenance to be performed

c. Are updated, accurate and complete, clear and concise in maintenance organization's Possession.

d. Are easily accessible to personnel and are controlled (no unauthorized copies).

e. Include a method to ensure revisions are made

3. Equipment, tools, and test equipment, per rating sought, to ensure:

a. Required types and quantities are available and under the control of the maintenance organization

b. All required items are serviceable and within calibration criteria, to include traceability to one of the following:

- National standards
- Standard established by the item's manufacturer
- If foreign manufactured, the standards of the country where manufactured, If approved by the DGCA.

c. System exits, which make it readily apparent to the user that, the item is not overdue for calibration.

d. A record keeping system exits of calibration results.

NOTE: If the maintenance organization utilizes and engine test cell, it must be correlated to the manufacturer's specifications

C. Review qualified staff list to ensure that:

1. Personnel directly in charge of maintenance functions for the maintenance organization are licensed / approved in accordance with Air Navigation Regulation of Sri Lanka

2. The certificate holder / applicant has appropriately qualified and adequate number of aircraft certifying staff

3. The certificate holder/ applicant's staff list includes appropriately authorized personnel to make final Maintenance Release.

D. Analyze Findings:

If deficiencies were found, inform the certificate holder / applicant for possible corrective actions.

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 1 – INTRODUCTION TO THE CONCEPT OF CONTINUING AIRWORTHINESS

1.1 GENERAL

NOTE : General Information on the continuing airworthiness procedures followed in individual ICAO Contracting Status is published in ICAO Circular 95 – The Continuing Airworthiness of Aircraft in Service.

1. Continuing airworthiness covers all of the processes ensuring that, at any time in their operating life; all aircraft comply with the airworthiness requirements in force and are in a condition for safe operation.

2. It includes, under the control of the respective Civil Aviation Authorities of the State of Design and the State of Registry:

    a. Design criteria, which provide the necessary accessibility for inspection and permit the use of established processes and practices for the accomplishment of maintenance.

    b. Preparation by the organization responsible for the type design of the specifications, methods, procedures and tasks necessary to maintain the aircraft and publication of this information in a format that can be readily adapted for use by an operator.

    c. Adoption by the operator of specifications, methods, procedures and tasks, using the information provided by the organization responsible for the type design and preparing that material in the form of a maintenance programme suitable for its operation;

    d. The reporting of defect and other significant maintenance and operational information by the operator to the organization responsible for the type designs in accordance with the requirements of the State of Registry.

    e. The analysis of defect, accident and other maintenance and operational information by the organization responsible for the type design, 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;

f. Consideration of, and, as deemed appropriate by the operator or the State of Registry, action on the information provided by the organization responsible for the type design or the State of Design, with particular emphasis on action designated as " mandatory";

g. Accomplishment by the operator of all mandatory requirements concerning the aircraft with particular reference to fatigue life limits and any special tests or inspections required by the certification process or subsequently found necessary to ensure structural integrity; and

h. Preparation of and compliance with Supplemental Structural Inspection programme and subsequent requirements related to aging aircraft.

1.2 STANDARD CERTIFICATES OF AIRWORTHINESS

1.2.1 BACKGROUND

a. Aircraft airworthiness certification is the whole process of assessing an aircraft type against its type design and condition for safe operation, which culminates in issue of a Certificate of Airworthiness (C of A) for an individual aircraft. Type certification is a part of the process of aircraft airworthiness certification which leads to issue of a Type Certificate or equivalent document. This is necessary before individual C of As can be issued.

b. The obligation for Contracting States of the International Civil Aviation Organization (ICAO), to issue C of As, is laid down in Part II, Section 3 of ICAO Annex 8, "Airworthiness of Aircraft". A C of A may be issued on the basis of satisfactory evidence that an individual aircraft complies with the appropriate airworthiness requirements, and that the aircraft has been constructed and assembled satisfactorily.

c. C of A is issued for individual aircraft as one of the preconditions to the aircraft being able to fly legally, in the sense of being fit to fly. Actual aircraft type approval stops at the issue of the Type Certificate.

d. Certification of individual aircraft (the C of A issue process) involves:

i. ensuring that the aircraft conforms with the definition of the design and its method of construction i.e. the aircraft conforms to the type design; this in turn ensures that the aircraft meets:

- a design standard; and
- the specified airworthiness requirements;

ii. ensuring that the aircraft is free from manufacturing and post-production test defects;

iii. ensuring that the required modifications, as dictated by both design changes and specific national Airworthiness Directives (ADs), have been embodied;

iv. ensuring that the required operational equipment has been fitted;

v. Ensuring that the aircraft's airworthiness state is properly reflected in the required documentation including alterations have been carried out in accordance with approved data.

1.2.2 STANDARD CERTIFICATES OF AIRWORTHINESS

A standard C of A may be issued in the following categories:

- Transport
- Normal
- Utility
- Acrobatic
- Commuter
- Manned free balloons

1.2.2.1 Transport Category:

a. transport category applies to multi-engined aircraft primarily intended for the regular public transport of passengers and/or cargo for hire or reward;

b. Transport category generally applies to aircraft with a maximum take-off weight (MTOW) in excess of 5700 kg. Such aircraft must meet the airworthiness standards for transport category aeroplanes (FAR Part 25 / EASA 25 for aeroplanes, or FAR Part 29 / EASA 29 for rotorcraft), or be automatically accepted from a country recognised by the Authority, or comply with the predecessors or equivalents of these standards.

c. there are some exceptions to the requirements outlined in (b) above:

i. Nothing precludes a multi-engined aircraft of less than 5700kg MTOW being certificated in the transport category, if that is the election of a manufacturer. However, the aircraft type must still meet the applicable standards (e.g. FARs Part 25 or Part 29 or EASA part 25 and part 29);

ii. commuter category aircraft may be in excess of 5700 kg MTOW;

iii. some normal category types may be in excess of 5700 kg MTOW e.g. aircraft certificated under Special FAR (SFAR) Part 41;

d. Some countries airworthiness standards include a transport category of aircraft based on FAR Part 23 (normal) certification, as long as certain minimum design features (such as multi-engined configuration) are met.

1.2.2.2 Normal Category:

a. Normal category applies to aircraft which are intended for non-acrobatic operation, having a seating configuration (excluding pilot seats) of nine seats or less, and a MTOW of 5700 kg or less, or 2750 kg or less for rotorcraft;

b. Normal category aircraft must meet the appropriate airworthiness standards (e.g. FAR Part 23 / EASA 23 for aeroplanes, or Part 27 / EASA 27 for rotorcraft), or be automatically accepted from a recognised country, or comply with the predecessors or equivalents of these standards;

c. Note that normal category aeroplanes which have been type-certificated under the JAR-VLA design requirements carry more design restrictions than the broad category specified in (a) above:

i. single, non-turbine engine only;

ii. two seats or less;

iii. MTOW of 750 kg or less;

iv. stall speed of 45 knots or less, in the landing configuration; operating restrictions are also placed on JAR-VLA types fitted with an engine certificated under FAR Part 32;

d. Notwithstanding the nine seats maximum limitation expressed in (a) above, normal category includes aircraft certificated under SFAR 41 and SFAR 23 (with weight and seating limitation extensions).

e. Non-acrobatic operation includes:

i. Any manoeuvre incidental to normal flying;

ii. Stalls, other than flick stalls;

iii. Lazy eights, chandelles and steep turns, in which the angle of bank does not exceed 60^0.

1.2.2.3 Utility Category:

a. Utility category applies to aeroplanes, gliders and powered sailplanes which can be used for limited acrobatic operations, having a seating configuration (excluding pilot seats) of nine seats or less, and an MTOW of 5700 kg or less. Utility category aircraft can be considered as normal category “plus” aircraft, and can thus, for example, provide more operational flexibility as a basic training aircraft;

b. Utility category aircraft must meet the appropriate design requirements (eg. FARs Part 22 or 23), or be automatically accepted from a recognised country, or comply with the predecessors or equivalents of these standards. Design requirements additional to those required for normal category include increased structural load and design dive speed factors;

c. Limited acrobatic operation includes:

i. spins (if approved for the particular type);

ii. Lazy eights, chandelles, and steep turns, or similar manoeuvres, in which the angle of bank is more than 60^0, but not more than 90^0

1.2.2.4 Acrobatic Category:

a. Acrobatic category (aerobatic category has exactly the same meaning) applies to aeroplanes, gliders and powered sailplanes which can be used for acrobatic operations, having a seating configuration (excluding pilot seats) of nine seats or less, and a MTOW of 5700 kg or less. Acrobatic aircraft can be flown without restrictions, other than those shown to be necessary as a result of certification flight testing;

b. Acrobatic category aircraft must meet the appropriate design requirements (e.g. FAR Parts 22 or 23), or be automatically accepted from a recognised country, or are aircraft which complied with the predecessors or equivalents of these standards.

1.2.2.5 Commuter Category:

a. commuter category applies to aircraft which are intended for non-acrobatic operation, and which are multi-engined, propeller-driven aeroplanes having a seating configuration (excluding pilot seats) of 19 seats or less, and a MTOW of 8618 kg or less;

b. Commuter category aircraft must meet the appropriate design requirements (e.g. FAR Part 23), or be automatically accepted from a recognised country. The design code (from a specified amendment onwards) calls up a number of design requirements for commuter category additional to those specified for normal category, in areas such as performance, structural, control and powerplant certification, and thus confer a higher level of safety than is intrinsic to the normal category. In this sense, the commuter category design code is often referred to as “FAR 23 plus”.

1.2.2.6 Manned Free Balloon Category:

a. manned free balloon category applies to non-power-driven, lighter-than-air aircraft, where lift may be derived by systems such as hot air or trapped light gas;

b. Manned free balloons must meet the appropriate design requirements (eg.FAR Part 31).

1.2.3 Standard C of As are only issued to aircraft which meet prescribed airworthiness standards e.g. either the EASA or FAA Part 23 (a design standard for small aircraft); Part 25 (a design standard for transport category aircraft); Part 31 (a design standard for manned free balloons).

1.2.4 Special C of A or special flight permits cover all other cases.

1.3 APPLYING FOR A STANDARD CERTIFICATE OF AIRWORTHINESS

1.3.1 Who may apply

a. The regulations generally state that “the holder of the Certificate of Registration (C of R) is eligible to apply for a Certificate of Airworthiness for the aircraft

b. The holder of a C of R is normally the person who has the custody and airworthiness control of the aircraft (otherwise defined as the “owner”). Therefore one major prerequisite for application for a standard C of A is that the aircraft must already be registered on the Civil Aircraft Register.

1.3.2 Other basic prerequisites

As well as the aircraft being registered and appropriately marked, in accordance with the regulations, there are normally two other basic prerequisites for issue of a standard C of A.

a. the aircraft must have been type certificated; a Type Certificate, Type Acceptance Certificate, or equivalent document must have been issued;

b. many states require that a fireproof plate is secured to the aircraft, eg:
"An (insert country name) aircraft shall carry, secured to the aircraft in a permanent position near the main entrance, a plate of fireproof metal or other fireproof material of suitable physical properties inscribed with the nationality mark and registration mark of the aircraft and with such other details as the Authority requires to give effect to the Convention".

1.3.3 The application form

A standard C of A application should be made on the prescribed Form which is available in the Airworthiness Section or download from caa.lk webpage.

1.4 AIRCRAFT SOURCES

1.4.1 General

The sourcing of an aircraft involved in a standard C of A application process has a direct bearing on the expense, effort, time and data provision requirements. The relevant variables being:

a. whether the aircraft is locally or foreign manufactured;

b. whether the aircraft has been based in this state prior to application, or whether it is being imported;

c. whether the aircraft is new or used;

d. whether the aircraft is a first-of-type (FOT) or first-of-model (FOM) for the purpose of C of A application;

e. the age of the aircraft;

f. the modification status of the aircraft.

1.4.2 Country of manufacture

a. If an aircraft is one of a type manufactured in this state, then, as a general rule, there should be few complications associated with provision of data necessary for design conformance; type certification data will be held within the Authority resources, and the C of A applicant would not normally be troubled in this regard.

b. If an aircraft of foreign manufacture has been approved for operation in this state, then it will have been issued with some form of Type Certificate or equivalent document, depending on the era of such approval

c. Some state's regulations allow the Authority to automatically issue a Type Acceptance Certificate (TAC) for an aircraft type that has a current Type Certificate issued to it by one or more recognised overseas authorities.

d. If a type acceptance certificate cannot be issued as per the above paragraph, then a full design validation must be undertaken by the Authority. This involves scrutiny of design data by the Authority technical specialists, and possibly a team technical visit to the manufacturer's site, in the case of transport category aircraft, and small aircraft if new technology or unique design is involved. The applicant for this process to be undertaken (which would normally be the C of A applicant) is liable for the costs of such an exercise, which are additional to the normal C of A costs. The whole validation process culminates in issue of a Type Certificate.

e. If the authority has no technical specialists, the authority may hire an external Agency. The cost to be borne by the applicant.

1.4.3 Imported aircraft

It is desirable for an application for a standard C of A for aircraft being imported into this state to be supported by a foreign export C of A or equivalent document (as discussed in more detail later in this chapter, and that local format logbooks and other documentation have been raised

1.4.4 Used aircraft

Used aircraft obviously have a “history” of operation, and some data in regard to this as discussed further below will be required

1.4.5 First-of-type/First-of-model

a. The following are definitions of “type” and “model”:

   i. “type” means a design and make of aircraft and refers to a group of essentially similar aircraft which, although possibly existing in different models, stem from a common basic design;

   ii. “model” means a particular version of an aircraft type, such as would be distinguished from another version of the same type by a change of sufficient effect on the weight and balance, structural strength, operational characteristics, or other characteristics as would require a separate entry on the type certificate identifying and approving the particular version as distinct from the identification and approval of other versions.

b. The Authority may produce a Ground Inspection Report (GIR), based on the C of A issue exercise for a First of Type (FOT) or First of Model (FOM) aircraft. It is for this reason that such a C of A issue exercise is more time-consuming than those for subsequent aircraft of the type or model. FOT/FOM C of As issue exercises are normally only carried out by the Authority inspectors. One criteria may be that the particular aircraft is a similar model to an aircraft already issued with a local C of A.

c. Any condition identified during the ground inspection will be included as a condition on the C of A for all aircraft of this type and model.

1.4.6 Age and modification status

Old aircraft and those incorporating major modifications usually incur some extra time and effort in terms of documentary requirements, as discussed further below.

1.5 SUPPLY OF DATA

1.5.1 The applicant should be advised that timely submission of the following data for inspection by the CAASL will assist in the processing of an application for the issue of a C of A. It is in the applicant's interest that such submission should be made at the time of application, or as soon as practicable thereafter

1.5.2 A. All aircraft

i. the Certificate of Registration
ii. evidence that there is a local Type Certificate or Type Acceptance Certificate in force for the aircraft type and model;
iii. evidence that the particular aircraft complies with the type design;
iv. the logbooks or equivalent maintenance records for the aircraft;
v. the current weight and balance report;
vi. A copy of the Aircraft Flight Manual (AFM), if it is required by the regulations.

B. Used aircraft

i. data listed in (A):and
ii. the following data from the aircraft's service history:

a. total hours and flights of the aircraft and all life limited components;
b. number of landings made, or if not available, a reliable estimate thereof;
c. number of cabin pressurization cycles and the pressure differentials to which the cabin has been subjected during its life;
d. statement describing the past operational uses of the aircraft, including any special mission roles and the approximate times in each role;
e. record of total hours and/or operating cycles, as appropriate, of all designated life-limited components of engines;

f. record of all major structural and life-limited component changes such as those of wings, rotor blades, tailplanes etc., and the individual histories of such components unless new when fitted;

g. record of all major structural repairs, and details of all salvage schemes, including the nature and cause of the damage in each case e.g. corrosion, cracking, lightning strike and accidental damage;

h. record of all major repairs performed on manned balloons;

C. Aged aircraft:

Special requirements may be imposed on used aircraft with MTOWs in excess of 5700 kilograms where the aircraft are in Maintenance Steering Group (MSG) -03. For such aircraft, data requirements are:

i. data listed in (b) above;

ii. details regarding previous operators of the aircraft, previous countries in which the aircraft has operated, and details of all structural repairs to the aircraft not carried out in accordance with the manufacturer's approved data; and

iii. a copy of the relevant Structural Inspection Document (USA FAA Advisory Circular No. 91-60 is relevant).

D. Imported aircraft:

i. data listed in (a), (b) or (c) as appropriate; and

ii. one of the following documents:

   a. A current export C of A for export to this state, or current C of A. or

   b. A written statement from the aircraft manufacturer, or from a maintenance organization with an appropriate approval for aircraft maintenance for the type, that all applicable Airworthiness Directives (ADs) issued by the appropriate authority of the country of manufacture, or, for aircraft types certificated in this state as per 7.2 (c) above, that all applicable ADs issued by the authority of the recognised country that issued the type certificate (if this is not the country of manufacture), have been complied with, and that the aircraft conforms to Type Certificate requirements.;

E. Modified aircraft:

A major modification is a change in the type design which has an appreciable effect on the weight, balance, structural strength, reliability, operational characteristics, or other characteristics affecting the airworthiness of an aircraft, aircraft engine or propeller, but not so appreciable as to necessitate a change to the Type Certificate. The major modification may be incorporated as a Supplemental Type

Certificate (STC). This is discussed in paragraph 1.10 of this document. For aircraft incorporating major modifications, the data requirements are

i. data as listed in the applicable paragraph (a) to (e) above; and
ii. written evidence that the modifications were incorporated in accordance with approved data:

a. manufacturer's data approved by a recognized authority; or
b. data approved by a recognized authority in the country of manufacture; or
c. data approved by an appropriate locally authorized person;

1.6 THE AIRCRAFT INSPECTION

1.6.1 As well as carrying out detailed documentary checks on the data and documentation provided as per the above paragraph, the AwI should carry out a physical inspection of the aircraft or be satisfied that the aircraft has been inspected and conforms to the type design, and is in a safe condition for flight.

1.6.2 The applicant should be made aware that the aircraft should be made available at a time and place mutually agreed to between the AwI and the applicant.

1.6.3 The physical inspection involves the completion of detailed checklists, and encompasses:

a. Inspection of structure, systems and engines, to the extent considered necessary to verify the aircraft is in a safe condition for flight, and to correlate physical aspects with the aircraft's documentation. The inspector will arrange provision of inspecting aids and checklists, but the applicant will be responsible for providing internal access to structure and systems if this is beyond the inspector's scope using his or her limited resources;

b. checking the correctness of registration markings and fireproof plate;

c. correlation of aircraft data plate details with documentation;

d. ensuring all placards as called up by the AFM, Maintenance Manual and/or ADs are correctly positioned, formatted and legible;

e. ensuring the role equipment is correctly installed; and

f. Operational equipment as required by the aircraft's intended role e.g. instrumentation, communication and navigation equipment, oxygen provisions, survival equipment etc. is correctly installed.

1.6.4 Formal non-compliance documents are not raised during the inspection process. Rather, the AwI will continue a dialogue with the applicant in this regard, advising him or her of deficiencies if and as they are discovered, and advising the applicant in regard to the need for rectification. Non-compliances may be pursued in different ways:

a. Rectified before the C of A can be issued;

b. The applicant accepting operational restrictions on the aircraft for subsequent use.

c. Transferred to the flight and technical log as deferred defects.

1.6.5 In case the requirement may arises some particular form of check test flight during the course of the C of A aircraft inspection process e.g. to investigate apparent design non-compliances, or the nature of defects, which cannot be resolved by ground inspection alone.

1.6.6 Once the aircraft and document inspections by the AwI have been satisfactorily completed and any flight test satisfactorily completed, then that person completes the process and the C of A is issued to the applicant.

1.7 CONDITIONS APPLIED TO A CERTIFICATE OF AIRWORTHINESS

The Authority is permitted under the regulations to place any condition on the issue of a C of A considered necessary in the interests of aviation safety. This may include operational limitations. Any condition will be in writing, attached to the C of A.

The AwI will, as a matter of course, fully discuss all proposed C of A conditions with the applicant prior to issue of the C of A. The aircraft must be subsequently operated and/or maintained under the terms of the C of A conditions.

1.8 STATUS OF THE CERTIFICATE OF AIRWORTHINESS

1.8.1 Duration

Some states do not require that standard C of As be renewed on a periodic basis, although the C of A can be issued for a specific period. However the prevailing philosophy is to ensure ongoing airworthiness of aircraft through prescribed maintenance requirements, surveillance and other continuing airworthiness controls. Basically the C of A validity period should not be less than one year in Sri Lanka.

1.8.2 Cancellation/Suspension

The DGCA has the power to suspend or cancel a C of A. Such action should be through written notice to the holder of the C of A, who is normally the C of R holder. Such action will be taken if maintenance on the aircraft is not carried out in accordance with Air Navigation Regulations in force, and/or, in the case of regular public transport aircraft, if type certification support, in the sense of continuing airworthiness obligations, ceases from an overseas source. If the CAASL otherwise considers cancellation/suspension action is warranted in the interests of safety, then it may also suspend or cancel the C of A.

A suspension of a C of A will be lifted on a date prescribed by the CAASL.

If a C of A has been cancelled, either through action as per the above or after an aircraft ceases to be on the Register, then a new C of A will be required.

1.8.3 Variation

If a condition on a C of A is to be varied by the CAASL, then the C of A will be re-issued.

1.8.4 Surrender

If a C of A stops being in force, expires or is suspended or cancelled, the holder of the C of A must surrender it to the CAASL, on written request from the DGCA.

1.9 OVERSEAS ISSUE OF AN CERTIFICATE OF AIRWORTHINESS

1.9.1 The Authority normally reserves the right to accept or refuse a request to assess an aircraft overseas.

1.9.2 The applicant must make a written, justifiable request to the Airworthiness Section that will be issuing the C of A, providing:

a. the reasons (justification) for the request;

b. details of the location of the aircraft;

c. details of the maintenance organization that will be performing maintenance on the aircraft.

d. aircraft type and model;

1.9.3 It is normal for the applicant to acknowledge in writing that he or she accepts the principle of full cost recovery, including travel and accommodation costs. These costs should be in addition to the C of A issue fees.

1.10 SUPPLEMENTAL TYPE CERTIFICATES

1.10.1 A STC formally identifies a major modification normally carried out on an aircraft by a party other than the type certificate holder, and is supported by an approved data package.

1.10.2 A STC incorporated into an aircraft for which C of A issue is required will fall into one of three groups:

a. an STC of local design, approved by the Authority;

b. a foreign STC which has been previously accepted by the Authority; or issued by an authority of a recognized country and automatically accepted;

c. STCs which have not been approved or accepted by the Authority as per (a) and (b) above.

1.10.3 An STC must be applicable to the particular aircraft by serial number and be in accordance with the Type Certificate or Type Acceptance Certificate certification basis.

1.10.4 In the case of the above, it will be the responsibility of the applicant to furnish to the Authority the design data package for the STC, so that the Authority technical specialists may carry out a design validation. The package required, consisting of drawings, test reports, flight manual supplement (if required) etc., is that lodged by the STC holder to the regulatory authority which issued the STC. Applicants must be aware that the prime aircraft manufacturer and any overseas regulatory authority involved are under no obligation to, and indeed may be precluded from, supplying the STC data package. The applicant will have to negotiate with the STC holder, and this often takes time; the STC holder will normally charge for provision of the data. Costs are the applicant's responsibility.

1.10.5 If the authority has no technical specialists, the authority may hire an external Agency. The cost to be borne by the applicant.

1.10.6 Finally, a physical inspection, as part of the overall C of A issue inspection, of the STC as fitted to the specific aircraft, may be required in order to establish conformity of the STC. However, the aircraft documentation should be checked that the continuing airworthiness and maintenance requirements are adequately addressed.

1.11 ASSOCIATED MATTERS

1.11.1 Noise certification

Noise certification for individual aircraft is required before the aircraft can legally be operated in some countries. Aircraft noise is regulated through the Regulations. Noise certification or lack of such has no legal impact on type approval, or individual C of A issue. However, if an individual aircraft does not meet the noise requirements, then it may be illegal for that aircraft to operate, even though the aircraft may have a valid C of A.

1.11.2 Maintenance release

A maintenance release is not issued prior to C of A issue. However, an aircraft operating on a standard C of A cannot legally fly until a maintenance release has been issued and is in force.

SECTION TWO

VOLUME 2

AIR OPERATOR/ MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 2 – INSPECTION OF OPERATORS MAIN BASE FACILITY

2.1 BACKGROUND AND OBJECTIVES

This chapter describes the process of inspecting an operator's maintenance/contract maintenance facility for regulatory compliance.

2.2 GENERAL

The maintenance inspection is performed to ensure that adequate housing, equipment; spare parts, technical data and qualified personnel are being utilized to satisfactorily complete all maintenance functions. Further details of main base facility inspection is described under chapter 4 Approved Maintenance Organization to this manual.

2.3 PERFORMING THE INSPECTION

A. **Equipment Identification**. The Airworthiness Inspectors should be aware of the type of aircraft being operated. The operations specifications or attached listing will identify the type of aircraft authorized for use.

B. **Previous Inspection Reports**. Previous inspection reports, correspondence, and other documents in the CAASL office files should be reviewed to determine if there are any open items or if areas are identified that require special attention.

C. **Facilities**. The maintenance facility is required to perform maintenance in accordance with the operator's maintenance manuals. The inspector should use these documents to determine what special equipment, housing, and environmental conditions are necessary to perform the work. For example, the manufacture specifies that the operator may require special stands, hand tools, or a dust – free environmental to repair a specific item.

D. **Contract Maintenance Arrangements**. If any maintenance is being performed by a contract facility, an inspection must be performed at the contractor's facility. During the inspection the inspector must determine if the contractor has adequate facilities and personnel to perform the contractors work. The inspector must keep in mind that the contract maintenance facility is an extension of the operator's overall maintenance organization. Maintenance performed by the contractor must be in accordance with the operator's approved maintenance programme.

1. For inspections of a contract maintenance facility located out side of the country; the inspections will be carried out at the operator's expense on a cost recovery basis. A list of contractor management personnel to be contracted shall be obtained from the operator.
2. The operator's manuals must be reviewed to determine the levels of maintenance performed at the contract maintenance facility.
3. The contract maintenance facilities should be inspected to ensure that they are properly certified and rated for the scope of work performed, e.g. aircraft, power plant, propeller, components, and accessories.

E. **Enforcement History.** Inspectors should check the Information system to determine if there are any areas that require special attention. If a contract maintenance organization is used, the organization should submit the audit records of the facilities of the contractor.

2.4 PROCEDURES FOR REVIEW

A. Review the Operator's Data Review ;

1. The CAASL office files to determine if any chronic or open items exist, status of any enforcement action Reports, exemptions, etc.
2. The operator's maintenance manuals to determine the level of maintenance accomplished and the complexity of operation at the maintenance facility
3. The operator's operations specifications to determine the maintenance and inspection program content and complexity

B. Inspect the Operator's Technical Library. Ensure all required technical data is available and current. If data is on microfiche, ensure that readers are available and serviceable. The data must include the following, as applicable:

1. Operations specifications
2. Operator's Maintenance Control Manual
3. Aircraft manufacturer's manuals
4. Propeller, appliance, engine, and emergency equipment Manufacturer's manuals
5. Manufacturer's and vendor's service bulletins/ letters
6. Applicable Aviation Regulations
7. Applicable Airworthiness Directives
8. Applicable Type Data sheets /Supplemental Type Certificates
9. Approved Flight Manual
10. Applicable CPCP, SSI programme

NOTE: Sample a representative number of aircraft records to ensure the integrity of the system.

C. Inspect the maintenance Organization. Ensure the following:

1. Staffing required to meet maintenance needs based on the complexity of operation
2. Responsibilities are separated between quality inspection and maintenance section.
3. Maintenance and quality inspection management personnel are qualified

D. Inspect the operator's maintenance facilities. Using the operator's manual as a reference, inspect the following:

1. Parts and storage areas, to ensure:

   a. Adequate spare parts are available to support complexity of operation
   b. Receiving inspections are accomplished in accordance with operator's manual
   c. Shelf life-limits are established for items, and that these items are controlled in accordance with operator's manual or manufacturer's recommendations
   d. Components and hardware are properly identified, protected, and classified as to serviceability
   e. Segregation of serviceable and unserviceable components and hardware is maintain
   f. Hazardous materials are suitably segregated and stored

2. Specials tool and test equipment, to ensure:

   a. Serviceability and calibration are accomplished in accordance with operator's manual.
   b. All required items are serviceable and within calibration criteria, to include tractability to one of the following:
      - National Standards
      - Standard established by the item's manufacturer
      - If foreign manufactured, the standards of the country where manufactured, if approved by the DGCA.
   c. Appropriate types and quantities are available
   d. Proper storage and protection is utilized.

3. Fuel/oil storage and dispensing facilities, if operated and maintained by operator.

4. Deicing chemical storage and dispensing equipment, if applicable. The following must be inspected to ensure compliance with the operator's manual:

   a. Chemical storage and dispensing
   b. Serviceability of equipment
   c. General condition and safety of storage areas
   d. Training of personnel in operator's deicing procedures

NOTE: If deicing services are provided on a contract basis, ensure that the contractor meets the above requirements.

5. Support shops (avionics, sheet metal, engine etc.)

   a. All required technical data is current and available. If data is on microfiche, ensure those readers available and serviceable.
   b. Staffing reflects complexity of shop
   c. Personnel are properly trained, qualified, and authorized
   d. Procedures for shift turnover are in place and properly utilized
   e. All required special tooling and equipment is available, serviceable, and within calibration criteria
   f. Maintenance tasks and inspection functions are being accomplished in accordance with operator's maintenance manual
   g. Safety equipment is available and serviceable
   h. Individual shop storage areas are maintained to same standards as main storage area
   i. Work areas do not conflict with each other, e.g. lathe next to avionics repair area
   j. Lighting, ventilation, and general housekeeping are adequate

6. Hanger facilities, to ensure:

   a. Facilities are adequate for work being performed
   b. Staffing reflects the complexity of work being performed
   c. Personnel are properly trained, qualified, and authorized
   d. Procedures for shift turnover are in place and properly utilized
   e. Special equipment and tooling is available, serviceable, and calibrated, if applicable
   f. Safety procedures are established and adhered to
   g. Procedures direct the flow and control of all maintenance and inspection records
   h. Lighting, ventilation and general housekeeping are adequate

7. Hanger ground support equipment, to ensure the equipment is serviceable and appropriate for the work being performed

E. Inspect the Engineering Department, if applicable. Ensure the following:

1. Staffing is adequate for complexity of assigned duties
2. Personnel are qualified
3. All required technical data is current and available
4. Engineering orders are accomplished and in accordance with operator's manual
5. Major repair and modifications are accomplished in accordance with approved, acceptable or specified data

6. Major repair reports are retained and available

NOTE: Review a representative sample of operator generated Engineering Orders to ensure that the program is being followed and items are being properly categorized (major versus minor)

F. Quality Assurance Department. Ensure the following:

1. Designated staffing is adequate for complexity of operation
2. Delegated staffing is at reasonable level
3. System ensures inspection personnel are trained, qualified, and properly authorized.

G. Inspect the Maintenance Control Center, if applicable.

1. Ensure the following:

   a. Staffing is adequate for the complexity of the operation and the personnel are trained and qualified
   b. Technical data is available and current
   c. Communications system provides effective communication between all departments and stations

2. Review the activity/turnover log to look for trends and to evaluate the general effectiveness of the overall maintenance program

H. Production/planning Control, if applicable. Ensure the following:

1. Staffing is adequate for the complexity of the operation

2. Planning system is effective, e.g., inspection/overhaul scheduling, facility scheduling, facility scheduling, parts forecast, personnel requirements, and communication with other departments

3. The system providers for scheduling, corrections of deferred and carryover maintenance items

NOTE: Randomly sample a representative number of open and completed work packages to ensure the effectiveness of the system.

I. Inspect Aircraft. Inspect any available aircraft to determine the quality of maintenance being performed.

J. Analyze Findings. Upon completion of inspection, record all deficiencies noted and meet relevant maintenance staff to discuss possible corrective actions.

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 3 – CONDUCT SPOT INSPECTION OF OPERATOR'S AIRCRAFT UNDERGOING MAINTENANCE

3.1 BACKGROUND AND OBJECTIVES

This chapter provides guidance for observing and analyzing in-progress maintenance operations for compliance with specific methods, techniques, and practices in the operator's inspection and maintenance programme.

3.2 GENERAL

A. Definition

Work package – Job task control units developed by the operator for performing maintenance/inspections. A typical work package may include the following:

- Special Inspections
- Components change sheets
- Inspection work cards
- Non-routine work cards
- Appropriate section of the maintenance procedures manual
- Engineering Orders (EOs)
- Modification leaflets
- ADs
- Aging aircraft inspections

B. Inspection Personnel

It is important that Airworthiness Inspectors are familiar with the type of aircraft to be inspected before performing the inspection. This can be accomplished through on the job training.

C. Coordination

Airworthiness Inspectors possess various degrees and types of expertise and experience. An AwI who needs additional information or guidance should coordinate with personnel experienced in that particular specialty.

3.3 INITIATION AND PLANNING

A. Initiation

Spot inspections can be scheduled as part of the work programme, but may be initiated whenever a problem is noted, including deficiencies noted during other types of inspections.

B. Planning

1. Spot inspections derived from planned work programme

   a. The number of spot inspections in the work programme depends on the type and number of operator aircraft. After determining the type of aircraft to be inspected, confirm the aircraft availability and scheduled maintenance functions with operator personnel.

   b. If the maintenance to be observed is known review the operator's maintenance procedures manual to become more familiar with the maintenance task. Review the following :

      - Duplicate Inspection Items (DII), if applicable
      - Forms used to document maintenance task
      - Latest manual revision and date
      - Special tools and equipment used to perform the maintenance task
      - Any other manual requirements relating to the maintenance task

   c. Examining previous inspection findings provides the AwI with background information regarding problem areas found during other spot inspections. This information can give an indication of how effective past corrective actions were in resolving previously identified problem areas.

   d. The Authority provides information such as Airworthiness Directives (ADs), Service Difficulty Report Summaries, and Maintenance Bulletins. This information should be reviewed, when available, so as to become familiar with current service difficulty information. While performing the spot inspection, ensure that these conditions do not exist on the aircraft.

2. Spot inspections not derived from the planned work programme. There are many situations while performing other surveillance activities that afford the opportunity to perform spot inspections. For example, if a discrepancy is found during a ramp inspection that requires maintenance, a spot inspection of that maintenance function could be performed.

3.4 MAINTENANCE RECORDS

During performance of the spot inspection, special attention should be paid to the following areas, as applicable:

- AD's current status, including the method of compliance
- Overhaul records, including documentation containing the overhaul details and replacement time
- Major repair/alteration classifications and the use of approved data
- Replacement time of life-limited parts

3.5 PERFORMING THE SPOT INSPECTION

A. Selecting a Maintenance Task :

1. Discuss with the maintenance supervisor what maintenance is currently being performed to determine what portions of that current maintenance/inspection should be observed.

2. Special emphasis should be placed on observing maintenance tasks that involve duplicate inspections. Problem areas to look at include:

   a. Persons performing inspections outside of authorizations or limitations

   b. Duplicate inspection items not being properly identified or accomplished

B. Performance Standard:

1. Each operator has a maintenance / inspection programme for its individual maintenance operations. For maintenance to be performed on the operator's aircraft there must be corresponding provisions and procedures in the operator's maintenance manual.

2. Each operator should have special procedures in the manual that ensure persons outside of the organization perform maintenance in accordance with the operator's maintenance manual.

C. Discrepancies Noted during Surveillance: When deviations from accepted procedures are noted, it must be brought to the attention of maintenance management that corrective action must be taken immediately. Discrepancies noted during the inspection should be documented and entered in the aircraft file maintained in the Airworthiness Section for follow up at a later time.

3.6 STRUCTURAL SPOT INSPECTIONS

A. Structural spot inspections of transport category aircraft undergoing "C", "D", or similar "heavy inspections" must be carried out on a regular basis. This increased surveillance is due to the "aging" fleets of many operators and reflects concern over structural fatigue and corrosion.

B. During the observance of a "heavy inspection", AwI's must pick an inspection area where maintenance has been started and where there could be possible fatigue or corrosion problems (especially an area that is not usually open to inspection, such as under the galley or lavatories)

1. If inspecting an area where maintenance is in progress, the following should be evaluated:

   a. While performing their job functions, are personnel accomplishing their job task per the work package.

   b. Does the Aging Aircraft/Corrosion Control programme provide the necessary guidance to evaluate and respond in a timely manner to structural fatigue and corrosion?

2. If inspecting an area where maintenance has already been accomplished, the following should be evaluated:

   a. Are there any structural fatigue or corrosion problems evident?

   b. If there are, were they identified by the person(s) responsible for that area?

   c. If they were identified, was corrective action initiated and completed

   d. Is there an AD applicable to this problem? If there is an AD, what is the status of that AD?

NOTE : While inspecting these areas that are not normally accessible, look for evidence of structural major repairs. If a major repair was accomplished, review the approved data for that repair.

3.7 PROCEDURES FOR INSPECTION

A. Initiate Spot Inspection, as applicable

B. Select appropriate aircraft for Inspection. Determine the following from the operator's maintenance schedules:

- Aircraft availability
- Aircraft type
- Type of maintenance being performed

C. Prepare for the Inspection. Review the following:

1. Maintenance manual procedures for maintenance being performed (if available)

2. Operations specifications time limitations, when applicable to the maintenance task

3. Previous inspection findings

4. Applicable maintenance alert bulletins

5. Service Difficulty Report Summary

6. Any new regulation and/or AD requirements affecting the aircraft to be inspected

D. Perform the Spot Inspection

1. Identify yourself to the maintenance supervisor and discuss the nature of your inspection.

2. Discuss with the maintenance supervisor / person in charge the status of the selected maintenance task.

3. Select a particular maintenance task within the work package. If possible, include a maintenance task that requires a duplicate inspection.

   a. Ensure that current maintenance procedures are available to the person(s) performing the work by accomplishing the following:

      - Asking maintenance personnel for the maintenance procedures used to accomplish the work
      - Recording the date of the maintenance procedures being used to perform the maintenance task for future comparison with the maintenance manual master copy

   b. Ensure that the maintenance ids performed according to established procedures by comparing actual performance to the operator's approved maintenance/inspection manual procedures.

   c. Ensure that the proper tools are being used by accomplishing the following:

      - Observing that special tools referenced in the maintenance manual are being used
      - Checking calibration due dates on precision tools, measuring devices, and testing equipment requiring calibration

   d. Ensure that the operator has the facilities to properly perform the maintenance task

e. Ensure that systems being maintained are not exposed to environmental conditions that could contaminate or damage components

f. Ensure that maintenance recording is accomplished according to the operator's record keeping system

g. Note any maintenance task deficiencies and include any copies of the documents that revealed the deficiencies

h. For those maintenance tasks involving duplicate inspection, determine that the persons observed performing these functions are appropriately certificated, authorized, and qualified.

E. Analyze the Findings. Evaluate inspection findings to determine if discrepancies exist. Discuss the results with the operator.

3.8 TASK OUTCOMES

Completion of this task can result in requested manual revisions.

Document Task. File all supporting paper work in the operator's office file.

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 4 - APPROVED MAINTENANCE ORGANISATIONS

4.1 BACKGROUND

A. *Annex I, Chapter 4* contains the requirements for licensing of aircraft maintenance engineers (technician mechanics) including the related certification privileges. The chapter also makes provision for certification privileges to be vested in organizations approved by the DGCA - Sri Lanka who are required to ensure that the associated certification standards will be no lower than those that would be achieved by the use of individually licensed personnel.

B. *Annex 6, Part I, 8.1.2* contains a reference to approved maintenance organizations. However, 8.4 places an obligation on operators to have in place a system of inspection to ensure that all maintenance, servicing, overhaul, etc

C. *Annex 6, Part I, 8.7.2* includes requirements for an operator to ensure that a maintenance procedure manual is provided for the use and guidance of maintenance organizations and personnel. The operator is required to ensure that the manual is amended and revised as necessary and that copies of the changes are distributed to holders of the manual.

D. *Annex 6, Part I, 11.3* specifies the subjects to be included in the maintenance Programme. In summary, the subjects comprise:

- servicing and maintenance procedures;
- the aeroplane maintenance Programme;
- the responsibilities of the various classes of skilled maintenance personnel;
- servicing and maintenance procedures which may be prescribed by, or require the approval of, the State of Registry; and
- Procedures for the preparation of the maintenance release required by paragraph 8.7 of the Annex 6.

E. Taken together, 8.4 and 11.3 effectively place an obligation on operators to have systems of maintenance management and inspection, but provide no specific guidance on the preferred method of certifying the aircraft as fit for release to service after maintenance, i.e. by individually licensed personnel, or through certification privileges vested in an approved organization.

F. This chapter of the manual provides guidance to Airworthiness Inspectors on the issues to be considered in approval of organizations for the maintenance of aircraft. Additional material can be found in the *Manual of Procedures for an Airworthiness Organization* (Doc 9389). Many States have issued detailed requirements for approval of aircraft maintenance organizations. An example adopted by a large number of European airworthiness authorities is EASA Part 145, prepared by the European Aviation Safety Agency.

4.2 OVERVIEW OF THE CRITERIA ON WHICH APPROVAL OF MAINTENANCE ORGANIZATIONS IS BASED

A. Grant of approval

a. The approval is granted to an organization headed by its Accountable Manager/ Chief Executive Officer (CEO), who should be responsible to DGCA for ensuring that the terms and conditions of the approval are complied with. This approach provides a guarantee to the CAASL that responsibility for corrective action for any deficiencies identified by the CAASL is vested at the highest level in the organization’s management structure, thus ensuring that the necessary executive authority (including finance, where applicable) will be available. This might not be the case, for example, if the approval is vested only in the inspection department of an organization.

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

B. Systems of inspection and quality management

a. To satisfy the obligation of States under *Annex 6, Part I,* aircraft cannot be released to service following scheduled or unscheduled maintenance unless certifications are made by appropriately licensed/approved personnel that the tasks have been completed in accordance with the requirements of the Air Navigation Regulation of Sri Lanka.

b. There are three generally accepted methods of meeting the requirement detailed below;

i. Use of licensed personnel; the individual either completes the task, or is responsible for its completion, and issues the necessary certification;

ii. The task is completed by staff of an engineering department; a separate inspection department is responsible for the necessary certification; and

iii. The staff of the engineering department is responsible for completion of the task to approved quality standards and is qualified to issue the necessary certification; a separate quality assurance department completes sample audits and surveillance to determine that the approved procedures are being adhered to and the final product is satisfactory. It is not uncommon to find various combinations of (i), (ii) and (iii) in organizations.

c. Of the three methods, some experts consider that (iii) is the optimum for the present generation of large transport aircraft. Before considering this topic further it is necessary, for the progress of this chapter, to provide definitions of quality, quality control and quality assurance:

i. ***Quality*** of a product or service is the degree to which it meets the requirements of the customer, including the relevant airworthiness requirements;

ii. ***Quality Control*** is a management system for Programming and coordinating the on-going quality and improvement efforts of the various groups in an organization to permit the completion of aircraft maintenance in accordance with the requirements of the airworthiness authority and any specific requirements of the organization or customer; and

iii. ***Quality Assurance*** is the over-all authority for the supervision of quality standards, enabling these standards set by the system of quality control to be enforced.

d. In practical terms, it is very difficult to manage quality control in circumstances where completion of a task and determination of compliance with the associated quality requirements is the responsibility of separate persons (as in B. 2) (ii)). The highest standard of quality of aircraft maintenance is very much dependent on the competence of the personnel who complete the tasks; it is not something that can be inspected-in'. Thus responsibility for quality control management is best vested in a competent production work force that completes the tasks and is qualified to accept responsibility for certification of them, in accordance with prescribed procedures.

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

i. Through product sampling, the requirements of the customer, including those related to airworthiness, are being satisfied;

ii. The procedures of the organization are being complied with and that they remain appropriate for the undertakings of the organization; and

iii. The organization remains in compliance with the requirements and conditions of the approval granted by the airworthiness authority.

f. Further guidance material on quality management is provided in paragraph 4.3.

C. The purpose of the Maintenance Procedure Manual / Maintenance Organization Exposition

a. Operators are required to provide a maintenance procedure manual, as outlined in 4.4 of this Chapter. Interpreted literally, the requirement applies only to an operator; CAASL is encouraged to apply the principle of this requirement to any approved maintenance organization, whether an integral part of an operator or not.

b. The purpose of the manual for an approved maintenance organization is threefold:

i. To provide to the personnel the necessary information to enable them to fulfil their various roles in complying with the terms and conditions of the approval and the relevant airworthiness requirements;

ii. To provide airworthiness management for the maintenance activities undertaken by the organization; and

iii. To substantiate to the airworthiness authority how the activities included in the approval - and the relevant airworthiness requirements will be satisfied.

c. It is recommended that the Airworthiness Section should consider the provision of this manual as an integral part of the approval of the organization; subsequent amendments to the manual should also be approved by the Airworthiness Section.

d. In the case of large organizations, it may be more appropriate for the manual to be divided into two or more volumes. The first volume would contain the essential requirements for management of the approval and compliance with the appropriate airworthiness requirements, including the control of the contents of the other volumes. It is then usual for the airworthiness authority to limit its direct approval to the contents of the first volume.

D. Human resources

a. The organization should employ sufficient personnel to plan, perform, supervise and inspect the activities included in the approval. Organizations engaged in aircraft maintenance for commercial reasons are under constant pressure to achieve maximum work throughout. It is important to determine that such organizations have the necessary human resources to match the anticipated workload without any reduction in the standards accepted by the Airworthiness Section in granting of the approval.

b. There are no Standards or Recommended Practices which relate to personnel employed in aircraft maintenance other than those which relate to certifying staff. Nevertheless, it is important to realize that aircraft maintenance is an integrated activity, involving technical records, planning, supervision, quality-control and/or quality-assurance personnel, mechanics and specialist technicians, e.g. non-destructive test and welding personnel. Procedures should exist to ensure that these persons are assessed for competence in relation to their particular role within the organization.

E. Training policy

a. Air transport is an industry which, more than most has to adapt to technology which is in a constant state of development. Training provided to personnel engaged in aircraft maintenance needs to mirror this state of change; consideration needs to be given to requirements for refresher/continuation training as well as initial training in the approval of organizations.

b. Only relevant Standards are in *Annex 6, Part I, 8.3 (aeroplanes) and Part III, 6.3 (helicopters) which require that: "An operator shall ensure that all maintenance personnel are instructed regarding the maintenance methods to be employed, in particular when new or unfamiliar equipment is introduced into service."*

c. It is strongly recommended that policies for initial and refresher training are considered in the assessment for approval by the Airworthiness Section. Consideration should be given to the needs of mechanics, quality-control and/or quality-assurance personnel, supervisors, planners and technical records personnel as well as those persons certifying aircraft as fit for release to service.

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

F. Qualification of certifying personnel

a. As in the ICAO requirements for the licensing of personnel engaged in aircraft maintenance and the acceptability of approved maintenance organizations are provided in Annex I. In relation to approved maintenance organizations, there are no Standards or Recommended Practices on the qualification of certifying personnel employed by the organization. Airworthiness Section should give particular attention to this point in their national requirements for the approval of maintenance organizations; for CAASL to issue Aircraft Maintenance Engineer (technician mechanic) licences, possession of an appropriate licence demonstrates a level of knowledge and experience which may be appropriate as a basic qualification for certifying personnel.

b. For Airworthiness Section who does not issue type rated licenses, it is important to ensure that properly approved procedures and training exist for qualification of the persons who will be making certifications in respect of the release of aircraft to service.

c. All certifying personnel should be familiar with the relevant company systems and procedures, as well as having appropriate knowledge of the aircraft component being maintained. It is important that compliance with this requirement is determined before a certifying authorization is granted.

G. Facility requirements

a. Facilities, including access equipment, should be available appropriate to the planned scope of work, including, in particular, protection from adverse weather conditions. Specialized workshops should be segregated to ensure that environmental or work area contamination are unlikely to occur. Aircraft maintenance is documentary intensive; adequate office facilities should be available for personnel engaged in the management of quality, planning and technical records.

b. Storage facilities should be provided for parts, equipment, tools and material. Storage conditions should be such that unauthorized access to serviceable parts is prevented and that there is complete segregation of serviceable and unserviceable parts. The stores should be segregated for bonded items and quarantine items.

H. Equipment, tools, material, airworthiness and maintenance data

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

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

I. Contract and sub-contract

It is accepted practice for operators to contract their maintenance requirements to approved maintenance organizations. Similarly, it is accepted practice to permit approved organizations to sub-contract work to organizations which are also approved by the CAASL for the activities under consideration. In addition the following alternative arrangement also considered acceptance to the CAASL.

i. the approved organization must be approved for the work which is to be sub-contracted and have the capability to assess the competence of the subcontractor;
ii. the approved organization must retain responsibility for quality control and release of sub-contracted activities, including the appropriate airworthiness requirements; and
iii. The existence of the necessary procedures for the control of sub-contracted activities, together with terms of reference for the personnel responsible for their management.

4.3 QUALITY MANAGEMENT

A. General

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

b. The maintenance organization's systems for quality control and assurance should take into account all of the facilities and procedures utilized to ensure continuing airworthiness where activities take place affecting the airworthiness of the aircraft and product quality for subjects not directly related to airworthiness.

c. Quality control should therefore be effective throughout the maintenance of aircraft and quality auditing should ensure that control is being properly applied and achieving satisfactory results.

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

B. Procedures and personnel qualifications

a. Staff assigned to quality control and assurance duties should be:

i. sufficiently experienced in the company systems and procedures and technically knowledgeable of the aircraft being maintained so as to enable them to perform their duties satisfactorily;
ii. experienced in the techniques of quality control and assurance or receive suitable training before taking up their duties; and
iii. Given clearly defined terms of reference and responsibility within the organization and reporting lines to senior management.

b. The department responsible for quality control and assurance should arrange for independent quality audit checks to be carried out in accordance with the audit Programme. Emphasis should be placed on the company systems employed to achieve and ensure airworthiness, their suitability and effectiveness. The scope of quality checks within the organization should be based on the guidelines given in Audit Procedures Manual of CAA SL.

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

4.4 ORGANIZATION'S PROCEDURE MANUAL / MOE

A. The organization's procedure manual should provide clear guidance to personnel on how the activities included in the CAASL approval are managed, their personal responsibilities and how compliance with the appropriate airworthiness requirements is achieved. It should also include a statement of the organization's policies and objectives. If this manual is used also to comply with the maintenance control manual requirements of *Annex 6, Part I, 11.3*, the aeroplane maintenance Programme should be included.

B. Consideration should be given to the following topics:

a. need for a statement signed by the Accountable Manager/CEO confirming that the manual defines the organization's procedures and associated personnel responsibilities and will be complied with at all times;

b. details of key personnel specifically nominated to the CAASL

i. A senior person, or group of persons, whose functions will include responsibility for the co-ordination of all appropriate departments so as to ensure compliance with the relevant airworthiness requirements. It is recommended that this person or group should be directly responsible to the Accountable Manager/CEO;

ii. Heads of departments and such other senior and specialist staff as are appropriate to the activities encompassed by the approval; and

iii. Personnel approved to authorize signatories for the maintenance releases specified in Annex 6, Part I, 8.7;

c. The terms of reference of the persons nominated in accordance with b above, as applicable to the activities covered by the approval. The specific subjects on which these persons are authorized to deal direct with the CAASL should be defined within the terms of reference;

d. An organization chart showing the associated chains of responsibility of the persons nominated in accordance with b above;

e. The scope of the facilities for the maintenance of aircraft, together with information on the availability of equipment essential for, and/or peculiar to, the type(s) for which approval is sought;

f. Details of the systems and procedures for the control of matters, including quality control, directly affecting continuing airworthiness. Guidance on systems and procedures which need to be considered is provided in this Chapter of this manual;

g. Details of training Programmes appropriate to the approval, together with details of the training facilities which will be used; and

h. Liaison and/or contractual arrangements with other organizations which provide services associated with the approval.

NOTE: 1. Requirements for the Establishment of an Approved Maintenance Organization is in checklist CAA/AW/CL/22,

and

2. The applicable Checklist prepared to review the Maintenance Procedure Manual / Maintenance Organization Exposition is given in the Check list CAA/AW/CL/02, Section 3 of Airworthiness Procedure Manual (SLCAP 6100)

SECTION TWO

VOLUME 2

AIR OPERATOR/ MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 5 – AIRCRAFT RAMP INSPECTIONS

5.1 OBJECTIVE

This chapter provides guidance for sampling the quality of maintenance and the degree of compliance with the operator's maintenance procedures on in service airline aircraft. *Detailed interior and exterior inspection guides are contained in appendix 1 & 2*.

5.2 GENERAL

A. Inspection Personnel

1. It is important that Airworthiness Inspector (AwI) become familiar with the type of aircraft to be inspected before performing the inspection. This can be accomplished by on the job training.

2. Due to the hub and spoke concept, many aircraft have less than one hour ground time. To ensure that the inspection is performed adequately, it is recommended that two AwIs perform this task in exterior and interior phases.

B. Coordination

1. Airworthiness and Operations Inspectors posses various degrees and types of expertise and experience. An AwI who needs additional information or guidance should coordinate with personnel experienced in that particular specialty.

2. Use of an Identification Card: Conflicts are occurring between AwIs performing ramp inspections and airport security personnel allowing access to aircraft and other secure areas. Proper use of airport identification badges should relieve some of these problems.

5.3 INITIATION AND PLANNING

A. Initiation:
This task is scheduled as part of the work Programme initiated by the Airworthiness Section

B. Planning:
The ramp inspection provides the AwI with a good opportunity to ensure that the compliance dates and requirements of new Airworthiness Directives (ADs) and regulatory revisions have been met. Service, Difficulty Report Summaries, Service Bulletins, and Previous reports should be reviewed, when available, so as to become familiar with current service difficulty information.

5.4 MAINTENANCE RECORDS

A. Regulations require that maintenance be recorded whenever it is performed prior to an approval for return to service. The operator's MCM/Maintenance Procedures Manual should describe the procedures for ensuring that these recording requirements are met, including the specific instructions on when an maintenance release or appropriate maintenance log entry is required.

B. All defects entered in the technical log must be either corrected or deferred using the methods identified in the MCM/Maintenance Procedures Manual.

C. The Minimum Equipment List has certain procedures and conditions that must be met prior to deferring the item(s)

1. These procedures are identified by “O”, “M”, and “O/M” and are normally contained in the operator's approved Minimum Equipment List. There are occasions in which the list references these procedures to another document. (E.g. A330 ADD)

2. When reviewing the records for Minimum Equipment List compliance the AwI must determine what procedures are required for deferral and ensure that these procedures are accomplished. The AwI should be mindful of the MEL item category and its deferred time period.

3. The AwI must ensure that all applicable repetitive Minimum Equipment procedures are accomplished for those items that are deferred and are continuing to be deferred through the station. These repetitive maintenance procedures must be signed off in the technical log as evidence that the procedures were accomplished.

5.5 DEFERRED MAINTENANCE

A. Minimum Equipment List / Deferred Maintenance: The operator's approved Minimum Equipment List allows the operator to continue a flight or series of flight with certain inoperative equipment. The continued operation must meet the requirements of the Minimum Equipment List deferral classification and requirements for the equipment loss.

B. Other Deferred Maintenance

1. Operators frequently use a system to monitor items that have been inspected previously and found to be within serviceable limits. These items are still airworthy, yet warrant repair at a later time or when items no longer meet serviceable limits. This method of deferral may require repetitive inspections to ensure continuing airworthiness of the items. Examples of items that are commonly deferred in this manner are fuel leak classifications, dent limitations, and temporary (airworthy) repairs

2. Passenger convenience item (not safety / airworthiness related) deferrals should be handled in accordance with the operator's Programme.

3. These deferrals should be made based on a published or industry accepted standards.

C. The maintenance Programme approved for an operator must provide for prompt and orderly repairs of inoperative items.

5.6 CABIN INSPECTION

A. This inspection should be performed, when possible, without disturbing the loading and unloading of passengers. The inspection can still be performed when some passengers are on board, but good judgment must be exercised by inspecting areas away from the passengers.

B. Any discrepancy should be brought to the attention of the flight crew or appropriate maintenance personnel immediately.

5.7 CARGO / COMBINATION CONFIGURED AIRCRAFT

A. Inspection results have disclosed instances of significant aircraft structural damage resulting from careless loading of cargo, such as:

- Torn or punctured liners, indicating hidden damage to circumferential stringers, fuselage skin, and bulkheads
- Damaged rollers, ball mats, etc., causing structural damage to the floors
- Corrosion and structural damage caused by improper handling of some hazardous materials.

B. The surveillance of hazardous materials handling is not the primary function of the Airworthiness Inspector. The AwI should contact the appropriate Operations Inspector if discrepancies are noted in the handling of hazardous materials,

5.8 PERFORMING THE RAMP INSPECTION

A. This inspection must be accomplished without interfering with the turnaround of the aircraft. The following list of items is just some of the activities that could cause a delay in the turnaround time if interfered with :

- Boarding and deplaning passengers
- Servicing
- Fuelling
- Maintenance
- Baggage handling
- Any other operator activity

B. Any discrepancies noted must be brought to the attention of appropriate personnel immediately, to allow the operator the opportunity to take corrective action without interrupting the flight schedule. The AwI must verify that all corrections taken were in accordance with the requirements of the operator's maintenance procedures / control manual. The AwI should use the relevant Checklist for inspection and deficiencies identified shall be submitted for the operator to rectify within the given time period.

5.9 PROCEDURES FOR RAMP INSPECTION

A. Initiate Ramp Inspection in accordance with the work Programme

B. Prepare for the Inspection

1. Review the operator's schedule, select the flight to be inspected, and determine the type of equipment and ground time

2. Determine if any recent problem areas have been identified for that type of aircraft

3. Determine if recent regulatory changes and AD requirements affect the aircraft to be inspected.

4. The AwI should review the previous inspection findings before the inspection

C. Conduct Interior and Exterior Inspection, as applicable. Perform this Inspection in accordance with the Check List given in Section three of the Hand Book.

D. Interview flight crew. Introduce yourself to the flight crew and describe the purpose and scope of the inspection

E. Inspect Aircraft Maintenance Records

1. Ensure that all open discrepancies from the previous flight are resolved per the operator's manual, prior to departure of the aircraft.

2. Review the maintenance records to determine if repetitive maintenance problems exist that might indicate a trend.

3. Ensure that all Minimum Equipment List items are deferred in accordance with the provisions of the operator's Minimum Equipment List.

   a. Review the operator's approved Minimum Equipment List to determine that conditions, procedures, and placarding requirements were accomplished correctly to defer specific items.

   b. Note the date when an item was first deferred to determine if the maximum allowed length of deferral was exceeded. Accomplish this by examining maintenance record pages, the deferred maintenance list, or deferred maintenance placards or stickers.

4. Ensure that a maintenance release, maintenance record entry, or appropriate approval for return to service has been made after the completion of maintenance

5. Ensure that the maintenance record contains the following for each discrepancy:

   a. Description of the work performed or a reference to acceptable data

   b. Name or other positive identification of the person approving the Work

   c. Name of the person performing work, if outside the organization

F. Debrief Operator. Inform the flight crew or appropriate personnel that the inspection has been completed. Discuss the discrepancies brought to the operator's attention during the inspection

G. Examine Maintenance Record Entries. Ensure that the operator has recorded all discrepancies noted during this inspection. If time is available, monitor the operators corrective actions

H. Analyze Findings. Analyze each finding to determine if the discrepancies are the result of improper maintenance and/or missing or inadequate maintenance / inspection procedures.

NOTE : The applicable checklist of Aircraft Ramp Inspection is in Check list CAA/AW/CL/17, Section 3 to Airworthiness Office Procedure Manual.

5.10 TASK OUTCOMES

On completion of Ramp Inspection the AWI would observe one of the following conditions

1. The inspection was satisfactory

2. Minor defects noted which need not be corrected immediately

3. Locally registered aircraft with defects that have a direct impact on airworthiness and that need rectification prior to further flight

4. Foreign registered aircraft with defects that have a direct impact on airworthiness and that need to be rectified prior to further flight

5.11 DOCUMENTATION AND FOLLOW UP ACTIVITIES

Based on inspection findings, (described above in 5.10) the AwI is required to fill up one of the following forms and issue a copy to the operator. One copy should be forwarded to the Airworthiness Section for follow up action and the third copy should be filed in the aircraft file.

a. Inspection satisfactory / Minor defects that do not require immediate corrective action	Use Notice of Aircraft Surveillance Form CAASL-AW-013
b Local registered Aircraft with defects that need corrective action prior to further flight	Use Notice of Aircraft Condition Form CAASL-AW-023
c. Foreign Registered Aircraft with defects that need corrective action prior to further flights	Use Notice of Aircraft Condition Form CAASL-AW-004

APPENDIX - 1

INTERIOR INSPECTION GUIDELINES

A. Examine the airworthiness and registration certificates. Ensure the following:

1. Airworthiness and registration certificates are current and valid
2. Both certificates contain the same model, serial, and registration numbers
3. Temporary registration is current, if applicable.
4. Signatures are in permanent-type ink

B. Flight Desk Inspection Inspect the following:

1. Instrument security and range markings
2. Windows (delaminating, scratches, crazing, and general visibility)
3. Emergency equipment
4. Seal on medical kit (if located on fight deck)
5. Seat belts and shoulder harnesses (Technical Standard Order marking,

   metal to metal latching, and general condition)
6. Check the following if using cockpit jump seat:
   - Jump seat oxygen system- turn regulator on and select 100% oxygen
   - Interphone system- select Comm 1 and Comm 2 to ensure systems are working
7. When the most forward jump seat is in the cabin, coordinate with the crew for connecting the headset and adapter cables.
8. Ensure that the jump seat is serviceable and that seat belt and shoulder harnesses are available

C. Cabin Inspection. Inspect the cabin to include the following:

1. Lavatory. Ensure the following:
   - Fire extinguisher system is installed in sealed trash containers
   - Smoke detection system is installed
   - Trash containers are sealed according to applicable Airworthiness Directive(s)
   - “No Smoking” placards are posted

- Ashtrays are available outside the lavatory

2. Flight Attendant seats.

- Pull the jump seat down to ensure seat retracts (those in the path of exits)
- Inspect seat belts for Technical Standard Order marking, metal to metal latching and general condition

3. Cabin emergency equipment. All equipment requiring periodic inspections should have an inspection date marked on it. Inspect the following:

- Flight attendant flash light serviceability and holder
- Slide containers, to ensure containers are properly marked for content.
- Check pressure of slide inflation bottle if visible
- Medical kit (if not checked on flight deck- content should be appeared)
- First aid kit (content should be appeared)
- Emergency oxygen (proper pressure and security)
- Megaphone(s) (security and general condition)
- Fire extinguishers (security, pressure, seal)
- Life raft storage and markings (if raft is required)
- Emergency briefing cards (random sample)
- General condition of emergency floor path lighting system
- Placement of all “Emergency Exit” signs
- Presence and legibility of “Emergency Exit” operation instructions
- Placarding for location of all emergency equipment
- Life preservers (vests)

4. Passenger seats. Ensure the following

- Seat adjacent to emergency exits do not block exit path
- Seats are secure in seat racks
- Seat break over pressure is in accordance with operator’s maintenance Programme (random samples)
- “Fasten seat belts during flight” placards are in view from all seats
- Seat belts have metal to metal latches and are in good condition (random sample)

5. Galley / Service centers. Inspect the following

- Trash bin lid for fit
- Storage compartment restraints
- Stationary card tie downs
- Lower lobe equipment / restraints
- Lift operation
- Galley supply storage

6. Overhead baggage compartments. Check for weight restriction placards and the doors for proper latching, when applicable

D. Inspect cargo compartment

1. Ensure the following:

   - Cargo compartment fire protection is appropriate for its classification
   - Cargo liner is free from tears and/or punctures. If these are noted, inspect structure behind liner for damage, e.g., stringers, circumferentials, etc. Ensure sealing tape is proper type and in good condition
   - Cargo door is free of fluid leaks and structural damage
   - Fuselage door structure and sill are free of damage
   - Smoke detectors are in satisfactory condition
   - Lighting is operable and protective grills are installed
   - Cargo flooring is free from structural or other damage
   - Pallet positions / compartments are placarded for position identification and weight limitations

2. Inspect pallet system, if applicable. Ensure the following:

   - Ball mats are serviceable, e.g., no broken or missing balls
   - Forward, aft, and side restraints are serviceable
   - Roller assemblies are secure and have no missing or broken rollers

3. Ensure the 9 g forward restraint net is serviceable, if applicable

4. Ensure that cargo restraints for bulk loaded cargo are adequate, if applicable.

5. Inspect cabin mounted equipment.

6. Inspect fire extinguishers for inspection due dates and pressure.

7. Inspect load manifest for hazardous Material. If present, determine crew knowledge of the following:

   - Location and labelling of hazardous materials
   - Special requirements, if required
   - If proper paperwork is available on board

8. Ensure captain is aware of the following responsibilities:

   - Inspection of cargo to ensure proper load distribution
   - Ensuring loads do not exceed compartment or position limits
   - Ensuring loads are being properly restrained

APPENDIX 2

EXTERIOR INSPECTION GUIDELINES

A. Accompany a flight crewmember during the exterior inspection, if possible, and inspect the following, as applicable:

1. Landing gear and wheel well areas. Check for the following:

   - Any indication of wear, chafing lines, chafing wires, cracks, dents, or other damage
   - Structural integrity of gear and doors (cracks, dents, or other damage)
   - Hydraulic leaks (gear struts, actuators, steering valves, etc)
   - Tire condition
   - Tire pressure (if pressure indicators are installed)
   - Wheel installation and safety locking devices
   - Wear, line security, leaks, and installation of brakes
   - Corrosion

2. Fuselage and pylons. Inspect the following:

   - Structure for cracks, corrosion, dents, or other damage
   - Fasteners (loose, improper, missing)
   - Condition of radome
   - Condition of pitot tubes
   - Static ports (cleanliness and obstructions)
   - Stall warning devices and other sensors
   - Antennas (security and indication of corrosion)
   - Lavatory servicing areas (evidence of fresh blue water streaks)
   - Cargo compartments for integrity of fire protective liners (no holes or unapproved tape used for repairs)
   - Emergency exit identification / markings
   - Registration marking (legibility)
   - All lights (general condition, broken lenses, etc.)

3. Wings and pylons. Inspect the following:

   - Structure for cracks, corrosion, dents, or other damage
   - Leading edge (dents and/or damage in line with engine inlets)
   - Leading edge devices (when open, actuator leaks, general condition of lines, wires, and plumbing)
   - All lights (general condition, broken lenses, etc.)
   - Flaps (cracks, corrosion, dents, and delamination)
   - Flap wells (general condition of lines, wires, and plumbing)
   - Static eliminators (number missing)
   - Ailerons and aileron tabs (cracks, corrosion, dents, and delamination)

- Missing, loose, or improperly secured access door / inspection panels and blowout panels

4. Engines - Inspect the following

- Intake for fan blade damage. and oil leaks
- Ring cowl for missing or loose fasteners
- Cowling doors for security and proper fit
- Lower cowling for evidence of fluid leaks
- Exhaust for turbine and tail plane damage, and evidence of fluids
- Reverser doors for stowage and security
- Access doors for security

5. Propellers - Inspect the following:

- Leading edge of propeller for cracks, dents, and other damage
- Deicer boots for signs of deterioration and security
- Spinners for security, cracks, and evidence of fluid leaks

6. Empennage - Inspect the following

- Leading edge for bents
- All lights (general condition, broken lenses, etc.)
- Missing static discharge eliminators
- Elevator, rudder, and tabs (cracks, corrosion, dents, and delamination)
- Elevator and rudder power unit for evidence of hydraulic leaks

7. Ground safety - Inspect the following:

- Positioning of support vehicles
- Fueling of aircraft, to include the following:
  - Refueling pressure
  - Condition of refueling unit (leaks, filter change dates, exhaust system, etc.)
  - Grounding
  - Fire protection
  - General fueling procedures

- General condition of ramp, to include the following:
  - Provisions for grounding
  - Foreign objects on ramp
  - Fuel spills
  - General housekeeping / cleanliness
  - Passenger control
  - Fire protection

8. Baggage. Observe loading and unloading of baggage compartments to include the following:

- Baggage restraining system
- Load distribution

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 6 - MAINTENANCE PROGRAMME

6.1 OBJECTIVE

This chapter provides guidance for evaluation and subsequent approval of a maintenance Programme developed by the owners or operators / applicants subject to regulatory requirements given in Air Navigation Regulations of Sri Lanka.

6.2 GENERAL

A maintenance Programme combines the maintenance and inspection functions used to fulfil an owner or operator / applicant's total maintenance needs. The regulations specify that each owner or operator / applicant must have a maintenance Programme adequate to perform the work and a separate inspection Programme adequate to perform required inspections. The guideline pertaining to the preparation of maintenance schedule is explained in Chapter 17, Section 2 of this manual.

A. Definitions:

1. Airworthiness: Conditions in which the aircraft, airframe, engine, propeller, accessories, and components meet their type design and are in a condition for safe operation.

2. Inspection: The routine performance of inspection tasks at prescribed intervals. The inspection must ensure the airworthiness of an aircraft, up to and including its overhaul or life- limits.

3. Scheduled (routine) maintenance: The performance of maintenance tasks at prescribed intervals.

4. Unscheduled (Non routine) Maintenance: The performance of maintenance tasks when mechanical irregularities occur. These irregularities are categorized as to whether or not they occur during flight time.

5. Structural Inspection: A detailed inspection of the airframe structure that may require special inspection techniques to

determine the continuous integrity of the airframe and its related parts.

B. Programme Requirements : Basic requirements of a maintenance Programme include the following

- Inspection
- Scheduled Maintenance
- Unscheduled maintenance
- Overhaul and repair
- Structural Inspection
- Duplicate Inspections
- Escalation of check periods/inspection intervals
- Reliability Programme (if appropriate)
- Aging aircraft and corrosion control Programme

C. Manuals:

Instructions and standards for unscheduled maintenance should be in the operator / applicant's technical manuals. The manuals must contain procedures to be followed when using these manuals and recording scheduled and unscheduled maintenance.

D. Operations Specifications:

Maintenance Programmes are approved according to the operations specifications. These operations specifications describe the scope of the Programme and reference manuals and other technical data. Details of the Programme must be included in the operator / applicant's manuals.

E. Operator / Applicant's Organizations:

The operator / applicant must have an organization adequate to carry out the provisions of the maintenance Programme. If the work is to be performed outside of the operator / applicant's organization, the contractor must meet the same requirements. The contractor shall be approved by the DGCA. In determining the adequacy of the organization, the following must be considered:

- The complexity of the organization
- The aircraft
- The experience of the personnel
- The number of personnel

6.3 REFERENCE MATERIAL

In developing a Maintenance Programme for a type of aircraft the operator will require to refer the following publications:

Small aircraft:

1. Manufacturer's Maintenance Manual / Recommended Inspection Programmes

2. ADs / SBs for repetitive inspections

3. Type approval data sheets

Large aircraft:

1. MPD document of the aircraft manufacture.

2. MRB reports, CMP(Customized Maintenance Programme) , ALI(Airworthiness Life Items), CMR (Certification Maintenance Requests) documents.

3. ADs / SBs for repetitive inspections

4. Corrosion Control document

5. Aging aircraft documents

6. Type Approval Data sheet.

7. Structural Inspection Documents (SSID)

8. NDT Inspection Schedules

Note; The descriptive details of the above documents which need inclusion to maintenance Programme at its development by operator for CAASL approval are given in separate Chapters of this manual for the Airworthiness Inspector to understand.

- Corrosion Control Programme, SSID and Aging aircraft Programme me is in Chapter 16.
- Certification Maintenance Requirements and Airworthiness Life Item (ALI) is in Chapter 15.

6.4 INSPECTIONS

A. Applicability:

During the original certification process of an operator / applicant, the Airworthiness Inspector (AwI) should ensure that the maintenance Programme is applicable to the operation in question. In order to do so, the Airworthiness Inspector (AwI) will inform the operator / applicant of the pertinent policies, and requirements of the regulations.

B. Scheduling:

The operator / applicant and the Airworthiness Inspector (AwI) should develop a plan to determine a schedule for the submission of required documents.

1. Scheduled Maintenance:

   Maintenance tasks prescribed at certain intervals are considered scheduled maintenance. Some of these tasks are performed concurrently with inspection tasks and may be included in the same work form. Work form that include maintenance instructions must be provided for a record of the accomplishment of these tasks

   a. Scheduled tasks include replacement of life-limited items and components requiring periodic overhaul, special non-destructive inspections (such as X-rays), checks or tests for on-condition items, lubrications and weighing aircraft.

   b. Prime factors considered for inspection intervals are aircraft utilization, environmental conditions, and the type of operation .
      Examples include changes in temperature, frequency of landings takeoffs, operation in areas of high industrial pollutants and passenger or cargo operations.

   c. To ensure proper maintenance, each inspection intervals must be stated in terms of calendar times, cycles and hours as required.

2. Unscheduled maintenance :

   Unscheduled maintenance takes place when mechanical irregularities occur

   a. Mechanical irregularities occurring during flight time (block to block);
      These include operational failures, malfunctions and abnormal flight operations such as hard or overweight landings. The aircraft maintenance record must be used to record each irregularity and its corrective action.

   b. Mechanical irregularities not occurring during flight time;
      These include all other failures, malfunctions and discrepancies, including but not limited to inspection findings. A discrepancy form or equivalent system must be used to record each irregularity and its corrective action.

C. Types of Maintenance :

1. Overhaul and repair (airframe, engine, propeller and component) maintenance for these items, whether scheduled or unscheduled, may be independent from maintenance performed on the aircraft. The operator / applicant must provide instructions and standards for repair and overhaul, along with a method of approving and

recording the work. Appropriate life-limited parts replacement requirements should be included in this portion of a maintenance Programme.

2. Structural Inspection

   a. Each level of inspection must be clearly defined in the operator/applicant's maintenance Programme. For example, a specific area of the aircraft may require only a visual inspection during pre-flight. "A" and "B" checks but will require a detailed, X-ray or Zyglo inspection in the same area for a "C" or "D" check

   b. Some aircraft are subjected to a Supplemental Structural Inspection Document, which require additional age-related structural inspections to be incorporated into the maintenance Programme.

D. Requirements:

If a certified operator proposes changes to the maintenance Programme, the Airworthiness Inspector (AwI) must determine the impact of the revision on the Programme. Since maintenance Programme vary, depending on the operator / applicant's complexity of operation, the Airworthiness Inspector (AwI) must become familiar with all of the pertinent technical and regulatory aspects of the Programme.

E. Return to Service:

Through the provisions of the Regulations, operators utilizing a maintenance Programme may be considered as maintenance organizations. As such they are authorized to approve aircraft and / or equipment for return to service and are responsible for meeting all the applicable requirements.

1. The person exercising certificate privileges have always had the responsibility to show compliance with regulatory requirements and to make a determination of conformance and safety. The need to ensure that a replacement part was produced by a CAASL approved source is therefore critical.

2. Airworthiness Inspectors, during the process of certification and surveillance, must ensure that the operator / applicant fully understands the regulatory requirements and the resulting responsibility to show that any /all parts and/or materials used, from any source, are airworthy (i.e., confirm to type design), are equal to the original or properly modified condition, and have been maintained properly.

3. Additionally, the AwI must ensure that the operator/applicant's manual contains adequate procedures at the incoming inspection

to determine the part is genuine and serviceable, prior to the material being stocked or used.

F. Small Aircraft Operators:

An operation with an approved maintenance Programme must maintain its aircraft according to that Programme. This includes small aircraft maintained under an operator's maintenance Programme in accordance with applicable regulations.

G. Maintenance Performed for other Operators:

A large aircraft operator with an approved maintenance Programme may also perform maintenance for another certificate holder. Such maintenance must be performed in accordance with that certificate holder's approved Programme. However, a small aircraft operator is not authorized to perform maintenance for a large aircraft operator, and vice versa.

6.5 MAINTENANCE PROGRAMME

A. The maintenance Programme must incorporate a set of procedures that ensure the following:

Maintenance and modifications are performed according to the operator's manual**.**

- Competent personnel, and the adequate facilities and equipment are provided for the proper performance of maintenance and modifications.
- Each aircraft released to service is airworthy
- Airworthiness inspections and duplicate inspections are performed as per the operator's manual, by qualified personnel
- That a system is in place that addresses how specific Duplicate Inspections are developed, and reviewed to ensure the continued airworthiness of aircraft.

B. Airworthiness Inspections

Air Navigation Regulations and the ASNs issued as supplements stipulate that each operation's manual must discuss airworthiness in sections, including instructions covering procedures, standards, responsibilities and authority of inspection personnel. The methods and procedures established by the operator's manual must be followed as prescribed in the Air Navigation Regulations. Items not designated, as RII items will also be inspected according to the manual instructions.

C. Required Inspection Items

(Duplicate Inspection) discuss the designation of maintenance and modification work that must be inspected

1. The manual must contain a designation of the items of maintenance and modification that must be inspected. These will include, at a minimum, those items that could result in failure, malfunction, or defect endangering the safe operation of the aircraft if maintenance is not performed properly or if improper parts or materials are used. Each operator must evaluate its work Programme to identify RII. Such items may be identified with the abbreviation “RII,” an asterisk, or any similar method.

2. In determining the work items which are to be categorized as RII. the operator should consider the importance of the following:

   - Installation, rigging, and adjustments of flight controls
   - Installation and repair of major structural components.
   - Installation of aircraft engines, propellers and rotors
   - Overhaul, calibration or rigging of components such as engines, propellers, transmissions, gear boxes, or navigation equipment.

6.6 INSPECTION ORGANIZATION

Each operator must have an organization adequate to perform required inspections. The performance of required inspections must be organized so as to separate the required inspection functions from other maintenance, preventive maintenance, and modification functions.

A. Personnel Considerations

1. The operator/applicant must maintain a current listing of persons qualified to inspect its RII items. Where such maintenance is performed by other organizations, the operator must determine that the contractor maintains such a list. Each individual must be identified by name, occupational title, and the RII that individual is authorized to inspect.

2. To comply with these requirements, the operators personnel staff list (or the contractor’s staff list) may be used. The staff list should include a method for positive identification of those who are trained, qualified, authorized, certificated and current.

3. Authorized individuals may be informed by letter or by a list showing the extent of their responsibilities, authorities, and inspection limitations. If a list is used, it should be signed by each authorized individual to confirm that the authorized person is fully aware of any inspection limitations.

6.7 ESCALATION PROCEDURES

The maintenance Programme defined time limitations, maintenance intervals, and instructions and procedures to conduct inspections, which include the necessary tests and checks, are an integral part of their maintenance and inspection Programme. This Programme is a fundamental component of the certificate holder's Continuous Airworthiness Maintenance Programme (CAMP). On average, the inspection intervals in the maintenance Programme include a degree of safety to maximize aircraft reliability. Due to unanticipated circumstances, a certificate holder might need to temporarily adjust the interval for an individual aircraft, system, or component.

1. Maintenance task intervals may be escalated (increased) in keeping with the operator's existing policies and practices. It is the operator's responsibility to justify an escalation of task intervals and other time limitations to DGCA for approval based on substantiating operating experience. When task intervals are to be escalated, the operator should carefully evaluate all items subject to escalation to ensure that only qualified items are included in the escalated interval and CMR remained unchanged.

2. Individual task intervals may be escalated based on satisfactory substantiation by the operator (i.e. in accordance with the operator's approved reliability Programme) review and approved by DGCA.

3. In case of the aircraft structural maintenance Programme, an operator's reliability Programme should not be used to escalate the inspection interval, or delete the task, for any structural inspection identified as an airworthiness limitation (AWL).

NOTE : Temporary Escalation of Maintenance Programme for obtain piston engine is provided in Appendix 1 to this chapter with the view to have good understanding of the process by the AwI.

6.8 EVALUATION PROCEDURE

A. Brief the Operator/Applicant: Provide the operator/applicant with the applicable Aviation Safety Notices and advise the operator/applicant of the current policies and regulatory requirements.

B. Review the Schedule of Events: If this task is performed as a part of an original certification, review the schedule of events to ensure that this task can be accomplished within the schedule.

C. Evaluate the Organization Documentation: The maintenance Programme must contain the following:

   1. A complete description of the operator's organization as it relates to the Programme, including the duties and the responsibilities of the relevant individuals.

2. A list of persons with whom the operator /applicant has arranged for the performance of any work along with a general description of that work

3. A proper separation of maintenance and inspection functions for the performance of required inspections

D. Evaluate the inspection and maintenance Programme: The maintenance Programme must contain inspection and maintenance procedures for the performance of maintenance and modifications. These procedures must, at a minimum, include the following:

1. The method of performing routine and non routine maintenance and modifications.

2. A list of designated items that must be inspected.

3. The method for performing required inspections

4. A system that addresses how specific required inspections are developed, controlled and reviewed to ensure the continued airworthiness of aircraft.

5. The method of designating personnel performing required inspections by occupational title, name, and authorization

6. Procedures for the re-inspection of the work performed as a result of previous required inspection findings (by back procedures)

7. Procedures, standards, and limits necessary for required inspections, including identifying RII items within work forms or job cards.

8. Procedures for the periodic inspections and calibration of precision tools, measuring devises and test equipment.

9. Procedures for maintaining records and control of the inspections and calibrations.

10. Procedures to ensure that all required inspections are performed.

11. Instructions to prevent any person who has performed any item of work from performing any required inspection of that work.

12. Instructions and procedures to prevent any decision of an AwI regarding any required inspection from being countermanded. Only supervisory personnel of the inspection unit or an administrative person with overall responsibility for both the

required inspection and other maintenance and modification functions can override an AwI's decision.

13. Procedures to ensure that required inspections, maintenance, and modifications that are left incomplete as a result of a work interruption are properly completed before the aircraft is released to service.

14. Work forms, job cards, and detailed procedures for performing inspections and other maintenance

E. Evaluate the Maintenance Records / Systems.

The maintenance Programme must contain a maintenance record keeping system. The operator /applicant must meet the requirements. In addition, the operator must have a system for the retention and retrieval of maintenance records to provide the following:

1. A description of the work performed

2. The name of the person performing the work and/or the name of the organization if other than the operator /applicant's

3. The name of the person approving the work

F. Evaluate Personnel.

The maintenance Programme must contain the following:

1. Procedures to determine the qualifications of the personnel, including management and supervisory personnel

2. Procedures to ensure that only persons appropriately certificated, properly trained, authorized, qualified, and current to perform any required inspections.

3. Instructions to ensure that those persons performing required inspections are under the control of the inspection unit

4. Instructions to relieve any person performing maintenance for excessive periods of time without adequate rest periods.

G. Evaluate Maintenance Interval Escalation Programme.

1. Escalation is considered only for Short-term and for aircraft, aircraft systems, or components not subject to a reliability Programme may only be authorized on a case-by-case basis.

2. Airworthiness Inspector must closely monitor the use of short-term escalation authorizations to ensure they are not being abused or used indiscriminately and that they do not conceal

unsound maintenance practices, maintenance Programme deficiencies, or poor management decisions.

3. Certificate holders operating aircraft, aircraft systems, or components under the controls of an approved reliability Programme may issue short-term escalations, provided that short-term escalation procedures have been incorporated into their reliability Programme.

4. The certificate holder must provide policy, procedures, instructions, and/or information in the manual, which allows personnel concerned with short-term escalations to perform their duties and responsibilities to a high degree of safety.

5. A short-term escalation should only be used after the certificate holder thoroughly evaluates all of the alternatives and gives careful consideration to the operating performance and the continued airworthiness of the aircraft, systems, and components. A review of the proposed escalation should include:

   a. If the short-term escalation authorization applies to powerplants, powerplant accessories and components, propellers and gearboxes, and airframe accessories and components, the certificate holder must provide previous inspection results or justifiable data from previous teardown reports

   b. If supplemental inspections are warranted during the escalation period to ensure continued airworthiness of the airframe, system, or component, the certificate holder must provide the supplemental inspection schedule

6. Short-term escalations cannot be issued after an item has exceeded an established maintenance Programme time limitation. AwIs should monitor each short-term escalation to ensure that non-compliance with the certificate holder’s time limitations is not being hidden by the use of short-term escalations. AwIs should look at the current time limitation, the current time, and the proposed escalation to properly monitor for these situations.

   NOTE: The short-term escalation must not be construed as a permanent escalation to the task or check interval.

7. Maximum short-term escalation intervals may be a percentage of an existing time interval for a particular task, or may be designated in hours of time-in-service, cycles, or some other identifiable increment. Except under certain conditions, the maximum time allowable for a short-term escalation is 10 percent, not to exceed 500 hours/cycles, time-in-service. In case if it is 500 hours/cycles, in every 100 hours/cycles the

operator should submits the appropriate performance report for further consideration up to its maximum of 500 hours/cycles. Maintenance tasks or checks that are controlled by calendar days or years would also be limited by 10 percent, not to exceed the amount of days it would take the aircraft to reach the 500-hour time-in-service limit. (For example, if a certificate holder's utilization is 10 hours a day, then a particular calendar task can be short-term escalated for a maximum of 10 percent but may not exceed 50 days (500 hours ÷ 10 hours a day = 50 days).) Certificate holders must describe the methods and procedures for calculating short-term escalation intervals in their manual.

8. The certificate holder must notify the CAASL no later than the next working day following the certificate holder's issuance of the short-term escalation. To ensure continuity between the CAASL and the certificate holder, it is recommended that the certificate holder's Programme include procedures to notify the CAASL.

9. Short term escalation may not be considered for further extension.

NOTE: The short-term escalation procedure to be followed in case of Piston Engine TBO escalation is explained in appendix 1 to this chapter.

H. Maintenance Reliability Programme

The maintenance reliability Programme required as part of the system of maintenance provides an appropriate means of monitoring the effectiveness of the maintenance Programme, with regard to spares, established defects, malfunctions and damages, and to amend the maintenance Programme. The amendment of the maintenance Programme shall involve the approval of the DGCA. Actions resulting from a reliability Programme may include escalating or deleting a maintenance task, or de-escalating or adding a maintenance task, as necessary.

Note; The guidelines required for the preparation of reliability Programme me for the operator and review mechanism for the Airworthiness Inspector is explained in the Chapter 10, Section 2 of this manual.

I. Evaluate the Structural Inspection Procedures: This part of the maintenance Programme must include the following:

1. Corrosion Control Procedures
2. A detailed inspection of areas where maintenance is being performed to detect cracks, distortion and corrosion, to examine attachment of parts, and to determine the condition of the area.

3. Maintenance Review Board/ manufacturer's routine structural inspection requirements

J. Analyze the findings:

1. Evaluate all deficiencies to determine what, if any, corrective actions will be required.

2. If there are deficiencies in the maintenance Programme, schedule a meeting with the operator / applicant to discuss needed Programme changes and deficiency resolutions.

NOTE: The Checklist prepared for the review of Operator's maintenance Programme is in the Appendix 2, which gives the guidance for the Airworthiness Inspector to review the Programme. The operator also required to follow the Checklist guidance to ease process of granting approval.

APPENDIX 1

TEMPORARY ESCALATION OF MAINTENANCE PROGRAMME (PISTON ENGINE)

The appendix is not intended to be the only means of compliance with established procedures, and consideration will be given to other methods of compliance that may be presented to the Director General of Civil Aviation. When new standards, practices, or procedures are found to be acceptable and they will be added to the appropriate manner.

The method described in this appendix permits the operation of piston engines beyond the manufacturer's recommended Time Between Overhaul (TBO) on a short term manor for the aircraft operators who maintains the aircraft in accordance with an escalation procedure that is included in a maintenance Programme me approved by the DGCA.

If an operator chooses not to maintain their piston engine to any of the appropriate procedures below, then they must overhaul the engine in accordance with the manufacturer's recommended overhaul intervals.

The approved maintenance Programme which addresses an inspection schedule of escalation procedure that should consistent with

i. the manufacturer's recommendations; and
ii. the operator's experience; and
iii. the type of operation in which the aircraft is engaged:

In developing an escalation Programme, consideration must be given to the type of operation, utilisation, previous operational history, engine build standard and the facilities in which the aircraft is kept and maintained. It is important to note that engines on an escalation Programme will need a more rigorous maintenance and reporting regime as detailed below, throughout the operating period.

A safety focused successful outcome for an escalation Programme will require a maintenance Programme that include, depending on the type of operation, **all or some** of the following elements in addition to what is required by the aircraft and engine manufacturers and any other CAASL requirements;

- Engine entry to the escalation Programme
- Engine condition monitoring
- Engine build standard
- Exhibit engines
- Reporting requirements
- Engine escalation management

The guidance below explains how to prepare Engine Condition Monitoring Programme for short term escalation of TBO by an operator for the review of CAASL for approval.
During short term escalation Programme me, when engines are operated beyond the manufacturer's TBO, it is important that the continuing airworthiness of the engines are assessed through a condition monitoring Programme

- All engines must be on a condition monitoring Programme starting at least 300 hours prior to reaching the manufacturer's TBO
- Condition monitoring must be performed per guidance below and submit for review.

Engine Condition Monitoring

Engine specific details including additional maintenance actions, where required, are to be included in the system of maintenance at the start of the escalation Programme.

Calibration

All instruments used for the following measurements must be calibrated against an industry acceptable standard.

Engine Performance

The certifying engineer shall evaluate the engine operation and record the following parameters. All aircraft maintenance manual and flight manual limitations ***as required*** are to be followed during the engine runs,

The engine parameters to be recorded may include;

- Take off power per the Flight Manual
- Oil pressure at idle and take off power
- Oil temperature at idle and take off power
- Cylinder head ***temperature at takeoff power***
- Exhaust gas temperature at take of power
- Fuel pressure/flow at idle and take off power
- Individual magneto performance at run up power
- Operation of fuel mixture control (idle mixture)
- Ambient temperature, altitude and ***Pressure altitude (1013 Hpa).*** Trends in the engine performance parameters are to be created and analysed.

Cylinder leak test

A cylinder leak test must be carried out per the procedures published by the manufacturer and the results recorded. Trends in the cylinder leak test results are to be created and analysed.

Oil system checks

Replace the oil filter and inspect the removed filter, oil pressure screen and if applicable oil suction screen for metal particles and other debris.
Replace engine oil at intervals recommended by the manufacturer and record oil consumption. Trends in oil consumption are to be created and analysed.

Turbocharger and controller checks

Turbocharger and controller where applicable must be checked and adjusted per the manufacturers recommendations.

Engine Performance Log.

Piston engine ground run: **Aircraft Registration: 4R-…………Job No:.....................**

Start engine I.A.W. manufacturer's instructions, observe gauges for normal operation, shut down engine if correct parameters are not achieved.

During Warm –up

Carry out magneto check at 1000 rpm, each magneto momentarily to **OFF.** Satisfactory? **Y/N**
If fitted, check carburetor heat control, move from **COLD** to **HOT.**
Check RPM drop? **Y/N**
Return to **COLD.** Check for RPM rise? **Y/N**
When oil temperature and CHT are in the green continuing as listed.

Ignition system check
Set engine rpm to ………(per A/C Flight Manual) Magneto drop LH ………RH……..

Propeller pitch change check
Set throttle to maintain RPM as above. Move propeller pitch control to reduce

RPM by maximum 300 rpm. Cycle propeller three times. Function correct? **Y/N**

Electrical system check
Maintain RPM set above. Check alternator/generator is charging
Function correct? **Y/N**

Vacuum system check
Maintain RPM set above. Check vacuum gauge reading/limits, and
Vacuum gyro instruments operation Function correct? **Y/N**

Full throttle/Take off power
Set throttle to maximum RPM and manifold pressure ensuring adequate clearance from other people/aircraft/buildings; record the following information:

Static rpm ....Manifold Pressure ....Oil pressure ....psi Oil Temp ......C/F

CHT ……..C/F Fuel pressure/Flow……. .... EGT…………..

Reduce throttle slowly to idle rpm and record ....rpm

Oil Pressure ……… psi Oil Temp ………C/F Fuel pressure/Flow…………

Idle rise mixture check

Set engine to 1000 rpm. Pull mixture control slowly towards **FULL LEAN.** Check and record idle rise……. rpm

Engine shut down

Ensure temperatures and pressures are within manufacture's limits before moving the mixture to **FULL LEAN** or I.AW. the manufacturer's instructions

Remarks:

APPENDIX 2

MAINTENANCE PROGRAMME CHECKLIST

The purpose of the Maintenance Programmes Compliance Checklist* is to assist owners / operators with a view to ensuring that Maintenance Programmes submitted to DGCA for approval are standardized and include all items that are required by Paragraph 2.2 –Maintenance Programme of SLCAIS 080 and also other additional required items. This checklist, when completed, should be submitted with the draft maintenance Programme (two copies).

This document includes all the relevant information as detailed in Appendix 1 to SLCAIS 080 Acceptable Means of Compliance (AMC), the format of which may be modified to suit the operator's preferred method. In all cases the checklist should clearly show both compliance (Yes) and location of the compliance in the notes section or not applicable (No) and the reason in the notes section.

The specific tasks and the relevant control procedures shall be included as specified in the Maintenance Programme (MP) or Continuing Airworthiness Management Exposition/Maintenance Control Manual or as appropriate (CAME/MCM/MOE) of the operator. The relevant cross-references shall be specified in the notes column at the appropriate paragraphs and the correct term MP, CAME or MCM/MOE shall be used. It is not acceptable to leave MP/CAME/MCM/MOE as the reference.

The checklist is provided to ensure the minimum required items are contained in the Maintenance Programme. It should be enhanced as necessary to suit the aircraft's needs; operational, utilisation and environmental.

AOC Number: Operators Name:

CAME/MCM/MOE/MPM Ref: Amendment Status:

Details of the previous maintenance Programme :

*Refer Compliance Checklist CAA/AW/CL/06 in section 3 in Airworthiness Office Procedure Manual

MAINTENANCE PROGRAMME CHECKLIST

			COMPLIANCE		
			Yes	No	Notes
1	**GENERAL REQUIREMENTS**				
1.1	**Maintenance Programme Basic Information**				
	1.1.1	The type/model/ and registration number of the aircraft			
		The type/model of the engines			
		The type/model of the propellers (where applicable)			
		The type/model of the auxiliary power units (where applicable)			
	1.1.2	The name and address of the owner, operator, managing the airworthiness of aircraft			
	1.1.3	The maintenance Programme reference, the date of issue and issue number			
	1.1.4	A signed statement (See Attachment 1 to this document)			
	1.1.5	Contents list			
		List of effective pages			
		Revision status of the document			
	1.1.6	Check periods for anticipated utilisation; include a utilisation tolerance of not more than 25%. Where utilisation cannot be anticipated, calendar time limits should also be included			
	1.1.7	Procedures for escalation of established check periods (where applicable) and acceptable to CAASL			
	1.1.8	Provision to record the date and reference of approved amendments incorporated in the maintenance Programme			
	1.1.9	Details of pre-flight maintenance tasks that are accomplished by maintenance staff			
	1.1.10	The tasks and the periods (intervals / frequencies) at which inspections should be carried out, including type and degree of inspection of the:			
		a. Aircraft			
		b. Engine(s)			
		c. APU			
		d. Propeller(s)			
		e. Components			

		f. Accessories			
		g. Equipment			
		h. Instruments			
		i. Electrical and radio apparatus			
	1.1.11	The periods at which components should be:			
		a. Checked			
		b. Cleaned			
		c. Lubricated			
		d. Replenished			
		e. Adjusted			
		f. Tested			
	1.1.12	Details of ageing aircraft system requirements together with any specified sampling Programmes, (if applicable)			
	1.1.13	Details of specific structural maintenance Programmes where issued by the type certificate holder (if applicable) including but not limited to:			
		a. Maintenance of structural integrity by Damage Tolerance and Supplemental Structural Inspection Programmes (SSID)			
		b. Structural maintenance Programmes resulting from the SB review performed by the TC holder			
		c. Corrosion prevention and control			
		d. Repair Assessment			
		e. Widespread Fatigue Damage			
	1.1.14	Statement of the limit of validity in terms of total flight cycles/calendar dates/flight hours for the structural Programme in 1.1.13 (if applicable)			
	1.1.15	The periods at which overhauls should be made			
		The periods at which replacements should be made			
	1.1.16	A cross-reference to other documents approved by the type certificate issuing authority which contains the details of			

		maintenance tasks related to:			
		a. Mandatory life limitations.			
		b. Certification Maintenance Requirements (CMR's), if applicable			
		c. Airworthiness Directives (AD)			
		Specific identification of the above items mandatory status			
	1.1.17	Reliability Programme or statistical methods of continuous Surveillance, if applicable			
	1.1.18	A statement that practices and procedures should be the standards specified by the TC holder's instructions. In the case of approved practices and procedures that differ, the statement should refer to them			
	1.1.19	Each maintenance task quoted (i.e. inspections - detailed, scan, general) should be defined in a definition section			
2	**PROGRAMME BASIS**				
	2.1	Is the Programme based upon the MRB report, the TC holder's maintenance planning document or Chapter 5 of the maintenance manual?			
	2.2	For newly type-certificated aircraft comprehensively appraise the manufacturer's recommendations (MRB report)			
	2.3	For existing aircraft types, comparisons with maintenance Programmes previously approved			
	2.4	If CDCCL (Critical Design Configuration Control Limitations) have been identified for the aircraft type by the TC/STC holder, maintenance instructions should be developed. CDCCL's are characterised by features in an aircraft installation or component that should be retained during modification, change, repair, or scheduled maintenance for the operational life of the aircraft or applicable component or part.			
3	**AMENDMENT**				
	3.1	Amendments (revisions) to reflect changes: See Attachment 2			
		a. In the TC holder's recommendations			

		b. Introduced by modifications			
		c. Introduced by repairs			
		d. Discovered by service experience			
		e. As required by the CAASL			
4	**PERMITTED VARIATIONS TO MAINTENANCE PERIODS**				
	4.1	Vary the periods through a Procedure approved by the CAASL?			
		Vary the periods with the approval of the CAASL (see Attachment 3)?			
5	**PERIODIC REVIEW OF MP CONTENTS**				
	5.1.	Periodic review to ensure that the Programme reflects current:			
		a. TC holder's recommendations			
		b. Revisions to the MRB report if applicable			
		c. Mandatory requirements			
		d. Maintenance needs of the aircraft			
	5.2	Annual review defined			
6	**RELIABILITY PROGRAMMES**				
6.1	**Applicability**				
	6.1.1	Developed in the following cases:			
		a. Programme is based upon MSG-3 logic			
		b. Programme includes condition monitored components			
		c. Programme does not contain overhaul time periods for all significant system components			
		d. Specified by the Manufacturer's MPD or MRB			
	6.1.2	Need not be developed in the following cases:			
		a. Programme is based upon the MSG-1 or 2 logic (only hard times or on condition items)			
		b. Not a large aircraft (= or < 5700 kgs MTOW or single engined helicopter)			
		c. Programme provides overhaul time periods for all significant system components			
	6.1.3	Operator may develop own reliability monitoring Programme			

6.2	**Applicability, Small Fleets**				
	6.2.1	Less than 6 aircraft of the same type			
	6.2.2	Reliability Programme is irrespective of the fleet size			
	6.2.3	Tailor reliability Programmes to suit the size and complexity of operation			
	6.2.4	Use of “Alert levels” should be used carefully			
	6.2.5	When establishing a reliability Programme, consider the following:			
		a. Focus on areas where a sufficient amount of data is likely to be processed			
		b. How is engineering judgment applied?			
	6.2.6	Pool data and analysis (paragraph 6.6 specifies conditions)			
	6.2.7	If unable to pool data / additional restrictions on the MRB/MPD tasks intervals specified			
6.3	**Engineering Judgment**				
	6.3.1	Are there appropriately qualified personnel (with appropriate engineering experience and understanding of reliability concept) for the reliability Programme ?			
6.4	**Contracted Maintenance**				
	6.4.1	Maintenance Programme / may delegate certain functions to the 145 Approved organisation			
	6.4.2	These are:			
		a. Developing the maintenance and reliability Programmes			
		b. Collection and analysis of the reliability data			
		c. Providing reliability reports			
		d. Proposing corrective actions to CAMO Approval			
	6.4.3	Approval to implement a corrective action remains the CAMO approval organisation prerogative and responsibility			
	6.4.4	The arrangement between the CAMO and the 145 Approved organisation should be specified in the maintenance contract (see SLCAIS 080 Appendix 1) and the relevant CAME/MCM, and MOE/MPM procedures.			

6.5	**Reliability Programme**				
6.5.1	Objectives				
	6.5.1.1	Statement summarising the prime objectives of the Programme including at least the following			
		a. Recognise the need for corrective action			
		b. Establish what corrective action is needed			
		c. Determine the effectiveness of that action			
	6.5.1.2	The extent of the objectives should be directly related to the scope of the Programme			
	6.5.1.3	All MSG-3 related tasks are effective and their periodicity is adequate			
6.5.2	Identification of Items				
	The items controlled by the Programme should be stated				
6.5.3	Terms and Definitions				
	Significant terms and definitions should be clearly identified				
6.5.4	Information sources and collection				
	6.5.4.1	Sources of information should be listed and procedures for the transmission of information from the sources, together with the procedure for collecting and receiving it, should be set out in detail in the Exposition as appropriate.			
	6.5.4.2	Type of information to be collected should be related to the objectives, examples of the normal prime sources:			
		a. Pilots Reports			
		b. Technical Logs			
		c. Aircraft Maintenance Access Terminal / On-board readouts			
		d. Maintenance Worksheets			
		e. Workshop Reports			
		f. Reports on Functional Checks			
		g. Reports on Special Inspections			
		h. Stores Issues/Reports			
		i. Air Safety Reports			
		j. Reports on Delays and Incidents			
		k. Other sources: i.e. ETOPS, RVSM, CAT II/III			

	6.5.4.3	Due account of Continuing Airworthiness information promulgated under Type Certification.			
6.5.5	Display of Information				
	Information displayed graphically or tabular or a combination				
	6.5.5.1	Provisions for "nil returns"			
	6.5.5.2	Where "standards" or "alert levels", information oriented accordingly			
6.5.6	Examination, analysis and interpretation of the information				
	Method for examining, analysing and interpreting the information should be explained				
	6.5.6.1	Methods of examination may be varied according to the content and quantity of information of individual Programmes			
	6.5.6.2	The whole process should enable a critical assessment of the effectiveness of the Programme as a total activity. May involve:			
		a. Comparisons of operational reliability with established or allocated standards			
		b. Analysis and interpretation of trends			
		c. Evaluation of repetitive defects			
		d. Confidence testing of expected and achieved results			
		e. Studies of life-bands and survival characteristics			
		f. Reliability predictions			
		g. Other methods of assessment			
	6.5.6.3	Range and depth of engineering analysis should be related to the particular Programme and facilities available. At least the following should be taken into account:			
		a. Flight defects and reductions in operational reliability			
		b. Defects - line and main base			
		c. Deterioration observed during routine maintenance			
		d. Workshop and overhaul findings			
		e. Modification evaluations			
		f. Sampling Programmes			
		g. Adequacy of maintenance equipment and publications			
		h. Effectiveness of maintenance			

		procedures			
		i. Staff training			
		j. Service bulletins, technical instructions etc			
	6.5.6.4	Contracted maintenance -arrangements established and details for information input included			
6.5.7	Corrective Actions				
	6.5.7.1	Procedures and time scales for implementing corrective actions and for monitoring the effects of corrective actions should be fully described & could include:			
		a. Changes to maintenance, operational procedures or techniques			
		b. Changes requiring amendment of the approved maintenance Programme?			
		c. Amendments to approved manuals			
		d. Initiation of modifications			
		e. Special inspections / fleet campaigns			
		f. Spares provisioning			
		g. Staff training			
		h. Manpower and equipment planning			
	6.5.7.2	The procedures for effecting changes to the maintenance Programme should be described, and the associated documentation should include a planned completion date for each corrective action, where applicable			
6.5.8	Organisational Responsibilities				
	Organisational structure and the department responsible for the administration of the Programme me should be stated. The chains of responsibility for individuals and departments in respect of the Programme, together with the information and functions of any Programme control committees should be defined				
6.5.9	Presentation of information to the CAASL				

	The following information should be submitted to CAASL for approval as part of the reliability Programme:				
	a. Format and content of routine reports				
	b. Time scales for production of reports together with their distribution				
	c. The format and content of reports supporting request for increases in periods between maintenance (escalation) and for amendments to the approved maintenance Programme. These reports should contain sufficient detailed information to enable CAASL to make its own evaluation where necessary.				
6.5.10	Evaluation and Review				
	Describe procedures and individual responsibilities - continuous monitoring of the effectiveness of the Programme				
	6.5.10.1	Procedures for revising the “standards” or “alert levels”.			
	6.5.10.2	Although not exhaustive, criteria to be taken into account during the review includes:			
		a. Utilisation (high / low / seasonal)			
		b. Fleet commonality			
		c. Alert Level adjustment criteria			
		d. Adequacy of data			
		e. Reliability procedure audit			
		f. Staff training			
		g. Operational and maintenance procedures			
6.5.11	Approval of organisation to implement MP changes arising from the reliability Programme results				
	a. Does the reliability Programme monitor the content of the maintenance Programme in a comprehensive manner?				
	b. Is appropriate control exercised by the owner / operator over the internal validation of such changes?				
6.6	**Pooling Arrangements**				
	6.6.1	Pooling information - must be substantially the same, including:			
		a. Certification / modification / SB compliance			

		b. Operational Factors			
		c. Maintenance factors			
	6.6.2	Is there a substantial amount of commonality / has the CAASL agreed?			
	6.6.3	Is the aircraft on short-term lease? CAASL may grant more flexibility			
	6.6.4	Changes to any Continuing Airworthiness Management Organisation requires assessment in order that the pooling benefits can be maintained			
	6.6.5	Reliability Programme managed by the aircraft manufacturer if agreed by the CAASL			
7	**CAASL REQUIREMENTS**				
7.1	Details of who may issue a CRS				
7.2	Define which inspections/checks are considered to be base maintenance				
7.3	Maintenance Requirements, in the absence of specific recommendations. See Attachment 4				
	7.3.1	Aircraft battery capacity check/deep cycle?			
	7.3.2	Emergency equipment			
	7.3.3	Emergency escape provisions:			
		a. Portable valise type life-rafts			
		b. Door and escape chutes/slides			
		c. Emergency exits / hatches			
	7.3.4	Flexible hoses			
	7.3.5	Fuel / oil system contamination checks			
	7.3.6	Pressure vessels			
	7.3.7	Seat belts and harnesses			
	7.3.8	Aviation Safety Notices applicability			
	7.3.9	Vital points and control systems			
	7.3.10	Maintenance applicable to special operations approvals (if applicable):			
		AWOPS			
		MNPS			
		RVSM			
		ETOPS			
		Offshore operations			

		HEMS			
		Transport of dangerous goods			
		Other (Specify) …			
	7.3.11	Customer furnished equipment			
	7.3.12	Engine and APU condition monitored maintenance			
	7.3.13	Mandatory requirements – airworthiness directives			
	7.3.14	Flight data recorder systems			
	7.3.15	CAASL mandatory requirements listed in SLCAISs			
	7.3.16	Mode ‘S’ transponder ICAO 24 bit aircraft address			
	7.3.17	In-flight entertainment systems (IFE)			

Completed by :

Signed :

Date :

ATTACHMENT 1 TO APPENDIX 2

SUGGESTED OPERATOR'S CERTIFICATION STATEMENT

In the preparation of this Maintenance Programme to meet the requirements of SLCAIS 080, the recommendations made by the airframe constructors and engine and equipment manufacturers have been evaluated and, where appropriate, have been incorporated.

This Maintenance Programme lists the tasks and identifies the practices and procedures, which form the basis for the scheduled maintenance of the aeroplane(s). The operator undertakes to ensure that these aeroplanes will continue to be maintained in accordance with this Programme.

The data contained in this Programme will be reviewed for continued validity at least annually in the light of operating experience.

It is accepted that this Programme does not prevent the necessity for complying with any new or amended regulation published by CAASL from time to time where these new or amended regulations may override elements of this Programme.

It is understood that compliance with this Programme alone does not discharge the operator from ensuring that the Programme reflects the maintenance needs of the aeroplane, such that continuing safe operation can be assured. It is further understood that the DGCA reserves the right to suspend, vary or cancel approval of the Maintenance Programme if the DGCA has evidence that the requirements of the Maintenance Programme are not being followed or that the required standards of airworthiness are not being maintained.

Name: ....
Position: ....
Signed: ....

For and on behalf of operator: ....

Date: ....

NOTE: The post holder identified above is either the Accountable Manager for an AOC operator's Continuing Airworthiness Management organisation, a nominated post holder within the CAM organisation when the aircraft's continuing airworthiness is contracted to an approved organisation or the aircraft owner when the aircrafts continuing airworthiness is not contracted to an approved organisation.

ATTACHMENT 2 TO APPENDIX 2

MAINTENANCE PROGRAMME AMENDMENT APPROVAL SUBMISSION

CAD Programme Ref: .... Issue No: ....

Aircraft Type: ....

Operators Programme Ref:.............................. Issue Date:..

Amendment No: ....

Item	Action to be taken	Justification	CAASL Remarks
1. Introduction Page A	Replace with new page dated …………………	Introduction of new check cycle	
2. Introduction Page B	Replace with new page dated …………………	Introduction of Aircraft Registration 8Q-…………………	
3. Page 45 – Item E12	Replace with new page dated …………………	Revision of forward and aft pressure bulkhead inspection requirements. In accordance with manufacturer's latest requirements	

COMPLIANCE STATEMENT: This Maintenance Programme complies with the manufacturer's minimum maintenance and inspection requirements and the requirements of the Civil Aviation Authority for the airframe, engines (on wing), systems and components except wherein previously or hereby Approved by the Director General of Civil Aviation.

Signed: .... Position: .... Date: ....

Organisation:....................................... On behalf of: ....

The above requested amendments are approved, with the exception of:

....

....

Signed on behalf of CAD:.. Date: ....

ATTACHMENT 3 TO APPENDIX 2

PERMITTED VARIATIONS TO MAINTENANCE PERIODS
(To be included in the operator's Continuing Airworthiness Management Exposition/Maintenance Organisation Exposition)

The operator may vary the periods prescribed by this Programme provided that such variations are within the limits of sub-paragraphs (a) to (d).

Variations shall be permitted only when the periods prescribed by this Programme (or documents in support of this Programme) cannot be complied with due to circumstances, which **could not reasonably have been foreseen by the operator**. The decision to vary any of the prescribed periods shall be made only by the operator. Particulars of every variation so made shall be entered in the appropriate Log Book(s).

Period Involved			Maximum Variation of the Prescribed Period
a	Items Controlled by Flying hours		
	i	5000 flying hours or less	10%
	ii	More than 5000 flying hours	500 flying hours
b	Items Controlled by Calendar Time		
	i	1 year or less	10% or 1 month, whichever is less
	ii	More than 1 year but less than 3 years	2 months
	iii	More than 3 years	3 months
c	Items Controlled by Landing/Cycles		
	i	500 Landing/Cycles or less	10% or 25 Landing/Cycles, whichever is less
	ii	More than 500 Landing/Cycles	10% or 500 Landing/Cycles, whichever is less
d	Items Controlled by More than 1 Limit		
	For items controlled by more than one limit, e.g. items controlled by flying hours and calendar time or flying hours and landings/cycles, the more restrictive limit shall be applied.		

NOTES

1. The variations permitted above do not apply to:

   a. Those components for which an ultimate (scrap) or retirement life has been prescribed (e.g. primary structure, components with limited fatigue lives, and high energy rotating parts for which containment is not provided). Details concerning all items of this nature are included in the Type Certificate holder's documents or manuals, and are included in the preface pages to the Maintenance Programme.

   b. Those tasks included in the Maintenance Programme, which have been classified as mandatory by the Type Certificate holder or the DGCA

c. Certification Maintenance Requirements (CMR) unless specifically approved by the manufacturer and agreed by the DGCA.

2. New or amended regulations may override these conditions.

ATTACHMENT 4 TO APPENDIX 2

ADDITIONAL MAINTENANCE REQUIREMENTS

(Reference item 7 – CAASL required items addressed in Maintenance Programme Check List)

7.3.1 AIRCRAFT BATTERY CAPACITY CHECKS - Aircraft batteries shall be maintained in accordance with the manufacturer's recommendations. In the absence of any manufacturer's instructions the following periods apply.

a. Lead acid Battery – not exceeding 3 months.

b. Ni-Cd Battery – not exceeding 4 months.

7.3.2 EMERGENCY EQUIPMENT - The required Emergency Equipment will be maintained to a Programme based on the equipment manufacturer's recommendations. In addition, the following requirements are complied with in the Maintenance Programme:

Emergency equipment is to be checked for correct complement, stowage, installation and expiry date(s) at suitable periods.

First Aid Kit(s) contents are checked at periods not exceeding 12 months.

7.3.3 EMERGENCY ESCAPE PROVISIONS (as applicable)

a. Portable Valise Type Life rafts. At the appropriate Overhaul Period, 10% of all life rafts installed in fleets will be test inflated using system bottle and release mechanisms.

b. Door and Escape Chutes/Slides.

c. Emergency Exits/Hatches. All emergency exits and hatches are functioned by both internal and external means at periods specified in this Maintenance Programme. In the absence of manufacturer's specific recommendations these occur at suitable periods not exceeding 6 months elapsed time.

7.3.4 FLEXIBLE HOSES - Flexible hoses shall be inspected, overhauled or life limited in accordance with the manufacturer's recommendations.

In the absence of manufacturer's recommendations, hoses shall be subject to a Programme of pressure testing at periods not exceeding 6 years from installation and 3 yearly thereafter, or in accordance with an alternative Programme as agreed by the CAASL.

7.3.5 FUEL/OIL SYSTEM CONTAMINATION CHECKS - Consumable fluids, gases etc. Uplifted prior to flight will be of the correct specification, free from contamination, and correctly recorded

Fuel system water drain checks are to be carried out in accordance with MME/MOE procedures.

The procedures shall be in accordance with the manufacturer's recommendations. In the absence of manufacturer's recommendations, the frequency of the water drain checks shall be approved by DGCA

7.3.6 PRESSURE VESSELS - Oxygen/Nitrogen pressure vessels are to be overhauled or tested in accordance with manufacturer's recommendations. In the absence of any such recommendations the periods specified in British Standard Institute Standard (BSI) BS5430 are applied.

7.3.7 SEAT BELTS AND HARNESSES - In the absence of manufacturer's recommendations, all installed seat belts and harnesses shall be subject to a Programme of Detailed Visual Inspection at periods not exceeding 6 months.

7.3.8 Additional requirements

Air Safety Notices requirements.

7.3.9 VITAL POINTS AND CONTROL SYSTEMS - Whenever inspections are made or work is undertaken on vital points, flying or engine control systems, a detailed investigation must be made on completion of the task to ensure that all tools, rags or any other loose articles which could impede the free movement and safe operation of the system(s) have been removed and that the system(s) and installation in the aircraft zone are clean and unobstructed.

7.3.10 MAINTENANCE APPLICABLE TO SPECIFIC AEROPLANE OPERATIONS - The Maintenance Programme contains the necessary tasks required to ensure continued compliance with additional special authorisations/approvals:

Automatic Approach and Automatic Landing CAT II/CAT III

Minimum Navigation Performance Specifications (MNPS)

Reduced Vertical Separation Minima (RVSM)

Extended Range Operations with two-engined aeroplanes (ETOPS)

Offshore operations

Helicopter Emergency Medical Service (HEMS)

Transportation of Dangerous Goods

Other (Specify)

7.3.11 CUSTOMER FURNISHED EQUIPMENT (CFE/VFE/BFE) - The Maintenance Programme contains the necessary tasks required to ensure continued airworthiness of additional equipment fitted to this aircraft.

7.3.12 MANDATORY REQUIREMENTS – AIRWORTHINESS DIRECTIVES

Procedures are in place to assess all ADs on a continuing basis for applicability to aircraft maintained to this Maintenance Programme.

7.3.13 FLIGHT DATA RECORDER SYSTEMS

Approval, Operational Serviceability and Readout of Flight Data Recorder Systems

The Maintenance Programme should contain the necessary tasks required to ensure that the Flight Data Recorder System(s) remain serviceable with regard to the parameters to be recorded and the duration of recording.

7.3.14 MODE “S” TRANSPONDER ICAO 24-BIT AIRCRAFT ADDRESSES

The correct Mode S address should be periodically confirmed for each transponder installed on the aircraft, via a field test set at an appropriate maintenance opportunity (not to exceed a 2 year periodicity). This task should be incorporated into the Approved Maintenance Programme.

7.3.15 IN-FLIGHT ENTERTAINMENT SYSTEMS (IFE)

Continuing Airworthiness and Safety Standards of Passenger Service and In-Flight Entertainment Systems to be maintained as per the standards published by the appropriate system manufacturer.

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 7 – MAINTENANCE RECORD KEEPING

7.1 OBJECTIVE

This chapter provides guidance to CAASL Airworthiness Inspectors for evaluating an applicant's procedure for utilizing, preserving and retrieving the maintenance records required by CAASL Regulations.

7.2 GENERAL

To comply with the maintenance recording requirements of the CAA-SL Regulations, the applicant's Maintenance Control Manual / Maintenance Procedures Manual or CAME/MOE as appropriate must identify and contain procedures to complete applicable documents used by the applicant. This Chapter is elaborating the record keeping requirements in SLCAIS 017.

A. Airworthiness Directive Status

The applicant must keep a record showing the current status of the applicable Airworthiness Directives (ADs), including the method of compliance

1. This record shall include the following:

   - A list of all ADs issued for the aircraft and reflecting which are applicable to the aircraft
   - The date and time in service or cycles, as applicable
   - The method of compliance
   - The time in service or cycles and/or date when next action is required (if it is a recurring AD)

2. An acceptable method of compliance description should include one or more of the following:

   - Reference to a specific portion of the AD
   - A manufacturer's service bulletin, if the bulletin is referenced in the AD
   - Another document generated by the applicant that shows compliance with AD, such as an Engineering Order (EO) / Engineering Authorization (EA)

3. When an Engineering order/Engineering Authorization is used, the applicant must retain the details. If the Engineering Order / Engineering Authorization also contains the accomplishment instructions and sign off, it must be retained indefinitely.

4. An applicant may apply for an alternate method of compliance for accomplishing ADs. Alternate method of compliance must be approved by the In-charge of Airworthiness section and will apply only to the applicant making the application.

5. The applicant's manual must have procedures to ensure compliance with new and emergency ADs within given time limits. The procedures must ensure that the individuals responsible for implementation during other than routine duty hours are notified, as necessary.

6. The document that contain the current status of the ADs/method of compliance may be the same as the record of AD accomplishment, although the retention requirements are different.

   - The record of AD accomplishment must be retained with the aircraft indefinitely.

   - The AD method of compliance record may only be retained until two year after the work is performed.

B. Total Time in Service Records

1. The total time in service records of engines, propellers and rotors, should require a record of life limited parts for their components. The only way to accomplish this is by keeping records for total time in service. The relevant records shall be kept for a minimum period of 90 days after the unit to which they refer has been permanently withdrawn from service.

2. Total time in service records may consist of aircraft maintenance records pages, separate component cards or pages, a computer list, or other methods as described in the applicant's manual.

C. Life-Limited Parts Status Records

CAASL Regulations require records of components of the airframe, engine, propellers, rotors, and appliances that are identified to be removed from service are maintained when the life limit has been reached.

1. The current life limited status of the part is a record indicating the operating time limits, total number of hours or cycles remaining

before the required retirement time of the component is reached. This record must include any modification of the part in accordance with ADs, service bulletins, or product improvements by the manufacturer or applicant.

2. The following are not considered a current life-limited status record. But preservation period of each to be addressed in Maintenance Control Manual without making any contradiction to the records being identified in SLCAIS 017;

   - Work orders
   - Maintenance installation records
   - Purchase requests
   - Sales receipts
   - Manufactures documentation of original certification
   - Other historical data

3. Whenever the current status of life-limited parts records cannot be established or has not been maintained (e.g., a break in current status) and the historical records are not available, the airworthiness of that product cannot be determined and therefore it must be removed from service.

D. Maintenance Releases

1. When maintenance, preventive maintenance, or modifications on an aircraft are performed, maintenance release or log entry must be completed prior to operating the aircraft. Using the procedures described in the manual, the applicant must be able to retain all of the records necessary to show that all requirements for the issuance of a maintenance release have been met. The maintenance release certificate shall be preserved for a minimum of 2 years after signing.

E. Overhaul List

The applicant is required to develop manual procedures for recording the time since last overhaul of all items installed on the aircraft that are required to be overhauled on a specified time basis. The items requiring overhaul are listed in a separate document.

1. The overhaul list includes the actual time or cycles in service since the last overhaul of all items installed on the aircraft. If continuity can not be established between overhaul periods, the last overhaul records must be reviewed to re-establish the currency of the overhaul list.

2. The overhaul list refers to the time since the last overhaul of an item and must not be confused with an overhaul record, which

requires the description of the work and identification of the person who performed and / or approved the work.

F. Overhaul Records

1. A record must be made whenever an item of aircraft equipment is overhauled and must include the following:

- A description of the work performed or reference to data acceptable to the DGCA.
- The name of the person performing the work, if the work is performed by a person outside of the applicant's organization
- The name or other positive identification of the individual approving the work

Note: A return to service tag does not constitute an overhaul record.

2. The applicant must retain the record and be able to make it available to the CAASL upon demand. The overhaul records shall be retained until the work is superseded by work of equal scope. However, the records shall be kept for a minimum period of 90 days after the unit to which they refer has been permanently withdrawn from service.

G. Current Aircraft Inspection Status

The applicant is required to retain a record identifying the current inspection status of each aircraft.

1. This record shall show the time in service since the last inspection required by the inspection Programme under which the aircraft and its appliances are maintained.

2. Inspection work packages or routine or non routine items generated while performing any part of the inspection Programme must be retained as follows:

- For one year after the work is performed
- Until the work is repeated or superseded by other work

H. Major modification and Major Repair

1. Applicants are required to retain records of current major repairs and major modifications that are accomplished on the following:

i. Airframe
ii. Engine
iii. Propeller
iv. Rotor
v. Appliance

2. Major modifications must be listed with the date of modification and a brief description of the work accomplished. The manual must have procedures for the following:

   - Extracting the information required for the list from the actual modification record of accomplishment
   - For transmitting a modification report to the Airworthiness Section.

3. The manual must contain procedures for retaining a report of each major repair and making it available for inspection by Airworthiness Inspectors.

7.3 EVALUATION PROCEDURES OF RECORD KEEPING

A. Review the Applicant's Maintenance Control Manual

1. Ensure that the necessary procedures exit in the applicant's manual to ensure a suitable system for creating, preserving and retrieving required records.

2. Ensure that all records will contain the following information, as applicable:

   - Description of work performed (or reference to data acceptable to the CAASL)
   - Name of the person(s) performing the work when the personnel are not employed by the applicant's organization
   - Name or other positive identification of the individual approving work

B. Review the Applicant's Manual's Procedures:

Review the Applicant's Record keeping procedures to ensure that the requirements of Air Navigation Regulations are met for the following

1. Maintenance Release Records: Ensure the following:

   - Maintenance release records will be retained for two year after the work is performed or until the work is repeated or suspended.
   - The applicant's manual identifies the person(s) authorized to sign a Maintenance release

2. Flight Maintenance Records: Ensure that procedures provide for the following entries:

   - Flight discrepancies to be entered at the end of each flight
   - Corrective actions and sign-off, per manual procedures

- Sign-offs for Required Inspection Items according to manual procedures by authorized personnel
- Minimum Equipment List (MEL) deferment as per the manual procedures

3. Total Time In Service Records

- Evaluate the method of recording total time in service airframes.
  This record must show the current time in service in hours.

- Ensure that procedures are in place to retain the records until the aircraft is sold and that the records will then be transferred with the aircraft.

4. Life-Limited Parts Status

   a. Ensure that the applicant has procedures for tracking the current status of life limited parts for each airframe, engine, propeller, rotor, and appliance, to include the following information.

      - Total operating hours (including calendar time) / cycles accumulated
      - Life limit (total service life)
      - Remaining time / cycles
      - Modifications

   b. Ensure that procedures are in place to retain the records until the aircraft is sold and are then transferred with the aircraft.

5. Time Since Last Overhaul Records: Ensure that the manual includes a method/procedure for updating this document from the overhaul records and ensuring that this document accompanies the aircraft upon sale.

6. Overhaul Records:

   a. Ensure that the manual describes how the applicant will document the last complete overhaul of each airframe, engine, propeller, rotor and appliance. The overhaul record should include the following information:

      - Disassembly data
      - Dimensional check data
      - Replacement parts list
      - Repair Data
      - Re assembly /test data
      - Reference to test data including overhaul specifications

7. Current Aircraft Inspection Status:

   a. Evaluate the method the applicant will use to record the time in service since the last inspection.

   b. Determine if procedures ensure that these records are retained until the aircraft is sold and are then transferred with the aircraft.

8. Airworthiness Directive (AD) Compliance: Evaluate how the applicant will comply with the record keeping requirements of the ADs. The procedures must generate a record that contains the following data:

   a. Current Status: Ensure that current status data will include the following:

      - A list of all ADs issued for the aircraft and clear identification of applicable to the aircraft
      - The date and time of compliance
      - The time and /or date of next required action (if a recurring AD)

   b. Method of Compliance: Ensure that this data will include either a record of the work performed or a reference to the applicable section of the AD.

Note: This data must be retained until the aircraft is sold and transferred with the aircraft

9. Major Modification Records:

   a. Evaluate the manual procedure to ensure that the applicant prepares and maintains a list of current major modifications to each airframe, engine, propeller, rotor and appliance.

   b. Ensure that the list include the following information:

      - The data of the modification
      - The brief description of the modification

10. Major Repair Records:

    Evaluate the manual procedures to ensure that the applicant prepares and maintains a report of all major repairs to each airframe, engine, propeller, rotor and appliance.

7.4 ANALYZE THE FINDINGS

Evaluate all deficiencies to determine if corrective actions will be required.

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANISATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 8 - MODIFICATIONS & REPAIRS

8.1 INTRODUCTION

The objective of this chapter is to provide guidance to CAASL Airworthiness Inspectors in approving type design modifications and repairs requested by the airlines, aircraft operators and approved maintenance organizations. This chapter sets out acceptable means for showing that modifications and repairs to aircraft comply with appropriate airworthiness requirements. Guidance is also provided concerning acceptable procedures for retention of substantiating data supporting compliance with the airworthiness requirements. Fundamentals of maintenance criteria and terminologies have been included to help Airworthiness Inspectors understand the concepts which will guide them through the approval process.

The information in this Chapter is intended to be of general nature and applies to all types of aircraft for which a type certificate has been issued and includes all components of the aircraft, such as engines, propellers, APU, systems and equipment. The requirement for approval of modifications and repairs stem from the standards contained in ICAO Annex 6, Part 1, 8.6, which states: "All modifications and repairs shall be shown to comply with airworthiness requirements acceptable to the State of Registry. Procedures shall be established to ensure that the substantiating data supporting compliance with the airworthiness requirements are retained".

8.2 TERMINOLOGY

The following test is included to give the Airworthiness Inspectors a general idea of the terms used and their implication. Throughout this chapter "alteration" and "modification" are intended to be synonymous. Guidance is presented in the Appendix to this chapter to assist in determining whether a particular modification or repair is major or minor.

8.2.1 Modification

A modification to an aeronautical product means a change to the type design which is not a repair.

a. Major. A major modification means a type design change not listed in the aircraft, aircraft engine or propeller specifications:

1. that might appreciably affect the mass and balance limits,

structural strength, performance, power plant operation, flight characteristics or other qualities affecting airworthiness or environmental characteristics; or

2. That will be embodied in the product according to non-standard practices.

b. Minor. A minor modification means a modification other than a major modification.

Note : Some States use the term "alteration" instead of modification. Throughout this chapter alteration and modification are intended to be synonymous.

8.2.2 Repair

A repair to an aeronautical product means a design change intended to restore it to an airworthy condition after it has been damaged or subjected to wear.

a. Major. A major repair means a design change which is intended to restore an aeronautical product to an airworthy condition:

1. Where the damage being repaired might appreciably affect the structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness or environmental characteristics; or

2. That will be embodied in the product using nonstandard practices.

b. Minor. A minor repair means a repair other than a major repair. Guidance is presented in the Appendix to this Chapter to assist in determining whether a particular modification or repair is major or minor.

8.2.3 Approved data

Data that can be used to substantiate major repairs/major modifications, derived from (but not limited to) the following:

- Type Certificate Data Sheets.
- Supplemental Type Certificate (STC) data, provided that it specifically applies to the item being repaired/altered.
- Airworthiness Directives (AD).
- Airframe, engine, and propeller manufacturer's "CAASL-approved" maintenance manuals or instructions..
- Component manufacturer's manuals or instruction, unless specifically not approved by the Director General of Civil Aviationor resulting in an alteration to the airframe, engine,

and/or propeller.

- Major Repair or Modification/Alteration form, when the specified data has been previously approved.
- Structural Repair Manuals (SRM), only as a source of approved data for a major repair, when it is a State of Design-approved document. Data that is contained in an SRM that is not approved can be used on a case-by-case basis if prior CAASL approval is granted for that repair.
- Repair data, issued by a CAASL delegated engineering authority holder,
- Foreign bulletins, for use on locally certificated foreign aircraft, when approved by the foreign authority.
- Service bulletins and letters or similar documents which are specifically approved by the Director General of Civil Aviation(under a TSO, PMA, or other type-certificated basis).
- Foreign bulletins as applied to use on a locally.-certificated product made by a foreign manufacturer who is located within a country with whom a Bilateral Agreement is in place and by letter of specific authorization issued by the foreign Civil Aviation Authority.
- Other data approved by the Director.
- **FAA Advisory Circular 43.13-1B,** Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair, as amended

NOTE: AC 43.13-1B, as amended, may be used as approved data, only if the following three prerequisites are met:

a. The user has determined that it is appropriate to the product being repaired/altered

b. The user has determined that it is directly applicable to the repair/alteration being made

c. The user has determined that it is not contrary to manufacturer's data

8.3 BASIC CONSIDERATIONS FOR APPROVAL OF MODIFICATIONS

8.3.1 Approval basis

8.3.1.1 It is recommended that the approval basis for a major modification or major repair should be the design standard in effect on the date of application; however, in certain circumstances discussed below, the Airworthiness authority of the state of Registry may accept an earlier amendment of the applicable design standard. In such cases the minimum acceptable approval basis would be that recorded in the type certification data sheet or equivalent document issued or accepted by the state of Registry for the aeronautical product being modified or repaired.

8.3.1.2 The applicant should be required to comply with the applicable design standards in effect on the date of application for any design change that the airworthiness authority classified as being significant. Examples of aircraft modification that would normally be considered as being in the significant classification include changes in the length of the fuselage or the number of flight crew. The introduction of the cargo door on an existing aircraft or the installation of skis or floats would also be regarded as significant changes. Similarly, the replacement of reciprocating engines with the same number of turbo propeller engines would normally be classified as a significant change. On the other hand, the installation in an aircraft on an alternative engine, using the same principle of propulsion with minimal change in thrust, would be an example of a modification that would not usually be considered a significant change. Examples of avionics changes which typically would be regarded as being in the significant classification include a major flight deck upgrade or installation of avionics equipment where operational credit is to be taken for its presence in the aircraft. A general avionics equipment change would not usually be considered significant, nor would the installation of new equipment such as a global positioning system for information purposes, where no credit is taken for it as an aid.

8.3.1.3 The approval basis recorded in the type certification data sheet would normally be deemed appropriate for:

a. A change that the airworthiness authority finds not to be in the significant classification.

b. Those areas, systems, components, equipment and appliances that are not affected by the change; or

c. Those areas, systems, components, equipment and appliances that are affected by the change, provided the airworthiness authority finds that compliance with the latest amendment to the standards would be impractical or would not contribute materially to the level of safety.

8.3.1.4 In areas not affected by the change the approval basis recorded in the type certification data sheet may be use, but it is important that the effects of the change are properly assessed. General characteristics of the aeroplane, such as performance, handling qualities, emergency provisions, fire protection, structural integrity and crashworthiness must be considered as well as the physical aspects of systems, components, equipment and appliances. For example, adding a fuselage plug is likely to significantly affect performance and handling qualities

8.3.1.5 Within the physical aspect it is necessary to make a distinction between principal changes such as a fuselage plug and secondary changes such as lengthening of the various aeroplane circuits as a result of the fuselage plug. Secondary changes may be considered to be unaffected areas.

8.3.1.6 Compliance with the latest amendments to the design standard could be considered impractical if the applicant can show that the resulting revisions required to the design change produce costs that are not commensurate with the change.

8.3.1.7 Compliance with the latest amendment could be considered not to contribute materially to the level of safety when an applicant can show that the design has compensating features, that relevant experience shows such compliance is unnecessary, or that compliance may compromise the existing level of safety. Consistency of design requirements should be considered under these provisions. For example, when a fuselage plug is added there will likely also be additional seats and overhead bins, which may be identical to the existing ones. The plug structure may also be identical to the existing structure. Under such circumstances application of the latest amendment only to the changed parts may not contribute materially to the level of safety, in which case compliance with the existing approval basis would be acceptable.

8.3.1.8 Other considerations may influence the airworthiness authority in requiring compliance with later amendments to the design standards, such as instances where retroactive regulations have been enacted, or in individual cases where experience has shown this to be warranted. For example, many older aircraft were type certified to design standards written before the advent of modern equipment and technology. These older standards may be inadequate to maintain the appropriate level of safety when modifications involving new technology and or equipment are made on these aircraft. Other examples include the application of the latest cabin interior smoke and fire protection standards where these have been imposed by retroactive regulation, and application of damage tolerance requirements to an aircraft originally designed to fall-safe standards in cases where a Supplemental Structural Inspection Document (SSID) has been issued for the aircraft type.

8.3.1.9 In some cases, the applicant may select to show compliance to a later amendment of the applicable design standard than that required by the Airworthiness authority. In such instances, compliance should be required with the entire amendment to the extent that it relates to the modification or repair for which approval is sought. In particular, partial compliance with later amendments, resulting in an alleviation of standards without compliance with related compensatory amendment, should not be approved.

8.3.2 Special conditions

Special conditions for approval of modifications may be specified when the authority finds that the applicable existing regulations do not contain adequate or appropriate safety standards for an aeronautical product because of novel or unusual design features. The special conditions should contain such safety standards, as the authority finds necessary, in order to establish a level of safety equivalent to that established in the regulations.

8.3.3 Design changes requiring a new type certificate

8.3.3.1 Some design changes may be so extensive that an application for a new type certificate will be required. Such changes are outside the scope of this manual.

8.3.3.2 Application for new type certificate would be required if the airworthiness authority finds that the change in design, power, thrust or mass is so extensive that a substantially complete investigation of compliance with the applicable design standards is required. There for a new design derived from an existing aeronautical product design and proposed either by the original manufacturer, or as a modification to the product by someone other than the original manufacturer, may require a new type certificate.

8.3.3.3 A substantially complete investigation is required when most of the existing justification is not applicable to the change product. This applies to the scope of the investigation required to establish compliance. For example, an extensive change may negate the validity of extrapolation or use of certain analyses or tests that were used to show compliance in the original or previous type certification of the product.

8.3.3.4 A new type certificate would normally be required for an increase in the number of engines, particularly from one engine to two, because such a change would generally affect the aero plane’s complexity to a considerable extent. Similarly, a change in the principle of propulsion from either a reciprocating or turbo-propeller engine to a turbo jet usually would be regarded as substantial enough to require a new type certificate.

8.3.4 Compatibility with existing design changes

Consideration should be given during the design process to compatibility between the proposed design change and other existing design changes, such as modifications, repairs and Airworthiness Directives.

8.3.5 Retention of substantiating data

To show that the modified or repaired aeronautical product complies with the appropriate design standards report on analyses and tests should be prepared. The airworthiness authority granting the approval of the design of the modification or repair should require that the holder of the approval:

a. Retain the records of the analyses and tests performed to demonstrate compliance until the aircraft modified or repaired in conformity with the approved modification or repair are permanently withdrawn from service;

b. Make the records available to it upon request; and

c. Ensure that no person destroys or otherwise disposes of any record referred to above with out its prior permission.

8.3.6 Responsibilities of holders of approvals.

The airworthiness authority issuing the modification of repair design approval should require that the person or organization responsible for the design of the modification of repair:

a. furnish at least one set of any amendment or supplement to a flight manual, maintenance manual or instructions for continuing airworthiness produced in obtaining approval of the design to each intended user and make available to any user subsequent changes to such documents;

b. If service experience shows a safety deficiency in the modification or repair:

    1. Advice the airworthiness authority of the deficiency immediately;
    2. Prepare appropriate design changers and make them available to the authority for mandatory continuing airworthiness action; and
    3. Make available the descriptive data concerning the changes to all operators of products affected by the mandatory action Descriptive data concerning changes to a modification or repair would normally be published in the form of a service bulletin. The approval holders' responsibility includes the need to advice operators of any vendor bulletins for equipment including a modification.

8.4 APPROVAL PROCEDURES – MODIFICATIONS

8.4.1 General

The approval procedures for a modification to an aeronautical product are intended to permit the airworthiness authority to agree that the applicant has considered the appropriate airworthiness and environmental standards and demonstrated that the design change complies with those standards. The approval of a major modification is recorded by the issue of a document (e.g. a supplemental type certificate or equivalent or a service bulletin).

8.4.2 Compliance Programme

One method of ensuring that the appropriate design standards are considered and complied with for a specific design change requires that the applicant prepare a compliance Programme. This is a document listing each discrete standard which must be satisfied, the method used in determining compliance (e.g. test, analysis, inspections) and the signature of a qualified person confirming the finding of compliance.

8.4.3 Procedures

In the case where a modification is not already approved or accepted, the following activities are required to be performed by, or on behalf of, the applicant:

a. Conduct all analyses, calculations and ground tests necessary to determine compliance with the applicable airworthiness and environmental standards;

b. Conduct all flight tests necessary to determine compliance with the applicable airworthiness and environmental standers;

c. Prepare all necessary documentation;

d. Determine that the modification can be installed in the product in conformity with the drawings and instructions; and

e. Determine that the operating and maintenance instructions provide adequate information for the safe operation and continuing airworthiness of the product.

In addition, the applicant must allow the airworthiness authority to conduct any inspection and any flight or ground test which, in the opinion of the authority, is necessary to confirm compliance with the applicable airworthiness and environmental standards.

8.4.4 Flight testing

8.4.4.1 It may be necessary to flight test a modified aircraft to demonstrate compliance with the applicable standards of airworthiness or to determine that the characteristics of the aircraft remain acceptable. Some examples of design changes that would normally require flight-testing are set out in the following sections.

8.4.4.2 Flight characteristics
Flight test assessments are usually required when a modification may affect aircraft flight characteristics including the following:

a. Controllability and maneuverability;

b. Trim;

c. Stability (static and dynamic);

d. Stalls;

e. Spinning (where applicable);

f. Ground or water handling characteristics; and

g. Miscellaneous flight characteristics, such as vibration and buffeting, high speed and out-of-trim characteristics.

8.4.4.3 Performance

Flight test are normally required when a modification has a significant effect on the aircraft lift, drag, installed thrust, maximum mass, ground friction characteristics or braking effectiveness. The effect of the modification on the aircraft performance should be considered in all applicable areas, among which may be:

a. Stall speeds;

b. Installed power or trust

c. Take-off and landing speeds;

d. Take-off and accelerate-stop distances;

e. Landing distances;

f. Take-off, approach and landing climb performance;

g. Airspeed indicator position error; and

h. Altimeter position error.

8.4.4.4 Flight deck design

Modifications affecting pilot compartment view, night vision (e.g. glare and reflections from additional or external lighting), aircraft flight instruments, flight controls, power plant instruments, warning and caution panels, system controls and displays and pilot workload normally requires a flight assessment.

8.4.4.5 Flight guidance

Modification of hardware or software in automatic flight control systems, auto-trust, auto-brake or auto-land systems and flight director systems may require a flight test assessment. The requirement for flight test can best be determined after a comprehensive analysis is conducted to identify the effect of the modification on all other systems interfacing with the modified component.

8.4.4.6 Navigation systems

Flight testing of navigation system modifications includes tests to establish system accuracy and performance in order to demonstrate that the modified equipment performs its intended function and that the aircraft will operate satisfactorily using the installed equipment. Examples of modifications, which can affect navigation system performance and accuracy, include

a. Addition of externally mounted equipment which may partially obscure a transmitter, antenna, sensor or receiver;

b. The relocation of antenna, transmitters and receiving sensors;

c. The replacement of navigation system equipment with components that have different specification;

d. Electrical modifications or the addition of systems which may cause electromagnetic interference with the existing navigation systems; and

e. A software or hardware update to permit Category II or steep approaches or both.

8.4.4.7 System operation

Flight test may be required after modification of any aircraft system not previously discussed. When considering the need for flight test the failure cases should be assessed to the level where the failure is assumed to occur after dispatch of the aircraft with systems inoperative as permitted in the master minimum equipment list. In most cases the primary objectives of the flight test assessment are:

a. to confirm that the modified system performs its intended functions has satisfactory operating characteristics;

b. to confirm that the modified system does not interfere with the function of other aircraft systems; and

c. to ensure that appropriate procedures are documented for the new equipment as well as any changes to the procedures for other aircraft systems.

8.4.5 Flight manual changes

The flight manual often needs to be amended as part of a modification approval. Typically a supplement is produced which includes changes or additions to the basic flight manual information that result from the modification. A flight manual supplement, flight manual amendment or new flight manual is normally required if any of the following conditions are met:

a. Testing or analysis has shown that operating limitations for the modified aircraft are changed. Examples in this category are:

1. Reduction in maximum operating airspeeds;
2. Changes to the mass and balanced limits;
3. Changes to engine operating limitations;
4. Reduction in maximum operating altitude;
5. The modified aircraft can only be operated in a restricted role (e.g. day VFR, no icing); and
6. Changes to system limitations (e.g. minimum autopilot engage altitude is increased);

b. Flight testing has shown a need for, system changes have necessitated, changes to normal, abnormal or emergency procedures; or

c. Performance characteristics have been changed by the modification. Some examples are.

1. Pilot static system calibrations;
2. Stall speeds;
3. Take – off or landing performance or both; or climb performance.

8.4.6 Documentation

The applicant for the modification approval must prepare all necessary documentation. This may include:

a. a master documentation list detailing the individual drawings and specification which define the design change;

b. drawings and instructions necessary for the installation of the design change in the product;

c. compliance Programme ;

d. engineering reports which contain the analyses, calculations and test result used to make the determination that the modified product complies with the approval basis;

e. a record of the change in mass and moment arm when the design change is installed in the aeronautical product;

f. a record of the change in electrical load when the design change is installed in an aircraft;

g. a supplement to the approved flight manual; and

h. Supplements to:

   1. maintenance instructions;
   2. instructions for continuing airworthiness; and
   3. repair instructions.

8.4.7 Issue of approval

The authority may approve the modification or authorized approval on its behalf when:

a. The applicant satisfies the authority that the aeronautical product, with the design change installed, complies with:

   1. The approval basis; and
   2. The requirement of the authority for the provision of engineering data and documentation; and

b. In the opinion of the authority the design has no unsafe features.

8.4.8 Application for Modification and Approval Procedure

Any modification, changes to any aircraft of components, equipment installed on aircraft registered in Sri Lanka Civil Aircraft Register requires approved engineering data applicable for the serialized aircraft or equipment, Service Bulletins etc. When such approved data does not exist, an Engineering Change Order is to be prepared by an operator and duly approved by the DGCA prior to carrying out such work on the aircraft or its components or equipments.

The purpose of this procedure is to provide guidance for airworthiness approval of Engineering Change Order (ECO) submitted by an Operator.

8.4.8.1 APPLICATION

1. The Form CAA/AW/A/007 will constitute the title Page of the ECO application in Section 03 in SLCAP 6100.
2. Operator shall submit an application to the Airworthiness Section on prescribed Form CAA/AW/A/007 along-with (02) copies of its ECO document, its Drawings and Attachments, if any.

8.4.8.2 REVIEW OF THE CONTENTS OF ECO BY AN AIRWORTHINESS INSPECTOR

1. The detailed Airworthiness Inspector shall review the contents of the ECO in order to check adequate coverage of following items and to issue a unique number for the Modification.

   a. The Title page application is properly filled and signed by operator. All the pages of the ECO bear page and ECO number in the top right hand column as:
   ECO Number
   Issue number
   Date
   Page Number as "------of------"
   Type of the aircraft
   ATA chapter reference

   b. SUBJECT/TITLE
   This item in the ECO shall have the title of the ECO, indicating Type of the aircraft and /or ATA Chapter

   c. BACKGROUND/DESCRIPTION
   Under this heading background details pertaining to this request for ECO are presented briefly that why operator is raising this ECO. What is to be accomplished on the aircraft

   d. REFERENCES
   Listing of references related to ECO is given under this item.

   e. PUBLICATIONS AFFECTED
   Listing of all affected pages, figures, drawings (WDM, IPC etc) Part number or quantity changes if any Configuration drawing changes, if any

f. ACTION
The actions, which are required to be taken by the operator for incorporation of this ECO, are given under this heading.

g. EFFECTIVELY
The Registration Number of the affected aircraft by this ECO is given under this heading as: -
4R-XXX and MSN (Manufacturer Serial Number).

h. REASON
Reason for the ECO, which may be either of these:
Airworthiness/ safety requirement Standardization
Improvement in reliability Operator's internal requirement,
Improvement in Economics, Obsolescence.

i. APPROVAL
This should contain the statement of the airworthiness approvals of the Engineering content, or part thereof, from any other regulatory agency (such as FAA, CAA (UK) etc) as applicable. This part will include a formal request from the DGCA to approve this ECO.

j. MANPOWER
This item presents details of the Manpower required to accomplish ECO on aircraft such as Number of Engineers, Number of Technicians etc. Total man-hours and elapsed time is also given under this heading.

k. MATERIAL & AVAILABILITY
Material required and its Availability details are given under this heading.

l. SPECIAL TOOLS
Special Tools required for accomplishment of this ECO are given, if applicable.

m. WEIGHT & BALANCE
Weight and Balance Changes created by this ECO are given under this item.

n. ELECTRICAL LOAD CHANGES
Electrical Load increases or decreases are given in Watts or Kilowatts for DC and KVA for AC.

o. STRUCTURE STRESS ANALYSIS
Structure Stress Analysis is given, if applicable

p. MATERIAL INFORMATION
All kits, material required is tabulated along-with part no and quantity required per aircraft. Any disposition of old

parts such as re-work, modification or discard is to be mentioned as well.

q. ACCOMPLISHMENT INSTRUCTIONS
Step by step procedure for accomplishment of the engineering changes is given under this heading. Check for proper reference to attached ECO Drawings and Figures.

r. ENGINEERING DRAWINGS
Numbers of the Engineering drawings being used in this ECO are given here. Review the ECO Engineering Drawings for adequacy of incorporation on aircraft.

8.4.8.3 APPROVAL PROCEDURE

1. The assigned Airworthiness Inspector shall review the ECO application and document for format and content per above item 8.4.8.2.1 above. The Inspector shall evaluate the ECO keeping in view the airworthiness requirements, standards and engineering practices.

2. The assigned Airworthiness Inspector shall interact with applicant Operator for any clarifications and/or changes in the ECO provisions. After satisfying itself the Airworthiness Inspector shall forward the ECO with remarks and recommendations to the DGCA/approving officer for approval. The Airworthiness Inspector will allocate a unique number for the Modification. This number is in the sequential order of; Aircraft Registration/Type of the Aircraft/Aircraft MSN/MOD–Given number in sequential order for the aircraft.
Eg: ADD/A343/MSN034/MOD-001

3. The CAASL approving officer shall sign on all the pages of ECO; its attached Drawings and affix official stamp on all pages.

4. After approval, send Original ECO along-with its Original drawings to the applicant operator. One copy of the approved ECO is to be retained in the office for record and necessary instructions to deduct fees from the concerned operator.

8.5 BASIC CONSIDERATIONS FOR APPROVAL OF REPAIRS

8.5.1 General

A repair is intended to restore an aeronautical product to an airworthy condition after it has been damaged or subjected to wear. The repair must be appropriately designed and installed to ensure restoration of the type design characteristics. Where a repair design is intended to correct damage to an aeronautical product, the design is generally unique to the specific unit damaged. Approval may be granted for a number of units where the damage to each is such that a common repair design is applicable. A repair design may be approved for all units of a given type of aeronautical product where the repair is suitable for repeated incorporation during overhaul and maintenance activities. Such repairs usually correct the effects of normal usage.

8.5.2 To ensure compliance with the approval basis, all applicable factors included in the original approval of the product must be addressed. This may require reference to the original type design holder. The following lists some areas to be considered:

a. static and fatigue strength of structure;

b. whether structure is safe-life, fail-safe or damage tolerant;

c. corrosion protection;

d. mass and balance (for the aircraft over-all or for balanced flight control surfaces);

e. flammability standards;

f. access and inspect-ability requirements;

g. electromagnetic interference (EMI) protection;

h. electrical conductivity (lightning strike);

I. colour and reflectance (i.e. ultraviolet absorption, thermal radiation);

j. process specifications (Nitriding, etc.);

k. environmental standards (noise, smoke and gaseous emissions); and

l. failure modes and effects analysis.

8.6 PROCEDURES OF APPROVAL OF REPAIRS

8.6.1 Repairs in accordance with SRM

A major repair to an aeronautical product should be accomplished in accordance with design data approved by, or acceptable to the airworthiness authority of the State of design. In this regard the structural repair manual (SRM) of the manufacturer of the aeronautical product is usually accepted, provided that it has been approved by the airworthiness authority of the State of Design directly or by delegation. Repairs incorporated in accordance with such a manual may be deemed to be in accordance with approved data. The Structural Repairs Manual (SRM) contains most of the possible damages which are likely to occur to an aircraft structure during its service life. This includes corrosion damage and structural fatigue cracks which may appear in the structure with time. The SRM is based on tests, analysis, or for an older aircraft with similar design philosophies, service experience. The SRM is approved by the State of Design of the aircraft, or the Type Certificating authority, as part of the Type Certification process. The repair schemes included in the SRM are, therefore, proposed by the manufacturer and approved by the type certificating authority. CAASL can accept all repairs carried out in accordance with the SRM as approved repairs, without having to approve the repairs again.

8.6.2 Repairs not included in the SRM

In the case where a repair is not already approved or accepted by the State of design or manufacture, the following activities are required to be performed by, or on behalf of, the applicant:

a. conduct all analyses, calculations and tests necessary to demonstrate compliance with the applicable airworthiness and environmental standards;

b. pare all necessary documentation;
The required documentation may include

1. Compliance programme.
2. Master drawing or drawing list, production drawings, and installation instructions.
3. Engineering reports (static strength, fatigue, damage tolerance, fault analysis, etc.)
4. Flight test programme and results.
5. Mass and moment change data.
6. Maintenance and repair manual supplements.
7. Instructions and continuing airworthiness and
8. Flight manual supplements.

c. determine that the design can be installed in the product in conformity with the drawings and instructions; and

d. ensure that adequate instructions are provided for the continuing airworthiness of the repair, e.g. inspection programme amendments.

As far as the airlines and operators based in Sri Lanka are concerned, though infrequently, there may be occasions that a damage which an aircraft experiences is not covered in the SRM. In such cases, specific repair schemes have to be developed in a manner that the modification or repair design conforms to applicable standards of airworthiness. The design of major modifications or repairs to aircraft should not be attempted unless the applicant has a sound knowledge of the design principles embodied in the aircraft type being modified or repaired. In many cases access to the analysis and test reports from the original type certification of the aeronautical product will be required. For this reason participation in, or review of, the modification or repair design by qualified representatives of the organization responsible for the type design is recommended. Where such co-operation is not available, the CAASL should not approve the modification or repair design unless it is confident that the applicant has:

a. comprehensive knowledge, experience and capabilities in the applicable technologies, such that in-depth analyses going back to first principles have been performed where required; and

b. sufficient information on the type design of the aircraft involved. If there is any doubt, consultation is suggested with the airworthiness authority of the State of Design.

To meet the above criteria, the operator/airline would require approval as a design organization, employing adequate human resources to perform strength analysis on designed repairs, and to have sufficient design data of loads which will make the analysis meaningful. Normally small or medium sized operators and airlines do not have resources to achieve this capability. In this context, it is considered best to depend on the resources available with the manufacturer and the original design organization.

The airline/operator should seek advice on repair of damages not included in the SRM from the manufacturer. The repair scheme provided by the manufacturer usually requires that the approval of the local regulatory authority should be obtained. In such cases, the airline/operator will submit the repair scheme for CAASL's approval. Such proposals should be examined with a view to ascertaining the following;

a. the airline/operator has provided complete details of the damage to the manufacturer while seeking a repair scheme. The operator should submit the complete correspondence in this regard.

b. the manufacturer has or has an access to an adequate and approved design organization and is capable and experienced in providing repair schemes.

c. the repair scheme contains material specifications, drawings, and process specifications to be accomplished by the airline/operator.

d. the airline/operator has suitably qualified personnel approved for structural repairs who will certify the repair work.

e. the DGCA may require that the repair scheme or modification specifically designed and devised by the manufacturer for an aircraft registered in Sri Lanka be approved by the State of Design. This requires issue of a Supplemental Type Certificate (STC) by the State of Manufacture/Design. The holder of the STC is entitled to have the repair or modification incorporated in the aircraft with proper certification by licensed or approved persons.

f. the DGCA may like to verify the approval details of the STC, namely, the documentation relating to the approval by a Designated Engineering Representative on behalf of the State of Design and availability of all detailed drawings, specifications, modification kit comprising of pre-fabricated components etc., and the applicability of the STC to the specific Sri Lankan aircraft.

g. In the case of a major modification or repair of aircraft, the DGCA may also require that the manufacturer's experts be associated for carrying out the work, certification and test flight after the work is completed.

h. As the case may be, the operator has to submit an ECN in accordance with the procedure describes under the paragraph 8.4.8 for review and the approval of DGCA/approving officer. The allocation of unique number for the repair is; Aircraft Registration/Type of the Aircraft/Aircraft MSN/REP – Given number in sequential order for the aircraft.
Eg: ADD/A343/MSN034/REP-001

If the above analysis is found satisfactory, the DGCA may grant approval to the modification or major repair to be performed. The CAASL inspectors must associate themselves with the work and make frequent visit to the work area to confirm that the modification is performed in accordance with approved documents, and using proper means.

Where a repair design is intended to correct damage to an aeronautical product, the design is generally unique to the specific unit damaged. Approval may be granted for a number of units where the damage to each is such that a common repair design is applicable. A repair design may be approved for all units of a given type of aeronautical product where the repair is suitable for repeated incorporation during overhaul and maintenance activities. Such repairs usually correct the effects of normal usage.

8.7 APPROVAL PROCEDURES – STRUCTURAL REPAIRS

8.7.1 The design of repairs for structural components must take into consideration the nature of the structure involved. Three different structural philosophies have been used in the design of aircraft structures which are in service at present. These are discussed in the following sections.

8.7.2 **Safe-life** is a term applied to a structure that has been evaluated as being able to withstand the repeated loads of variable magnitude expected during its service life without detectable cracks. Safe-life structure often has a non-redundant arrangement of load carrying members. Because failures of elements of this type of structure can be critical to the safety of the aircraft, fatigue life limits are carefully determined and it is mandatory to remove safe-life components from service when the life limits are reached. Because configuration changes can drastically affect fatigue life, the repair of a safe-life component necessitates that the remaining life be re-established and approved by, or on behalf of, the airworthiness authority. In most cases this task should not be attempted without the assistance of the organization having responsibility for the type design.

8.7.3 **Fail-safe** is a term applied to a structure that has been evaluated to ensure that catastrophic failure is not probable after fatigue failure or obvious partial failure of a single, principal structural element. A fail-safe structure is characterized by multiple or redundant load paths. Considerations which should be addressed in the design and substantiation of repairs to fail-safe structure include:

a. the static strength must be shown to be adequate after failure of single neighboring structural elements, i.e. fail-safe design cases must be considered;

b. fail-safe design features must not be compromised, e.g. integrity of crack stoppers must be maintained;

c. inspect-ability must be maintained or, alternatively, appropriate nondestructive inspection procedures introduced;

d. good detail design should be employed to reduce, to the extent possible, the introduction of stress raisers leading to premature fatigue cracking of the repair or the surrounding area; and

e. the structural inspection intervals for the area repaired should be re-assessed to determine whether they should be shortened to account for possible fatigue life reduction resulting from the repair.

8.7.4 **Damage tolerant** is a term applied to a structure that has been evaluated to ensure that should serious fatigue, corrosion, or accidental damage occurs within the operational life of the aircraft, the remaining structure can withstand reasonable loads without failure or excessive structural deformation until the damage is detected. Characteristics often, but not always, found in a damage tolerant structure include multiple or redundant load paths, materials with slow crack growth rates, ability to withstand relatively long cracks before unstable crack growth occurs and design for good inspect-ability. An effective structural inspection programme is an essential element of damage tolerant design and must be developed to permit adequate opportunity to detect damage in principal structural elements before such damage becomes critical.

8.7.5 Substantiation of a repair to a damage tolerant structure requires that a damage tolerance evaluation be performed in addition to a static strength substantiation. The damage tolerance evaluation requires a determination of the probable location and modes of damage due to fatigue, corrosion and accidental damage. Fatigue initiation threshold and crack propagation rates must be established. Inspection methods, thresholds and frequencies must be defined such that the residual strength of the repaired structure at any time during the operational life of the aircraft is sufficient to withstand the damage tolerance load cases listed in the applicable design requirements. The aircraft damage tolerance documentation must be revised to reflect new inspection methods, thresholds and frequencies established for the repaired structure and the revisions approved by, or on behalf of, the airworthiness authority. A damage tolerance assessment should not normally be attempted without the assistance of the organization having responsibility for the type design.

8.8 SERVICE LIMITATIONS FOR REPAIRS

8.8.1 Pending the completion of a permanent repair, it is occasionally necessary to restore a damaged aeronautical product. Such a repair may be permissible under controlled operating conditions. Two categories where service limitations apply are described below.

8.8.2 **Interim repairs** are deemed to comply with applicable design standards at the time of their implementation and for a limited time thereafter. However, they may be subject to long-term effects which in time would compromise their compliance with regulatory requirements. An example of an interim repair is a structural repair which has been shown to have adequate static strength, but which has not been substantiated for damage tolerance requirements. In such a case a two-stage evaluation may be acceptable, as follows:

a. a static structural strength evaluation is made prior to release of the aircraft into service with a stated time for completion of the damage tolerance evaluation; and
b. a damage tolerance evaluation of the repair is made within the prescribed time period after this interim release.

8.8.3 **Temporary repairs** do not fully restore damaged components to compliance with applicable regulatory requirements, but instead restore the aircraft to a condition acceptable for ferry flight, with appropriate restrictions, to a maintenance base for permanent repair.

8.9 WHAT IS A SIGNIFICANT MODIFICATION

A significant modification can be considered as one which will alter its type specifications and require or cause major structural alteration. Examples of aircraft modifications that would normally be considered as being in the significant classification include changes in the length of the fuselage or the number of flight crew. The introduction of a cargo door on an existing aircraft or the installation of skis or floats would also be regarded as significant changes. Similarly, the replacement of reciprocating engines with the same number of turbo-propeller engines would be classified as a significant change on the other hand, the installation in an aircraft of an alternative engine, using the same principle of propulsion with minimal change in thrust, would be an example of a modification that would not usually be considered a significant change. Examples of avionic changes which typically would be regarded as being in the significant classification include a major flight deck upgrade or installation of avionic equipment where operational credit is to be taken for its presence in the aircraft. A general avionic equipment change would not usually be considered significant, nor would the installation of new equipment such as a global positioning system for information purposes, where no credit is taken for it as an aid.

8.10 DESIGN CHANGES REQUIRING A NEW TYPE CERTIFICATE

8.10.1 Some design changes may be so extensive that an application for a new type certificate will be required. Such changes are outside the scope of this manual.

8.10.2 Application for a new type certificate would be required if the airworthiness authority finds that the change in design, power, thrust or mass is so extensive that a substantially complete investigation of compliance with the applicable design standards is required. Therefore a new design derived from an existing aircraft design and proposed by someone other than the original manufacturer, may require a new type certificate. CAASL will consider the case for a new type certificate only if the original type certificate is granted by CAASL. In most cases, the applicants for a significant design change should be referred to approach the original design organization and the original State of Design for the issuance of a new or supplemental type certificate.

8.10.3 A new type certificate would normally be required for an increase in the number of engines, particularly from one engine to two, because such a change would generally affect the aeroplane's complexity to a considerable extent. Similarly, a change in the principle of propulsion from either a reciprocating or turbo-propeller engine to a turbo-jet usually would be regarded as substantial enough to require a new type certificate.

8.10.4 The cases described under 8.10 required to follow the procedure described under paragraph 8.4.8 and submits the ECO for review and necessary approval of the DGCA/approving officer.

8.11 INCORPORATION OF AIRWORTHINESS DIRECTIVES

Incorporation of ADs will not require specific approval from CAASL. The ADs are issued by the State of Design based on the service bulletins proposed by the manufacturer. The circumstances triggering issue of SBs may include service difficulties encountered, or detection of design flaws which require rectification in the interest of enhancing the safety features of the design. The compliance of ADs is usually done as per instructions in the corresponding SBs. However, the airline/operator may approach CAASL for alternate means of compliance of such modifications, repairs and Airworthiness Directives. Such request should be carefully examined to preclude any effect on the continued airworthiness of the aircraft or systems. Where the airline proposes to use alternate materials, the airline should be asked to demonstrate equivalent level of strength by the use of alternate method. In such cases, the effect of substitute materials on residual structural strength must be examined.

8.12 RETENTION OF SUBSTANTIATING DATA

As explained above, in most cases the manufacturer's SRM will be used to carry out structural repairs/modifications and alteration. In the case of significant modifications outside SRM, when the modification is carried out in accordance with an approved STC, or a modification devised by the airline and approved by CAASL, the retention of substantiating data and documentation is extremely important. To show that the modified or repaired aeronautical product complies with the appropriate design standards, reports on analyses and tests are prepared, which form the basis for issue of STC / CAASL approval. The CAASL / airworthiness section granting the approval of the design of the modification or repair should require that the holder of the approval:

a. retain the records of the analyses and tests performed to demonstrate compliance until the aircraft modified or repaired in conformity with the approved modification or repair are permanently withdrawn from service;

b. make the records available to it upon request; and

c. ensure that no person destroys or otherwise disposes of any record refereed to above without its prior permission.

8.13 RESPONSIBILITIES OF HOLDERS OF APPROVALS

The CAASL may require that the person or organization responsible for the design of the modification and requesting approval (applicant) :

a. furnish at least one set of amendment, if any required, or supplement to a flight manual, maintenance manual or instructions for continuing airworthiness produced in obtaining approval of the design to each intended user and make available to any user subsequent changes to such documents;

b. if service experience shows a safety deficiency in the modification or repair:

    - advise the CAASL of the deficiency immediately;
    - prepare appropriate design changes and make them available to the authority for mandatory continuing airworthiness action; and
    - make available the descriptive data concerning the changes to all operators of products affected by the mandatory action.

Descriptive data concerning changes to a modification or repair would normally be published in the form of a service bulletin. The approval holder's responsibility includes the need to advise operators of any vendor bulletins for equipment included in a modification.

APPENDIX 1

CRITERIA FOR THE CLASSIFICATION OF MAJOR AND MINOR MODIFICATIONS AND REPAIRS

1. GENERAL

The following criteria outline the decisions needed in assessing a modification or repair as major or minor. For each issue, it must be determined whether or not the proposed change will have other than a negligible effect. The questions require "yes" or "no" responses. An affirmative answer to any individual question indicates that the modification or repair should be classified as major. The examples and tests listed are for illustration only and not intended to be all-encompassing.

2. CRITERIA

2.1 General

Is the change being accomplished as an alternative means of compliance with an airworthiness directive or equivalent?

2.2 Mass and balance

a. Does the change involve a revision in the approved mass limitations or centre of gravity range limits?

b. Does the change require the installation of ballast or other methods to maintain the centre of gravity within the approved limits?

2.3 Performance and flight characteristics

Does the change involve alterations to the configuration of the aircraft which may:

a. increase drag;

b. alter the thrust or power;

c. affect stability or controllability;

d. induce flutter or vibration; or

e. alter the stalling characteristics to an extent which necessitates analysis or test?

2.4 Structural strength

a. Does the change involve a principal component of the aircraft structure such as a frame, stringer, rib, spar or stressed skin?

b. Does the change involve a structural element which is addressed as part of a damage tolerance or fatigue/failsafe evaluation?

c. Is a pressure vessel penetration or change involved?

d. Does the change involve the installation of an item of mass necessitating structural re-evaluation?

e. Does the change involve the installation or alteration of a containment or restraint system intended for the stowage of items of significant mass?

f. Does the change involve repairs or modifications to the load-bearing structure of seats, harnesses or their means of attachment or any other occupant restraint equipment?

g. Does the change involve the substitution of materials?

2.5 Power plant operation

Does the change significantly affect the powerplant or propeller or their accessories?

2.6 Other qualities affecting airworthiness

a. Does the change involve equipment for which there is no performance standard which has been approved or accepted by the airworthiness authority?

b. Does the change affect the probability of failure conditions which could impair or preclude continued safe flight or landing?

c. Does the change affect the pilot's visibility or impair the pilot's capability to control the aircraft?

d. Does the change involve alterations to the interior arrangement or cabin materials?

e. Does the change involve Systems for cabin pressurization or the provision of breathing oxygen?

f. Does the change involve flight controls or an autopilot?

g. Does the change involve critical or essential components of the electrical system such as generators, alternators, inverters, batteries, distribution busses, or bus protection and control devices?

h. Does the change affect instruments, indicators or their subsystems which provide navigation information?

i. Does the change affect instruments, indicators or their subsystems which provide essential or critical information concerning the aircraft status?

j. Does the change affect a regulated placard?

k. Does the change affect any approved information contained in the flight manual or equivalent document?

2.7 Other qualities affecting environmental characteristics

Does the change alter the aircraft noise or emission characteristics?

2.8 Non-standard practices

Does the change involve practices or techniques which are novel or unproven in the proposed application?

SECTION TWO

VOLUME 2

AIR OPERATOR /MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 9 - APPROVAL OF A WEIGHT & BALANCE PROGRAMME

9.1 BACKGROUND AND OBJECTIVES

This chapter provides guidance for evaluating an operator/applicant weight and balance control Programme in compliance with conditions stipulated in the Air Operator Certificate to ensure continuing airworthiness of a fleet or an individual aircraft.

9.2 GENERAL

a. Approved weight and balance control procedures are the only means for an operator/applicant to authorize the use of other than known weights for crew, passengers, baggage, or cargo. The weight and balance control Programme, including loading schedules and charts, are approved on operations specifications by the DGCA. This Programme must be included either in the operator/applicant's Maintenance Control Manual or Flight Operations Manual or both as appropriate.

b. The operator/applicant may develop and submit for approval any method or procedure by which it can show that an aircraft:

1. Is properly loaded according to approved configuration (loading schedules or charts)

2. Will not exceed authorized weight and balance limitations during all ground and flight operations

3. Will be periodically reweighed and its data re-evaluated

4. Will have its data recalculated, if changes necessitate

NOTE: In most cases, the above steps 1 and 2 are considered to be performed by operations department and the steps 3 and 4 are of maintenance department functions.

c. The operator/applicant's weight and balance control procedures may either be an independently controlled document which includes all the instructions and procedures for maintenance, operations, and baggage/ cargo control, or it may be included in the manual.

9.3 ESTABLISHED WEIGHT AND CENTER OF GRAVITY (CG) LIMITS

a. During type certification, the aircraft manufacturer must flight test weight and balance under all conditions and established gravity limits. These limits are approved by the DGCA.

9.4 LOADING PROCEDURES

a. Use of Average passenger Weights:

For some types of regular operations, average passenger and baggage weights may be authorized.

1. Average weights may be determined by actually weighing passengers and baggage and documenting the weights. Average weight must be based on acceptable data collected during actual operations.

2. Generally, average weights for operations in warm climates are lighter than those in colder climates. In establishing average passenger and baggage weights, operating environment must be considered. For example, warm clothing carried in colder climates may affect the established weight.

NOTE: The average passenger and baggage weights is found in documents such as FAA Advisory Circular 120-27E, Aircraft Weight and Balance Control, is for guidance only and must be evaluated for applicability to individual operators in the various countries they operate in.

b. Non Standard Weight Groups:

Average weights are not suitable for groups that tend to be heavier or lighter than the average. The operator/applicant must use actual weights for loading nonstandard weight groups and their baggage (such as athletics squads, military personnel, and children's groups).

c. Carry – on Baggage.

Procedures must be provided for controlling carry – on baggage.

1. Carry – on baggage must be limited to articles that may be placed in overhead compartments or under seats. No article may be placed in an overhead compartment that causes the weight limit of the compartment to be exceeded.

2. Carry – on baggage weight must either be accounted for in the same manner as checked baggage or be added to the passenger weight.

3. Operators using average weights for computing weight and balance should re-evaluate carry – on baggage weight at least once per year.

9.5 AIRCRAFT WEIGHTS

a. Weighing of Aircraft

1. An operator shall ensure that during any phase of operation, the loading, mass and centre of gravity of the aeroplane complies with the limitations specified in the approved Aeroplane Flight Manual, or the Operations Manual whichever is more restrictive.

2. An operator must establish the mass and the centre of gravity of any aeroplane by actual weighing prior to initial entry into service and thereafter at intervals of 4 years if individual aeroplane masses are used and 9 years if fleet masses are used. The accumulated effects of modifications and repairs on the mass and balance must be accounted for and properly documented. Furthermore, aeroplanes must be reweighed if the effect of modifications on the mass and balance is not accurately known.

b. Use of Fleet Weights. A fleet generally is considered to be three or more aircraft of the same model and configurations. This allows realistic averages to be determined.

1. Aircraft operating under fleet weights must be weighed in accordance with the operator/applicant's instructions. The operating weights and center of gravity position must be within established limits. The use of fleet weights is authorized by operations specification.

2. An operator's empty fleet weight is determined by averaging aircraft weights as follows:

Fleet Size	Weighing Policy
2 to 3	Weigh all aircraft
4 to 9 aircraft	[No of Aircraft + 3]/2
10 or more aircraft	[No of aircraft+ 51]/10

c. Scales used to weigh passengers, aircraft, cargo, and baggage must be calibrated and traceable to a national standard. Calibration must be

performed in accordance with the requirements for weights and measures of CAASL
The frequency of testing depends on use and handling.

9.6 CONTRACTORS

An operator/applicant may use a contractor to weigh items required to be weighed. However, the operator/ applicant is responsible for ensuring the contractor complies with the operator/applicant's approved weight and balance control Programme. This includes ensuring scales are calibrated and tested in accordance with the operator/applicant's Maintenance Control Manual or Flight Operations Manual.

9.7 EVALUATION PROCEDURES

a. Coordinate with operator/Applicant; Operator/applicant must submit the following for review:

- Manual or revision
- Weight and Balance Programme document (if not part of manual)
- Pertinent company procedures
- Instructions for completing forms used in aircraft weight control and aircraft loading

b. Review the Operator/Applicant's Manual/Programme Documents. The manual must include procedures, levels of authority, and information appropriate to CAASL Regulations. In addition, the following must be included:

1. Manual introduction, to include:

    - Description of the philosophy and the goals of the manual
    - Description of the division of contents between volumes, if more than one volume
    - List of effective pages, including dates

2. Manual revision and distribution procedures, to ensure:

    - Current information is provided to all manual holders
    - Manual are available to maintenance, operations and ground personnel and are furnished to the CAASL.

3. Definitions of all significant terms used in the Programme. The definitions must reflect their intended use. Acronyms or abbreviations unique to the manual must also be defined.

4. Description of the organizational unit responsible for the control and maintenance of the weight and balance Programme, to include:

- Definitions of lines of authority
- Description of the support structure

5. Job descriptions for all elements

6. Training Programmes that include the following:

   - Maintenance personnel
   - Operations and dispatch personnel
   - Ground handling personnel

7. A means of documenting and relating individual training records

8. Procedures for:

   - Determine standards and schedules for calibration of aircraft scales
   - Pre-weighing instructions and requirements
   - Determining which aircraft is to be weighed.
   - Establishing and maintaining equipment lists for each aircraft.
   - Recording the type and serial number for each scale used airplane weight, residual fluids, and scale tare weights.
   - Initial weighing of aircraft.
   - Monitoring and adjusting individual aircraft or fleet, empty weight and center of gravity.
   - Periodic reweighing of aircraft.
   - Ensuring aircraft are configured in accordance with approved data of Manufacturer.

9. A loading schedule consisting of graphs/tables or a special loading schedule for a calculator or computerize Programme. These schedules must ensure pertinent data is concerning all problem weight and balance conditions of the aircraft.

10. A load manifest on which all required loading information shall be entered by personnel responsible for weight and balance control, including procedures for:

    - Completing the load manifest
    - Ensuring load manifest is carried on the aircraft
    - Retaining the load manifest for the time periods specified in the Regulations.
    - Distribution of the load manifest in accordance with the regulations.

11. Procedures to be used by crewmembers, cargo handlers, and other personnel concerned with aircraft loading, for the following.

- Distribution of passengers
- Distribution of fuel
- Distribution of cargo
- Verification and acceptance of actual cargo weights as listed on a bill of lading
- Restriction of passenger movement during flight, if applicable
- Hazardous material requirements, if applicable

12. A drawing of each cargo and /or passenger configuration to include emergency equipment locations.

13. Mathematical justification for loading provisions or schedules. This may be included under separate cover and as part of the company manual.

14. An alternate procedure for allowing manual computations, if a computerized weight and balance Programme is utilized.

15. Procedures for a weight range system, if applicable, that ensures:

    - The range is typical of passengers carried on similar operations
    - Computations for critical load considerations support the ranges.
    - Personnel responsible for loading the aircraft are required to prepare appropriate loading records.
    - The system includes methods for loading passengers whose weights are outside the range.
    - Loading records indicate the number of passengers within the stated range and account for passengers that do not fall within the range.

16. A system for loading nonstandard weight groups, such as athletic squads or military groups and their baggage, which must utilize actual weights for both passengers and baggage.

17. Procedures and schedules for calibration of commercial scales used to determine baggage/cargo weights

18. Standards and schedules for calibration of commercial scales used to determine baggage/cargo weights

19. Procedures to ensure that carry on baggage are limited to articles, which may be placed in overhead compartments, or under seats. Carry –on baggage weight must be accounted for in the same manner as checked baggage or added to the average passenger weight.

c. Review Operator/Applicant's Operations Specifications:

Review the draft operations specifications to ensure that operations specifications Part E includes the following:

1. Aircraft make/model/series
2. Type of loading schedule instructions for:
3. Loading schedule instructions for:
   - Passenger and crew (average or actual weight)
   - Baggage (average or actual weight) and cargo (actual)
   - Nonstandard weight groups
4. Weight and balance control procedures

NOTE: The above items must be referenced by indicating the locations of the same items in the operator /applicant's manuals, e.g, volume, chapter, etc.

d. Analyze the Results. Upon completion of review, analyze the results and determine whether the operator/applicant's manual and operations specifications meet all requirements.

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 10 – APPROVAL OF RELIABILITY PROGRAMME

10.1 OBJECTIVE

This chapter provides guidance for approving airline reliability programmes and providing technical assistance to the certificate holder.

10.2 GENERAL

A. This task is performed by the Airworthiness Inspectors (AwI) and needs to be closely coordinated between both the maintenance and avionics specialties. Approving a reliability programme is one of the complex duties of an Airworthiness Inspector and special attention must be given to every element of the proposed programme.

B. Reliability programmes establish the time limitations or standards for determining intervals between overhauls , inspections ,and checks of airframes ,engines ,propellers ,appliances and emergency equipment Guidance on the programme elements is listed in FAA Advisory Circular (AC) 120-17A, Maintenance programme Management through Reliability Methods ,as amended ,the Airline /Manufacture Maintenance Planning Document ,and /or Maintenance Tasks. It is important that the AwI explains all of the programme requirements to the operator/applicant.

10.3 MAINTENANCE RELIABILITY PROGRAMME

The maintenance reliability programme required as part of the system of maintenance provides an appropriate means of monitoring the effectiveness of the maintenance programme, with regard to spares, established defects, malfunctions and damages, and to amend the maintenance programme. The amendment of the maintenance programme shall involve the approval of the CAASL. Actions resulting from a reliability programme may include escalating or deleting a maintenance task, or de-escalating or adding a maintenance task, as necessary.

10.4 MAINTENANCE RELIABILITY PROGRAMME REQUIREMENT

All operators of transport category aircraft engaged in commercial operations shall, as part of the system of maintenance for those aircraft, have in place a maintenance reliability programme where:

a. The aircraft's maintenance programme is based on MSG-3 logic process; or

b. The aircraft's maintenance programme includes condition monitored components; or

c. The aircraft's maintenance programme does not contain overhaul time periods for all significant system components; or

d. It is required by the manufacturer's maintenance planning document (MPD) or Maintenance Review Board (MRB) report issued by the Civil Aviation Authority responsible for type certification of the aircraft.

Note; A maintenance reliability programme **is not** required, where:

- The maintenance programme is based on the MSG-1 or 2 logic process, but only contains hard time or on condition items; or
- The aircraft's MTOW is 5700 kg or below; or
- The aircraft maintenance programme provides overhaul time periods for all significant system components.

10.5 ELEMENTS OF A RELIABILITY PROGRAMME

The CAASL recognizes that the operating philosophy and maintenance programme management practices utilized by each operator may be different. However an operator's maintenance reliability programme shall meet, as a minimum, the following criteria, which is acceptable as guidelines to the CAASL;

a. For aircraft subject to reliability monitoring, all the elements of a reliability programme as contained in FAA AC 120-17A "Maintenance Control by Reliability"; and

b. For aeroplanes to be engaged in ETOPS operations, all the additional reliability requirements as contained in FAA AC 120-42B "Extended Range Operation with Two-engine Airplane".

10.6 PROVISION OF RELIABILITY REPORTS TO CAASL

DGCA may accept maintenance reliability reports through:

a. Hard copy; or

b. Any other method as described in the approved MCM/MME, including giving access to the DGCA to the operator database.

c. For all aircraft, reliability reports shall be forwarded to CAASL in every month or as in the approved MCM/MME.

d. For aircraft used in ETOPS operations, reliability reports shall be forwarded to the Authority:

- At least on every month(or in 3 months as approved) and
- Reports shall be made as soon as practicable, but in any case within 72 hours, whenever the operator observes adverse

trend(s) detrimental to ETOPS flights. Details of investigation and corrective action may also be provided to DGCA.

10.7 INFORMATION TO BE INCLUDED IN A RELIABILITY REPORT

a. Fleet reliability summary

This summary relates to all aircraft of the same type, and shall contain the following information for the defined reporting period:

- Number of aircraft in fleet
- Number of aircraft in service
- Number of operating days (less maintenance checks)
- Total number of flying hours
- Average daily utilisation per aircraft
- Average flight duration
- Total number of cycles/landings
- Total number delays/cancellations
- Technical incidents.

b. Aircraft technical delays/cancellations

All technical delays more than 15 minutes and cancellation of flight(s) due to technical malfunction are required to be reported with moving average rate and, where appropriate, the Alert Level. The operator shall present the information for a minimum period of 12 consecutive months, but need not repeat the occurrences in descriptive form.

c. In-flight diversions due to mechanical malfunction or failures (known or suspected)

While all in-flight diversions due to mechanical malfunction or failures (known or suspected) shall be reported through normal Incident Reporting System, a summary of all in-flight diversions shall be provided.

d. Engine unscheduled shutdown or propeller feathering

All In Flight Shut Down (IFSD) and IFSD rates or propeller feathering in flight, if applicable, listed by type of engine and aircraft for the reporting period shall be reported and presented in graphical form. When dealing with small numbers of IFSD, IFSD rate, or propeller feathering in flight, this information should be presented in such a way as to show the trend over a period of at least one year.

e. Incidents involving inability to control engine/obtain desired power

All incidents involving inability to control engine/obtain desired power during the reporting period, shall be reported and presented in graphical form. When dealing with small numbers of such incidents, this information should be presented in such a way as to show the trend over a period of at least one year.

f. Unscheduled engine removals due to mechanical failures

All unscheduled engine removals due to mechanical failures, listed by type of engine and aircraft for the reporting period shall be reported and presented in graphical form. When dealing with small numbers unscheduled engine removals, this information should be presented in such a way as to show the trend over a period for at least one year.

g. Component unscheduled removal

All unscheduled removal of components, by ATA chapter, during the defined reporting period shall be reported and presented in graphical form. In situations that needs observing thousands of components, only those components having significant removal rate will be presented in graphical format. Other components may be presented in tabular format. The format of component removal information shall be such that:

- Both unscheduled removals and confirmed failures rates should be compared with the Alert Levels so as to identify when the Levels are likely to be exceeded; and
- Current and past periods of operation should be compared.

h. Fleet dispatch reliability rate

Fleet dispatch reliability rate during the defined reporting period shall be reported and presented in graphical format.

i. Operation of aircraft with multiple MEL items invoked

A monthly (or in 3 months as approved) reliability report shall include trend reporting of dispatch of aircraft with multiple MEL items invoked and shall present the information for a minimum period of 12 months. The report need not repeat the occurrences in descriptive form

j. Pilot reports (PIREPS)

PIREPS shall be reported by ATA chapters in graphical and/or tabular form as a count and rate for the defined reporting period, and comparison thereof with the Alert Level:

- In case CAASL understands that the pilot-reported defects are not a valid reliability indicator. In such situations, reporting of PIREPS will not be required.

k. ETOPS specific operations

In addition to non-ETOPS reliability reporting requirements, the following information shall be provided for ETOPS flights:

- Number of ETOPS flights during the defined reporting period
- Aircraft/engine type/combination involved in the programme.
- Details of aircraft involved in the programme during the reporting cycle
- Average fleet utilization time and cycles during the reporting cycle
- ETOPS critical component failures or malfunctions, by ATA chapter. However, ETOPS critical system failure reporting would also be acceptable to the Authority.

10.8 APPROVAL OF MAINTENANCE RELIABILITY PROGRAMME AND MONITORING OF RELIABILITY REPORTS

The following factors are acceptable for establishing or revising a reliability programme's performance standards

1. Past and present individual operator and industry experience. If industry experience is used, the programme must include a provision for reviewing the standards after the operator has gained 1 year of operating experience.
2. Performance analysis of similar equipment currently in engines.
3. Aircraft or equipment or manufacturers' reliability engineering analysis.
4. History of experience where reliability standards were acceptable to the airline industry.

The responsibilities of the AWI in respect of approval of a maintenance reliability programme, and monitoring of reliability reports thereafter, shall be as follows:

- Airworthiness Section shall advise and make recommendation on **policy and procedures** in relation to the approval of a maintenance reliability programme.
- The assigned Airworthiness Inspector in coordination with the Maintenance Reliability Engineer of the operator shall approve maintenance reliability programmes.
- All operators shall forward periodic reliability reports required by the Airworthiness Section and the provision of individual reliability reports to the Airworthiness Section.
- Airworthiness Section shall nationally monitor all reliability reports against international and national trends and prepare recommendations and/or observations, if any, for further action.
- Airworthiness Section shall determine any variations to reliability reporting requirements and shall retain responsibility for administration and oversight of the national reporting requirements
- Airworthiness Section shall conduct periodic reliability meetings with representatives of airline operator or vice versa. The purpose of such meetings is to relay national and international reliability trends and to impart specialist knowledge necessary for the oversight of reliability programmes.

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 11- EXTENDED RANGE OPERATIONS WITH TWO – ENGINE AIRCRAFT (ETOPS)

11.1 BACKGROUND AND OBJECTIVE

The material in this chapter provides guidance on the continuing airworthiness approval for extended range operations (ETOPS) aeroplanes with a maximum certificated take- off mass exceeding 5700 kg and powered by two turbine power- units.

ETOPS Definition:

Extended Range Operation with Two Engine Aeroplanes (ETOPS) ; Operations conducted over a route containing a point further than one hour flying time at the normal one engine inoperative cruise speed (in still air) from an adequate airport

11.2 GENERAL

ICAO Standards containing the basic requirements for the approval of ETOPS are contained in Annex 6, Part l, Para 4.7. Attachment E of the Annex contains guidance on the setting of a threshold time and on the means of achieving the required level of safety. Part lll, Section 5, Chapter 1 of the Airworthiness Manual (Doc 9760) contains guidance on the assessment of the level of performance and reliability of systems.

11.3 CONTINUING AIRWORTHINESS CONSIDERATIONS

11.3.1 General

In considering an application from an operator to conduct ETOPS, assessments should be made of the operator’s over-all safety record, past performance, training and maintenance programmes. The data provided with the request should substantiate the operator’s ability and competence to Safely conduct and support these operations and should include the means used to satisfy the considerations outlined in this paragraph. Any reliability assessment obtained, either through analysis or service experience, should be used as guidance in support of operational judgments regarding the suitability of the intended operation

11.3.2 Assessment of the operator's propulsion system reliability:

An assessment should be made of the operator's ability to achieve and maintain the level of propulsion system reliability achieved by the world fleet. This assessment should include trend comparisons of the operator's data with other operators as well as the world fleet average values and the application of a qualitative judgment that considered all of the relevant factors. The operator's past record of propulsion system reliability with related types of power- units should also be reviewed, as well as its record of achieved system reliability with airframe- engine combination for which authorization is sough to conduct ETOPS.

11.3.3 Engineering modifications and maintenance programme considerations:

Although these considerations are normally part of the operator's continuing airworthiness programme, the maintenance and reliability programme may need to be supplemented in consideration of the special requirement of ETOPS (see the Appendix to this chapter) The following items, as part of the operator's programme, should be reviewed to ensure that they are adequate for ETOPS.

a. **Engineering modifications**: The operator should provide to the state of Registry and, where applicable, to the State of the Operator the titles and numbers of all modifications, additions and changes which were made in order to substantiate the incorporation of the configuration maintenance and procedures (CMP) standard in the aeroplanes used in ETOPS.

b. **Maintenance procedures**: Following approval of the changes in the maintenance and training procedures, practices or limitations established to qualify for ETOPS should be submitted to the State of the Operator and where applicable, to the State of Registry, before such changes may be adopted.

c. **Reliability reporting:** The reliability reporting programme as supplemented and approved, should be implemented prior to and continued after approval of ETOPS. Data from this process should result in a suitable summary of problem events, reliability trends and corrective actions and should be provided regularly to the State of the Operator and to the concerned airframe and engine manufacturers.

d. **Modifications and inspections implementation:** Approved modifications and inspections, which would maintain the reliability objective for the propulsion system and airframe systems as a consequence of AD actions and revised CMP standards should be promptly implemented. Other recommendations made by the engine and airframe manufacturers should also be considered for prompt implementation. This would apply to both installed and spare parts.

e. **Aeroplane dispatch procedures:** Procedures and centralized control processes should be established which would preclude an aeroplane's being dispatched for ETOPS after propulsion system shut-down or primary airframe system failure on a previous flight, or significant adverse trends in system performance, without appropriate corrective action having been taken. Confirmation of such action as being appropriate may, in some cases, require successful completion of one or more non-revenue or non- ETOPS revenue flights (as appropriate) prior to dispatch on an ETOPS.

f. **Maintenance programme:** The operator's maintenance programme should ensure that the airframe and propulsion systems will continue to be maintained at the level of performance and reliability necessary for ETOPS, including such programmes as an engine condition monitoring programme and engine oil consumption monitoring programme.

11.3.4 Airworthiness Flight Dispatch Considerations

Although many of the airworthiness flight dispatch considerations may already be incorporated in to approved programmes for other aeronautical or non- ETOPS, the nature of ETOPS necessitates a re- examination of these programmes to ensure that they are adequate for this purpose. Systems redundancy levels appropriate to ETOPS should be reflected in the Master Minimum Equipment list (MMEL) An operator's minimum equipment list (MEL) may be more restrictive than the MMEL considering the kind of ETOPS proposed and equipment and service problems to the operator. Systems considered to have a fundamental influence on flight safety may include, but are not limited to:

- Electrical, including battery;
- Hydraulic;
- Pneumatic
- Flight instrumentation; fuel;
- Flight control;
- Ice protection;
- Engine start and ignition;
- Propulsion system instruments;
- Navigation and communication;
- Auxiliary power- unit;
- Air conditioning and pressurization;
- Engine fire protection;
- Emergency equipment; and

- Any other equipment required for ETOPS.

11.4 CONTINUING SURVEILLANCE

The fleet average in – flight shut down (IFSD) rate for the specified airframe engine combination will continue to be monitored by the certification authority. As with all other operations, the state of the Operator should also monitor all aspects of the operation it has authorized to ensure that the level of reliability achieved in ETOPS remains at the necessary level and that the operation continues to be conducted safely. In the event that an acceptable level of reliability is not maintained, significant adverse trends exist, or if significant deficiencies are detected in the type design or the conduct of the operation, the state of the operator should initiate a special evaluation, impose operational restrictions, if necessary, and stipulate corrective action for the operator to adopt to resolve the problems in a timely manner. The state of the Operator should alert the certification authority when an evaluation is initiated and provide for its participation.

11.5 EVALUATION PROCEDUES

a. Verify the Compliance of the Aircraft with the configuration; maintenance and procedures Document produced by the manufacturer for ETOPS operations.

b. Evaluate the Operator’s Current Maintenance programme. Request and evaluate the following information for ETOPS suitability:

1. The date of type design and the review of each engine/airframe combination
2. The in service experience for each engine/airframe combination, to include the following.

   i. The number of months/years of operational experience with each specific engine/airframe combination.

   ii. The total number of ETOPS and/ or domestic operations conducted with the specific engine/ airframe.

   iii. The engine/airframe hours and cycles, to include both total and time engines.

   iv. The in- flight shutdown rate (all causes) , including the 12 month and 6-month rolling average for both the ETOPS and the world fleet

   v. The unscheduled engine removal rate for both the world fleet and the operator.

   vi. The mean time between failure (MTBF) for major components

vii. The record of APU starts and run reliability

viii. The records of delays and cancellations, with the causes, by the specific aircraft systems

ix. The records of significant operator events, including the phase of flight where the event occurred, such as:

- Uncommanded power changes (surge or rollback)
- Inability to control the engine or obtain desired power
- In- flight shutdown events

c. Review the Operator’s Manual (ETOPS Maintenance Manual): The inspector must ensure that the following programmes and procedures have been included as part of the operator’s supplemental maintenance programme:

1. Verification programme, to include:

   - A list of primary systems
   - Conditions that require verification flights
   - Procedures for initiating verification actions
   - Procedures that monitor and evaluate corrective actions
   - Procedures that verify the implementation of corrective action
   - Procedures that preclude repeat items from occurring
   - Procedures that identify and reverse the adverse trends

2. Engine condition- monitoring programme, to include:

   - Scope of programme. E.g., data collection and analysis
   - Notification procedures for deterioration
   - Deterioration monitoring limits for internal engine parts

3. Reliability programme, to include:

   - Reporting criteria
   - Procedures to ensure reporting of significant individual events (engine shutdowns, flight diversions, etc.)

4. Engine/APU oil consumption monitoring programme, to include:

   - Established limits of consumption
   - Procedures for use and verification prior to the start of each extended range leg

5. Extended range parts control, to include:

   - Method of verification of proper parts
   - Control procedures during parts pooling and borrowing

6. Maintenance training programme, to ensure:

   - Personnel are aware that an ETOPS authorization is in place
   - Personnel, including contract personnel, are adequately trained on the special programmes required by an ETOPS authorization

7. Continuing analysis and surveillance programme, to include:

   - Ensuring the continued integrity of the ETOPS maintenance programmes
   - Ensuring that adjustments are made , as required, to the ETOPS programmes

8. Procedures that accomplish the following:

   - Preclude simultaneous actions from being applied to multiple similar elements in any ETOPS critical system
   - Identify ETOPS related tasks on routine work forms are related instructions.
   - Develop an ETOPS over water service check to verify the status of the aeroplane and ensures certain critical items are acceptable

d. Successful completion of this evaluation will result in the following:

1. An ETOPS Authorization given to the operator.
2. Recommendations to amend Operation Specifications as appropriate.

APPENDIX 1

ETOPS MAINTENANCE REQUIREMENTS

1. GENERAL

The maintenance programme should contain the standards, guidance and direction necessary to support the intended operations. Maintenance personnel involved should be made aware of the special nature of ETOPS and have the knowledge, skills and ability to accomplished the requirements of the programme.

2. ETOPS MAINTENANCE PROGRAMME

The basic maintenance programme for the aircraft being considered for ETOPS should be the continuing airworthiness maintenance programme currently approved for that operator, for the make and model airframe-engine combination. This programme should be reviewed to ensure that it provides an adequate basis for development of ETOPS maintenance requirements. This should include maintenance procedures to preclude identical action being applied to multiple similar elements in any ETOPS –critical system (e.g. fuel control change on both engines).

ETOPS- related tasks should be identified on the operator’s routine work forms and related instructions.

ETOPS- related procedures, such as involvement of centralized maintenance control, should be clearly defined in the operator’s programme.

An ETOPS service check should be developed to verify that the status of the aircraft and certain critical items are acceptable. This check should be accomplished and signed off by an ETOPS qualified maintenance person immediately prior to an ETOPS flight.

Logbooks should be reviewed and documented as appropriate to ensure proper MEL procedures, deferred items and maintenance checks and those system verification procedures have been performed.

3. ETOPS MANUAL

The operator should develop a manual for use by personnel involved in ETOPS. This manual need not include, but should at least refer to, the maintenance programme and other requirements described by this Appendix and clearly indicate where they are located in the operator’s manual system. All ETOPS requirements, including supportive programme procedures, duties and responsibilities, should be identified and be subject to revision control. Alternatively the operator may include this information in existing manuals used by personnel involved in ETOPS.

4. OIL CONSUMPTION PROGRAMME

The operator's oil consumption programme should reflect the manufacturer's recommendations and be sensitive to oil consumption trends. It should consider the amount of oil added at the departing ETOPS stations with reference to the running average consumption, i.e. the monitoring must be continuous up to , and including , oil added at the ETOPS departure station. If oil analysis is relevant to this make and model, it should be included in the programme. If the auxiliary power-unit (APU) is required for ETOPS operation, it should be added to the oil consumption programme.

5. ENGINE CONDITION MONITORING

This programme should describe the parameters to be monitored, method of data collection and corrective action process. The programme should reflect manufacturer's instructions and industry practice. This monitoring should be used to detect deterioration at an early stage to allow for corrective action before safe operation is affected. The programme should ensure- engine limit margins are maintained so that a prolonged single- engine diversion may be conducted without exceeding approved engine limits (i.e. rotor speeds, exhaust gas temperatures) at all approved power levels and expected environmental conditions. Engine margins preserved through this programme should account for the effects of additional engine loading demands (e.g. anti-ice. Electrical. Etc) which may be required during the single- engine flight phase associated with a diversion.

6. RECTIFICATION OF AIRCRAFT DEFECTS

The operator should develop a verification programme, or procedures should be established, to ensure corrective action following an engine shutdown, primary system failure, adverse trends or any prescribed events which require verification flight or other action and established means to assure their accomplishment. A clear description of who must initiate verification action and the section or group responsible for the determination of what action is necessary should be identified in the programme. Primary systems or conditions requiring verification actions should be described in the operator's ETOPS manual.

7. RELIBILITY PROGRAMME

7.1 An ETOPS reliability programme should be developed or the existing reliability programme supplemented. This programme should be designed with early identification and prevention of ETOPS- related problems as the primary goal. The programme should be event-orientated and incorporate reporting procedures for significant events detrimental to ETOPS flights. This information should be readily available for use by the operator and the state of the operator to help establish that the reliability level is adequate and to assess the operator's competence and capability to safely continue ETOPS. It is recommended that the state of the operator should be notified within a short time (usually 72 hours) of events reportable through this programme.

7.2 In addition to the items required to be reported by the operator, the following items should be included.

a. In – flight shut –downs;

b. Diversion or turn – back;

c. Uncommanded power changes or surges;

d. Inability to control the engine or obtain desired power;

e. Problems with systems critical to ETOPS; and

f. Any other event detrimental to ETOPS

7.3 The report should also identify the following;

a. Aircraft identification(make and serial number) ;

b. Engine identification (make and serial number)

c. Total time, cycles and time since last shop visit.

d. For systems, the TSO or last inspection of defective unit;

e. Phase of flight; and

f. Corrective action

8. PROPULSION SYSTEM MONITORING

The operator's assessment of propulsion systems reliability for the extended range fleet should be made available to the CAASL (with the supporting data) on at least a monthly basis to ensure that the approved maintenance programme continues to maintain a level of reliability necessary for ETOPS. The assessment should include, as a minimum, engine removal rate computed on a twelve- month rolling average basis. Any adverse sustained trend would require an immediate evaluation to be accomplished by the operator in consultation with the state of the operator. The evaluation may result in corrective action or operational restriction being applied.

9. MAINTENANCE TRAINING

Maintenance training should focus on the special nature of ETOPS, This programme should be included in normal maintenance training. The goal of this programme is to ensure that all personnel involved in ETOPS are provided with the necessary training so that the ETOPS maintenance tasks are properly accomplished and to emphasize the special nature of ETOPS maintenance requirements. Qualified maintenance personnel are those that have completed the operator's ETOPS training programme and have satisfactorily performed ETIOPS tasks under supervision, within the framework of the operator's approved procedures for personnel Authorization.

10. ETOPS PARTS CONTROL

The operator should develop a parts control programme that ensure the proper parts and configurations are maintained for ETOPS. The programme includes verification that parts placed on ETOPS aircraft during parts borrowing or pooling arrangements as well as those parts used after repair or overhaul maintain the necessary ETOPS configuration for that aircraft.

SECTION TWO

VOLUME 2

AIR OPRATOR /MAINTENANCE ORGANIZATION ADMINISTRATION SURVEILLANCE

CHAPTER 12- FLIGHT PERMITS – FERRY FLIGHTS

12.1 OBJECTIVE

This chapter provides guidance for evaluating an application from an operator to allow him to authorize ferry flights. This authorization is granted case by case basis as it is not provided in the operations specifications to allow for the in –house issue of a special Flight Permit to conduct a ferry flight.

12.2 GENERAL

A. **Definition**: Damaged aircraft – An aircraft that has sustained physical damage or has inoperative /malfunctioning equipment.

B. **Issuance**: The authorizing regulation does not automatically authorize the issuance of permits to all operators. Therefore, an eligible operator’s operations specifications or Company Manuals (Operations and Maintenance) specifically laid down procedure will be used to authorize the issue of such permits and to ensure responsible utilization of the permit.

C. **Eligibility:**

1. The authority to issue special flight permits should only be given to certain operators on case by case basis subject to the following regulations:

2. Aircraft involved in an accident or incident may not be ferried prior to notifying the CAASL accident investigation Section and obtain approval.

3. An Airworthiness Directive (AD) may dictate that safety demands further limitations. The AD may limit ferry flights to those specially approved by the CAASL.

No person may operate an aircraft to which an AD applies except in accordance with the requirements of that AD. Therefore, if an AD requires compliance before further flight, with no provision for the issuance of special flight permit, the operation of the specified aircraft would not be permitted.

D. Manual Review:

1. The operator should consider certain conditions and the limitations necessary before authorizing the operation of an aircraft. These conditions and limitations should be included in the operator's manuals (operation and maintenance).

2. When reviewing manual material, the following items should be considered:

   i. Technical data
   ii. Operational equipment necessary for safe operation of the aircraft
   iii. Aircraft weight limits
   iv. Fuel distribution limits
   v. Center of gravity limits
   vi. Aircraft maneuver limitations
   vii. Flight equipment usage, limitations, e.g autopilot, etc.
   viii. Airspeed limits
   ix. Meteorological limits, including:

      - Conditions to be avoided
      - Required inspections when these conditions are encountered
      - Weather minima.

E. Authorization for ferry Flights with one Engine Inoperative

Certain large transport category aircraft operators may be authorized to conduct a ferry flight of a four engine aeroplane or a turbine engine powered aeroplane equipped with three engines, with one engine inoperative, to a base for the purpose of repairing that engine. The following restrictions will apply:

1. The particular aeroplane model must have had a test flight conduct with an engine in accordance with the performance data contained in the applicable flight manual of the airplane.

2. The approved aeroplane flight manual must contain the performance data.

3. The operator's manual must contain operating procedures for the safe operation of the aeroplane, including the specific requirements listed in the appropriate regulation.

4. The operator may not depart an airport where the initial climb-out is in thickly populated or the weather conditions at the takeoff or destination airport are less than those required for visual Flight Rules (VFR) flight

5. Only required flight crewmembers can be carried abroad during this ferry flight.

6. The required flight crewmembers must be trained and proved his/her proficiency within last six month, and be thoroughly familiar with the company's operating procedures and the aeroplane Approved Flight Manual, for one- engine inoperative ferry flights.

12.3 APPLICATIONS INVOLVING FOREIGN AIR TRANSPORTATION

ICAO Annex 8 recognizes the temporary loss of airworthiness due to damage to the aircraft. In this case, damaged aircraft can refer to inoperative or malfunctioning equipment as well as physical damage to the aircraft. In such an event, Annex 8, part II, Section 6.2.2, recognizes that the country of registry may allow the aircraft to be ferried to a base where it can be restored to an airworthy condition.

NOTE: This authorization does not extend to situations, which involve flying an undamaged aircraft to a base where modifications will be performed.

12.4 DISPLAY OF PERMIT

The operator must display in the aircraft the current airworthiness certificate which is in force, including the special flight permit or authorization. The operator must carry on board the aircraft a copy of those conditions and limitations imposed by DGCA and contained in the operations specifications or appropriate company manuals.

12.5 PROCEDURE OF ISSUING FLIGHT PERMIT

A. Review the Operator's Operations and Maintenance Manuals

1. Ensure that the manuals have the following procedures for ferry flights:

   i. Provisions for conveying the authorization to the operating crew
   ii. A system for recording details of each flight conducted under this authorization.
   iii. Procedures to determine that the proposed special flight complies with the Sri Lanka Air Navigation Regulations and is not prohibited by any Airworthiness Directives (ADs)
   iv. Procedures to allow additional crewmembers and other authorized persons to be carried abroad the aircraft during ferry flights when the aircraft flight characteristics have not been appreciably changed or its operation in flight has not been substantially affected.
   v. Procedures to ensure the display of the current airworthiness certificate and the special flight permit or authorization.

vi Procedures to ensure the review of the following items prior to releasing the ferry flight:

- Technical data to which the aircraft must perform
- Operational equipment necessary for safe operation of the aircraft
- Aircraft weight limits
- Fuel distribution limits
- Centre of gravity limit s
- Aircraft manoeuvre limitations
- Equipment usage limitations, e.g., autopilot
- Airspeed limits
- Meteorological limits, including conditions to be avoided, inspections required should these conditions be encountered inadvertently, and weather minimums

vii. Procedures to ensure that such flights are only approved by senior operations and airworthiness management staff.

2. For one engine inoperative ferry flights, ensure the following:

i. The operator has a four engine airplane or a turbine engine powered aeroplane equipped with three engines

ii. The applicable aeroplane has been previously test flown with one engine inoperative in accordance with its approved aeroplane flight Manual. The approved Aeroplane flight Manual must contain the following data.

- Maximum weight
- Configuration of the inoperative propeller, if applicable
- Runway length for take off , including temperature accountability
- Altitude range
- Certificate limitations
- Ranges of operational limits
- Performance information
- Operating procedures

3. The operator's manual must include the following:

▪ A limitation that the operating weights on any ferry flight must be the minimum necessary with the necessary reserve fuel load.

▪ A limitation that takeoffs must be made from dry runway unless based on a showing of actual runway operating takeoff techniques on wet runways with one engine inoperative, takeoffs with full controllability from wet runways have been approved for the specific model aircraft and included in the approved Aeroplane Flight Manual or in the Flight Crew Operating Manual as appropriate.

- Procedures for operations from airports in which the runways may require a takeoff or approach over populated and build-up areas

- Inspection procedures for determining the operating conditions of the operative engines

- A restriction that no aircraft may takeoff from an airport in which the initial climb is over thickly populated areas or weather conditions at the takeoff and destination airport are less than those required for Visual Flight Rules (VFR) flight.

- Procedures that ensure carrying only essential flight crewmembers abroad the aeroplane during the ferry flight

- Procedures that ensure flight crewmembers are thoroughly familiar with the operator's operating procedures and the approved Aeroplane flight Manual for one-engine inoperative ferry flights.

- Recent proficiency requirement of the flight crew in respect of the operation as explained in the operation manual. For example successful completion of simulator check within last six month and necessary endorsement in relation to the operation.

B. Notify the CAASL Accident Investigation branch prior to any authorization of an aircraft involved in an Accident or Incident.

NOTE: The required authorisation form to carryout Ferry Flight given in the attachment in Section 3 in Airworthiness Office Procedure Manual should be submitted for approval before performing the Ferry Flight.

SECTION TWO

VOLUME 2

AIR OPERATOR /MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 13 - LEASE AND INTERCHANGE OF AIRCRAFT

13.1 BACKGROUND

13.1.1 The material in this part is intended to provide guidance to Airworthiness Inspectors in meeting their responsibilities and the states relating to continuing airworthiness when they are involved, either representing the State of the Operator or the State of Registry, in the transfer of aircraft under lease, charter or interchange arrangements.

13.1.2 The entry into force of Article 83 *bis* of the Chicago Convention will create the opportunity for States to delegate certain functions and duties in the case of such arrangements, but the purpose of the material in this part of the manual is to draw the attention of the two airworthiness authorities involved, the state of Registry and the State of the Operator, to problems directly concerning continuing airworthiness which have to be considered when such transfers occur, irrespective of the rectification of Article 83 *bis.* The appropriate operational arrangement between the State of Registry and the State of the Operator shall be drawn on the lines given in Article 83 *bis.* This Chapter provides necessary guidance to understand such arrangement given in the Article 83*bis*.

13.1.3 Authorities should give due consideration to the objectives of continuing airworthiness and to the transfer of information as required in :

- Annex 6, part I, 8.6 “Modifications and repairs”
- Annex 6, part I, 8.8, “Maintenance Release”;
- Annex 6, part I, 8.5, “Continuing Airworthiness Information”;
- Annex 6, part I, 11.3, “Maintenance Control Manual” and
- Annex 8, Part II, 4.2, “Information related to continuing airworthiness of aircraft”.

In doing so, authorities should also take into account the type/length of transfers, etc. and should develop administrative procedures and arrangements between the states involved. If the period of wet-lease exceeds more than three months, the State of Operator and the State of Registry should go for Article 83*bis* arrangement as appropriate.

Chapter 10 of ICAO Doc 8335, Manual of Procedures for Operational Inspection, Certification and Continued Surveillance advises of legal and practical operational problems to be considered by the authorities in the certification of an operator proposing to utilize leased aircraft.

13.1.4 Irrespective of the various types of arrangements and categories of lease, charter and interchange (Doc 8335) , this part will discuss the following issues in relation to the transfer of aircraft between the State of Registry and the State of the Operator:

a. Acceptance of the "type design"

b. Maintenance;

c. Information on faults, malfunctions and defects and other occurrences;

d. Mandatory continuing airworthiness information

e. Distribution of mandatory continuing airworthiness information.

f. Approval for EDTO

13.2 ACCEPTANCE OF THE TYPE DESIGN

13.2.1 The laws of the State of Registry generally prescribe the airworthiness and the design – related operational requirements for aircraft registered in that State and operated by an operator under its jurisdiction However, the laws of the Operator may also require that foreign – registered aircraft utilized by operators under its jurisdiction comply with the same airworthiness and design- related operational requirements, as if they were registered in that State.

13.2.2 Notwithstanding the above, the States of Registry and of the Operator should, when prescribing the airworthiness and design – related operational requirements, give due consideration to the period of time for which the aircraft is transferred.

13.2.3 Resulting from the above the following issues should be considered when an aircraft is transferred from the State of Registry to the State of the Operator:

a. The differences between the type certification basis of the State of Registry and that of the State of the Operator

b. The differences between the design –related operational requirements of the State of the Registry and those of the State of the Operator; and

c. The respective responsibilities of the State of Registry and the State of the Operator with respect to the approval of:

- Changes to the type design, including those required to take into consideration the differences stated in a) and b);
- and repairs which require a design approval before implementation

13.2.4 The responsibility that the aircraft, and any modification to it, complies with an approved design is in general that of the State of Registry. To preserve this responsibility the State of the Operator should not endorse the implementation of any change without prior approval by the State of Registry.

13.2.5 To discharge their respective functions States could enter into bilateral airworthiness and transfer of aircraft arrangements part of which describe procedures for:

a. The approval of the changes to the type design;

b. The performance and the certification of the changes; and

c. The record keeping of the changes

13.2.6 The transfer of the responsibilities referred in the first paragraph of this chapter is given in the Article 83*bis*.

13.3 MAINTENANCE

13.3.1 Although the maintenance programme is usually approved by the State of Registry (Annex 6, part I, 11.3) the legislation of a State may require it to approve the maintenance programme for all aircraft operated by the operators of that state. Other factors may, by necessity or for convenience, lead to the use of a third State's maintenance programme, in the case of transferred aircraft.

13.3.2 Some of the factors influencing the selection of the maintenance to be applied when aircraft are transferred;

a. The period of time for which the aircraft is transferred;

b. The differences between the maintenance requirements of the State of Registry and those of the State of the Operator and the compatibly of their approved maintenance programmes.

c. The absence of requirements regarding the approval of the maintenance programme by the State of the Operator and /or of the State of Registry; and

d. The distance between the place where the aircraft is operated and the State of the Operator, i.e. the aircraft may be operated in a third State for the duration of the transfer.

13.3.3 Arrangements and procedures regarding the maintenance, the performance and certification of maintenance, including the signing of maintenance release and the record keeping should be acceptable to both the state of Registry and the state of the Operator. These arrangements and procedures could be developed on a case-by-case basis or be the subject of bilateral airworthiness and/or transfer arrangements.

13.3.4 If the agreement is determined to be a wet lease, the lessor normally exercises **operational control** over the aircraft and the **responsibility for the airworthiness and operational oversight of the airplane will remain with the State of Registry**. If the agreement is in the nature of the dry lease, then responsibility for operational control will normally rest with the lessee, and it may be advantageous for the state of Registry to enter into agreement with the state of the operator to transfer or share various factors of operational and airworthiness oversight. However, leasing agreements are often very complex instruments for which operator should exercise day to day operational control are not clear cut. For example, flight crews may be comprised of a mixture of personnel from both the lessor and lessee.

13.3.5 Whatever the case, the authorities will firmly established, through written agreements with each other , which State will have responsibility for every fact of operational and airworthiness oversight of the leased aircraft. All responsibilities must be considered and assigned: those associated with the state of Registry, and those associated with the State of the Operator of the airline which has operational control.

13.3.6 Historically there have been a number of difficulties associated with the maintenance of transferred aircraft. To facilitate transfers in a safe and efficient manner, expanded guidance on maintenance aspects is contained in Appendix 1 to this Chapter.

13.4 INFORMATION ON FAULTS, MALFUNCTIONS AND DEFECTS AND OTHER OCCURRENCES

13.4.1 Annex 8, part II, 4.2.3 requires the State of Registry to ensure that there exists a system whereby information on faults, malfunctions, defects and other occurrences is transmitted to the organization responsible for the type design. Furthermore, 4.2.4 of the same document requires Contracting States to establish which type of service information is to be reported by operators, organizations responsible for type design and maintenance organizations.

13.4.2 It is clear from the above that the State of Registry is responsible for ensuring the transfer of information on defects to the organization responsible for the type design. For an operator of an aircraft subject to a transfer, it may not be appropriate, convenient or enforceable to report defects according to the system of the Sate of Registry and the State of the operator should be developed to ensure that the information on defects for the aircraft is transferred to the organization responsible for the type design.

13.4.3 Some of the factors influencing the selection of the system to be used for reporting information on defects, when aircraft are transferred, are:

a. The period of time for which the aircraft is transferred;

b. The compatibility/differences between the reporting system of the State of Registry and that of the State of the Operator:

c. The absence of a reporting system in the State of the Operator and/or the State of Registry; and

d. The regulatory requirements of the States involved.

13.5 MANDATORY CONTINUING AIRWORTHINESS INFORMATION

13.5.1 In general the State of Registry has prime regulatory responsibility for the airworthiness of the aircraft. If the State of Registry is also the State of Design, it will normally be the originator of mandatory continuing airworthiness information, such as airworthiness directive (AD)

13.5.2 If the State of registry is not the State of Design, it should have procedures in place to respond to mandatory continuing airworthiness information received from the State of design and should decide whether the information will be made mandatory in its State. When made mandatory, the State of Registry will either issue its own mandatory information or require compliance with issued by the State of Design.

13.5.3 Notwithstanding 13.5.1.and 13.5.2, the State of Registry, without being the State of Design, may issue mandatory continuing airworthiness information applicable to aircraft registered in its State.

13.5.4 Similarly, the state of the Operator may, in certain circumstances, issue mandatory continuing airworthiness information applicable to aircraft operated and/or registered in its State. In such cases the State of the Operator has the mandate.

13.5.5 Where an aircraft is transferred from the State of Registry to the State of the operator, irrespective of the fact that either State could be the State of Design, unnecessary cost may arise if the State of Registry and the State of the Operator impose different mandatory continuing airworthiness information on the same aircraft. It is therefore recommended that:

a. The authorities of the State of Registry and of the State of the Operator in consultation with the registered owner and the operator of transferred aircraft should determine that the State of Operator mandatory continuing airworthiness information will apply to the transferred aircraft, before they enter into a transfer agreement; and

b. The States involved in aircraft transfer should develop administrative procedures to this effect.

13.5.6 The intent of 13.5.5 can be achieved, by a general agreement or arrangement on aircraft transfer between the State or authorities involved or by individual arrangements at the time of transfer.

13.6 DISTRIBUTION OF MANDATORY CONTINUING AIRWORTHINESS INFORMATION

13.6.1 The mandatory continuing airworthiness information issued by the State of Registry in the form of an AD, or equivalent, or issued by the State of Design and made mandatory by the State of Registry, should be made available to affected operators by the State of Registry. Some States disseminate this mandatory information directly to each registered owner of an affected aircraft on their registers and rely on the registered owner to transmit the information to the operator. Other States makes the information available through the officers of their airworthiness authorities or also publish the information and make it available by subscription.

13.6.2 As described in 13.5.4, the mandatory continuing airworthiness information issued, in certain circumstances, by the State of the operator, and made mandatory on aircraft registered in another State and operated in its State (state of the Operator), should be made available to affected operators by the State of the Operator.

13.6.3 When an aircraft is transferred to another State, distribution of mandatory continuing airworthiness information by the State of Registry may be accomplished by making the mandatory documents available to the registered aircraft owner, as the case may be, who should be responsible for transmitting them to the aircraft operator. If the State of Registry has an agreement with the State of the operator to provide surveillance and assistance, or if the State of the operator wishes to be kept informed regarding transferred aircraft operated by its operators, then the State of Registry should also transmit the mandatory continuing airworthiness information documents to the State of the Operator.

13.7 APPENDICES

13.7.1 Appendix 1 - “Maintenance aspect of aircraft transfer” is included as guidance material.

13.7.2 In most of the issues referred to in 13.1.4 and discussed in this chapter, the State of Registry and the State of operator, to facilitate the discharge of their respective responsibilities by transferring certain functions, could enter into a Bilateral Airworthiness

Agreement, Technical Arrangement, or Memorandum of Understanding as per the framework explained in the Article 83*bis* and the circular 295 – guidance on the implementation of Article *83bis* of the convention on International Civil Aviation.

13.7.3 Appendix 2 – The statement to be completed and signed by the operator for Aircraft Transfer Arrangements.

APPENDIX 1

MAINTENANCE ASPECTS OF AIRCRAFT TRANSFER

1. INTRODUCTION

The content of this Appendix is intended to facilitate the leasing and / or transfer of aircraft in a safe and efficient manner. Historically there have been a number of difficulties associated with the transfer and leasing of aircraft, usually caused by:

- Differing national airworthiness standards;
- Differing national operational standards;
- Differing build standards; and
- Non-standards application of the above.

2. GENERAL

2.1 This appendix is intended to define clearly the minimum requirements for aircraft owners, airlines or regulatory authorities who are planning or preparing to transfer or lease an aircraft across international boundaries.

2.2 The material contains recommended methods and practices, which could be used during preparation and organization of an aircraft lease or an international aircraft transfer. The proposed requirements are intended to be used as minimum, additional requirements may be demanded by the lessor /buyer.

2.3 Documentation should be provided to establish the national regulations under which the maintenance and operation of the aircraft have been carried out. This should also include, where applicable, details of any deviations from, or exemptions issues against, those regulations

2.4 The maintenance programme should be identified to the following standard.

a. **Approval**: The approval or acceptance of the maintenance programme by the associated regulatory authority should be identified;

b. **Traceability:** The maintenance programme should be identified and be traceable to its approved minimum requirements standard, e.g. Maintenance Review Board (MRB) Report, the manufacture's recommended maintenance programme or recommended tasks. In the event that the programme fails to meet the minimum requirements standard, all areas of such deficiencies should be identified and corrective action taken, on the aircraft or to the programme as necessary. The minimum standard is understood to mean only minimum required tasks and not the intervals; and

c. **Documentation:** A printed copy of the maintenance schedule should be provided which identifies all tasks and functions in such a manner as to permit Traceability to the corresponding work cards. This includes sampling programme tasks.

3. RECORDS AND DOCUMENTATION

3.1 General

3.1.1 Consideration should be given to aircraft records and documentation as indicated in the following paragraphs.

3.1.2 Governing requirement

Prior to initiation of the lease or other transfer, representatives of both parties should co- ordinate the scope and content requirements of the technical logs and the aircraft technical log book which will eventually be required upon aircraft return or further transfer. The governing record- keeping regulation under which the aircraft records should be maintained should be determined prior to initiation of the lease or transfer.

3.1.3 Language

All aircraft records should be maintained in a language, which is acceptable to the regulatory authority. For practical purposes another language may be used; however, a translation to the acceptable language(English) should be provided at the time of transfer, if required by the regulatory authority.

3.1.4 Documentation requirements

3.1.4.1 Documentation requirements for incoming components and parts should be identified in the operator's manual to support its purchasing and receiving inspection functions. This included, but is not limited to, documentation of airworthiness directives (AD) compliance, time on life-limits, descriptions of work performed and certification of new and repaired parts. Once these requirements are satisfied and the essential information is entered into the operator's records system, the only source documentation required to be retained is that necessary to:

a. Satisfy the requirements of CAA-SL as the responsible regulatory authority;
b. Support the operator's continuing analysis and surveillance system; and
c. Support further maintenance on the affected parts.

3.1.4.2 However, operators are advised to retain or archive documentation of AD compliance, life-limited part service times and other information, which may be useful in the future.

3.1.4.3 When a used aircraft is introduced into an operator's fleet, the receiving operator should review the records to ensure they provide the current maintenance information necessary to phase the aircraft into the maintenance programme of the operator. This includes records such as the documentation of the last scheduled inspection, the current status of AD, life-limited parts and components, Supplemental Structural Inspection Document, damage- tolerance inspection status, Certification Maintenance Requirements, major repairs and major alterations.

3.1.4.4 If the aircraft is being transferred to another operator, the records from the transferring operator of the status of life-limited parts and AD, including the method of AD compliance should be acceptable as valid unless obvious discrepancies are apparent. The transferring operator should provide written statements that the records are correct.

3.1.4.5 If the aircraft is being transferred from another State, it may be necessary to evaluate the previous operator's maintenance scheduling and record –keeping system to ensure the validity of the records. The available records may vary depending on the country of origin. Therefore a means of assuring the integrity of the previous operator's records system may be necessary. This may require communication between the two regulatory authorities concerned.

3.1.4.6 The following are recommendations for determining the validity of the current status of life-limited parts and AD compliance.

a. If the State of the operator is an ICAO signatory, the operator's records should meet ICAO requirements and a record of current status would be acceptable;

Note - ICAO record keeping requirements are specified in Annex 6, Part I, Chapter 8(Aeroplanes) and part III, Chapter 6 (Helicopters).

b. A sampling check of visible ADs would be indicative of the accuracy of those records;

c. A sample check of source records for the record-keeping system of the transferring operator would indicate the quality of those records;

d. The state of the transferring operator’s shop records would be indicative of the integrity of the operator’s record-keeping system.

3.1.5 Part numbers

Record must accurately reflect the manufacturer’s part number as applicable. In the event that the operator utilizes a part numbering system other than the manufacture’s system, a complete cross-reference should be provided with the records. If alternative part numbers are records, technical substation should be available to support the part substitution.

3.1.6 Serial numbers

All components and assemblies controlled by serial numbers should have their serial numbers recorded in the maintenance records. In the event that the operator utilizes a serial numbering system other than the manufacture’s system, a complete cross- reference should be provided with the records.

3.1.7 Dates

All records should be properly dated with reference to an installation or maintenance function accomplishment. If the date format is numeric, the system should use a day /month/ year format to date the records.

3.2 Record-Keeping Requirements for Airworthiness Directives

3.2.1 The current status of applicable AD for a particular airframe, engine, propeller, rotor or appliance should be maintained. This record should identify the particular airframe, engine. Propeller, rotor or appliance; Identify the applicable AD (including amendment number, if required) date (when the next recurring inspection (action) is due; describe the method of compliance (if more than one method is specified in the AD) and show the appropriate measuring parameters (hours, cycles and / or calendar times).

3.2.2 The requirements of the regulatory authority will determine the specific data required as part of a maintenance record. An operator is not required to retain actual work documents to show accomplishment of the work on a given airframe, engine, propeller, rotor or appliance to document AD compliance unless such records are otherwise called for by the requirements of the regulatory authority.

Note - Current status information is required to be maintained as long as the airframe, engine, propeller, rotor or appliance is used or intended to be used by the operator. ICAO requirements for retention of records are specified in Annex 6, part I, Chapter 8 (Aeroplanes) and part III, Chapter 6 (Helicopters).

3.3 Record –keeping requirements for life-limited parts

3.3.1 Each operator should maintain the current status of life-limited parts. If the operator obtained such parts new from the manufacturer, the current status will be based upon the operator's in –service history of the part. If the part has been obtained from a previous operator, the current status will be based on the status from the previous operator plus the present operator's in –service history. The current status of life –limited parts is required upon each transfer throughout the operating life of the part. When such parts are transferred, the previous operator should produce an in –service history for life-limited parts, irrespective of the operator's governing regulations. When life-limited parts are transferred between operators, a written statement by the previous operator, attesting to the current status of life- limited parts, is an acceptable method of indicating prior operating service of the part(s)

3.3.2 When the records of current status for life-limited parts are lost or destroyed, an equivalent level of safety may be determined by consideration of other records available, such as technical records, utilization reports, manufacture's information or presentation of other evidence. If review of other available documentation reveals significant errors or omissions that prevent the development of a current status for the life-limited part(s) , the part(s) in question should be retired from service. It is the operator's responsibility to notify the regulatory authority when such records are lost or destroyed and to initiate an immediate search for records from which the current status of the life-limited part (s) can be determined.

3.3.3 Operators may receive life –limited parts from a repair station that has a system to determine the current status of such life-limited parts. This system should be recognized as a factor in the substantiation of the current status of life-limited parts.

3.4 Transfer of records

3.4.1 When an aircraft, airframe, engine, propeller, rotor or appliance is transferred to a new operator the records of these products should accompany the transfer. Such records should include the current status of maintenance, AD and life-limited parts and should clearly identify the person responsible for the data in the report and the date associated with the records.

3.4.2 When an aircraft, airframe, engine, propeller, rotor or appliance is leased, the associated records should be transferred as if the transaction were a sale. By agreement between the lessee and the lessor, some records, such as work cards and inspection records, may be retained by the owner; however, the lessee has a responsibility to review the records retain by the owner and ensure that the summary information used to support the airworthiness of the item is complete and accurate.

3.5 Lost records

In the event that required maintenance records have been lost or destroyed alternative proof must be provided that the task in question has been performed.

3.6 Service bulletins

All service bulletins that have been incorporated should be listed together with accomplishment dates. If options are available, the option complied with should also be indicated. When a service bulletin involves recurring action, the times and /or dates, as applicable, of the last action and the next action due should be provided.

3.7 Modifications/alterations

3.7.1 All modifications/alterations performed since the original aircraft delivery which are still existent on the aircraft should have been carried out in accordance with the requirements of the airworthiness authority of the State of Registry at the time of their incorporation.

3.7.2 A list of such modifications/alterations should be provided indicating their classification and supported by appropriate documentation. In the case of a major modification/alteration this documentation should include as a minimum:

a. The document defining the modification/alteration;
b. The certification basis; and
c. The approval of the relevant authority.

3.8 Repairs

All major repairs performed since original aircraft delivery and which are still existent upon the aircraft should be listed and demonstrated to be in compliance with the requirements of the airworthiness authority of the State of Registry at the time of the their incorporation. If additional action is required, e.g. recurring inspection, this should also be indicated.

4. DOCUMENT PRRESENTATION

4.1 Presentation

A standard method of presenting the records is encouraged. It is recommended that the summary of records and other pertinent information be compiled into a book or other concise document in order to simplify, as much as possible, the record review process.

4.2 Recommended format

This section should begin with a statement of certification from the transferring operator or owner that the information presented is true and correct, including.

a. Airworthiness certificate basis and status;

b. A general statement of the current status of non-repetitive airworthiness directives such as.

 ‘All applicable airworthiness directives through (specify date, issue, etc.) have been incorporated as listed on the (specify name of operators) airworthiness directive summary (specify date) with the exception of those AD requiring initial or repetitive action.”

c. A general statement of the current status of repetitive airworthiness directives, such as:

 “All AD listed on the (specify operator) certified airworthiness directive control summary dated (specify date) require initial or repetitive action at the date, time or cycles listed.”

d. A statement of the extent of the operator’s direct operational and maintenance control of the aircraft and a list of major repairs accomplished during that time, such as:

 “This aircraft has been under the direct operational and maintenance control of (specify operator) since (specify date). During this time the aircraft underwent the following major repairs/modifications in accordance with approved technical data documented in the aircraft records. (List all major repairs/modifications)”

e. A statement regarding the accomplishment of the last major inspection, such as:

 “The last (specify type of major inspection) was accomplished by (specify operator/maintenance organization) maintenance facility in (specify city, country). Airframe total hours and total cycles were…”

f. A statement regarding the current status of the installed engines and any spare engines, such as:

 “The following engines are currently installed on the aircraft with the total accumulated and remaining hours and cycles listed for each (List engine here.) The (specify operator) life-limited parts report has been prepared using the (list manufacturer’s controlling document here), and reflect accurate times and cycles of the as of the engine time/cycles noted above” and

g. A statement regarding the current component status, such as:

"The components/inspection times listed on the (specify operator) component control summary represent the latest component installation information as of (specify date)"

Section 1: Should be signed by the senior airline official responsible for aircraft maintenance record keeping.

Section 2: The aircraft lease agreement
This section should contain a copy of the lease or sale agreement. Economic or monetary information may be deleted for the purposes of this presentation.

Section 3: Operating authority
This page should contain a copy of the operating authority issued by the responsible regulatory authority of the last operator. This is used to establish the rules under which the aeroplane was operated and maintained.

Section 4: Export certificate of airworthiness
This section should contain a copy of the export certificate of airworthiness (if any)

Section 5: Current inspection status summary
This page should give a summary of the current inspection status of the aircraft at the time of transfer. It should list:

a. the aircraft total time;

b. the aircraft total cycles or landings;

c. the time and landings since the last major scheduled maintenance or inspection;

d. the scheduled major inspection intervals and the time remaining to the next inspection; and

e. The powerplant by position and serial number. The listing should show the time since new, cycles since new and the time and / or cycles remaining to the next life-limited part removal for each powerplant.

Section 6: Summary of current status of life-limited parts

This section should contain a listing of all the airframe and powerplant life-limited components /parts installed on the aircraft at the time of transfer. The listing should contain the name of the component/part, the installed location or position of the component/part, The component/ part number, The component part serial number, the required retain time of the component/part, the total number of hours or accumulated cycles and the number of hours or cycles remaining before the required retirement time of the component/part is reached.

Section 7: Current status should contain a listing of each airworthiness directive, which is applicable to the aeroplane, power plants, components and appliances. Recurring AD should be listed separately .The listing should contain:

a. The AD number and revision date;

b. A concise description of the required action

c. The method of compliance

d. The time in service and the date of AD accomplishment and

e. For AD having requirements for recurring action

Section 8: Aircraft maintenance programme integration

If the maintenance /inspection programme is to be changed for the aircraft, the integration or prorating plan for the two programmes should be presented here. For an integration plan, a listing of each scheduled maintenance/inspection item under both the old and new programme should be shown along with the method of transfer or bridging from one to the other.

5. MINIMUM AIRWORTHINESS STANDARDS FOR LEASING AGREEMENTS

In the area of airworthiness standards, the lease agreement should ensure at least that:

a. The lessor and lessee are properly identified.
b. The aircraft subject to the lease agreement is identified by aircraft make and model, registration number and manufacture's serial number;
c. The effective dates of the lease are properly identified;
d. The person having operational control is specially identified
e. The state of registry and the airworthiness code under which the aircraft will be maintain are identified
f. The responsibilities for the accomplishment of maintenance in accordance with the designated airworthiness code are specifically identified; and
g. The maintenance /inspection programme that will be utilized is specially identified

APPENDIX 2

CIVIL AVIATION AUTHORITY OF SRI LANKA

CAA GUIDELINES FOR AIRCRAFT TRANSFER ARRANGEMENTS

STATUS SUMMARY

The objective of this document is to guide the aircraft operators seeking transfer of aircraft under any arrangement such as lease, interchange or charter etc. to obtain written declaration from the transferee at the time of taking over in order to ascertain the status of aircraft compliance with the applicable airworthiness requirements. It is recommended that an operator taking over the possession of an aircraft should request the transferee to provide him with a Status Summary relating to the aircraft which includes at least the following. The Status Summary shall be submitted to the CAA-Sri Lanka when seeking approval for operation of such aircraft in Sri Lanka under any arrangement.

1.1 General

This part describes the contents of a status summary, together with examples where appropriate. The status summary is a document given by the transferor to the transferee validating the continuing airworthiness of the aircraft.

1.2 Sample – Contents of a Status Summary

1.2.1 Status Summary and Data Certification

This Section should begin with a statement of certification from the transferring operator, owner or C of R holder, as applicable, that the information presented is true and correct, including:

- Airworthiness certificate basis and status

- A general statement of the current status of non-repetitive ADs – for example :

‘All applicable Airworthiness Directives (Specify, date, issue etc.) from the country for design / manufacture have been incorporated as listed on the (specify name of operator) AD summary (specify date) with the exception of those ADs requiring initial or representative action’

- A general statement of the current status of repetitive ADs, - for example :

‘All ADs listed on …………………………..airlines’ AD control summary dated (specify day/month/year) require initial or repetitive action at the date, time or cycles indicated’

- A statement of the extent of their direct operational and maintenance control of the aircraft and a list of major repairs/modifications carried out during that time – for example :

‘This aircraft has been under the direct operational and maintenance control of ……………………………………………. Airlines since (specify day/month/year). During the intervening period the aircraft was subject to the following major repairs/modifications in accordance with approved technical data documented in the aircraft records'; and List all major repairs/modifications.

- A statement regarding the completion of the last major inspection – for example:

'The last 'D' check was carried out by …………………………………………. Airlines between (specify day/month/year) and (specify day/month/year) at …………………………..Airline' maintenance facility in (specify city, country). Airframe total hours were xx,xxx and total cycles were yy,yyy'

- A status regarding the current status of the installed engines and any spare engines – for example:

'The following ……………………………………….. engines are currently installed on the aircraft with the total hours and cycles remaining listed for each.
List hours and cycles.

'The ………………………………………………… Airlines' life-limited parts report has been prepared using the (list manufacturer's controlling documents here), and reflects accurate times and cycles of the life-limited parts as of the engine time/cycles noted above'

- A statement regarding the current status of installed components –for example:

'The components/inspection times listed on …………………………………………. Airlines' component control summary represents the latest components installation information as of day/month/year'.

Note: The C of R holder or senior airline official responsible for aircraft maintenance records should sign this section (Status summary and data Certification).

1.2.2 Operating Authority

This page should contain a copy of the operating authority of the last operator. This is used to establish the regulations under which the aircraft was operated and maintained.

1.2.3 Export Certificate of Airworthiness

This section should contain a copy of he export certificate of airworthiness.

1.2.4 Current Inspection Status Summary

This section should give a summary of the current inspection status of the aircraft at the time of transfer.
The summary should list:

- The aircraft total time
- The aircraft total cycles or landings
- The time and landings since the last major scheduled maintenance or inspection
- A list of the power plants by position and serial number.

The list should indicate the time since new, cycles since new and the time and/or cycles remaining to the next life-limited component removal for each power plant.

1.2.5 Current Status of Life Limited parts Summary

This Section should contain a list of all the airframe and power plant life-limited components installed on the aircraft at the time of transfer.
The list should contain:

- The name of the component
- Component part number
- Component serial number
- Required retirement time of the component
- Total number of hours and/or accumulated cycles
- Number of hours and/or cycles remaining before the required retirement time of the component is reached.

1.2.6 Current Status of Airworthiness Directives

This section should contain a list of all Ads that are applicable to the aircraft, power plants and components. Recurring Ads should be listed separately. The list should contain:

- The AD number and revision
- The method of compliance
- A concise description of the required action
- The time in service and the date of AD compliance

1.2.7 Aircraft Maintenance Programme Integration

Where the maintenance/inspection programme is to be changed, the integration of the two programmes should be presented here. For an integration plan, a list of each scheduled maintenance/inspection item/task under both the new and the old programme should be indicated and contain the method of transfer/bridging from one to the other.

SECTION TWO

VOLUME 2

AIR OPERATOR /MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 14 - EVALUATE CATEGORY I/II/III/IIIA LANDING MINIMUM/ MAINTENANCE / INSPECTION PROGRAMMES

14.1 OBJECTIVE

This Chapter provides guidance for evaluating and accepting applications from operators to use lower approach and landing minima in respect to the appropriate support programme.

14.2 GENERAL

A. Responsibilities ;

1. The Airworthiness Inspector's primary responsibility is to provide technical support to the Operations Inspector and the applicant. The responsibility for monitoring all applicants during the evaluation period should be coordinated between the Avionics and Operations Inspectors, to include:

   * Approvals
   * In flight evaluation observations
   * Surveillance

2. It is the applicant's responsibility to obtain and submit all documents that establish the eligibility of its aircraft, such as:

   * The required maintenance/inspection programme necessary for continued eligibility
   * The applicant's Minimum Equipment List (MEL) with the limitations for Category I operations, if applicable
   * An acceptable means for maintaining the reliability of the flight guidance control and associated systems

B. Qualifications for Low Approach Landing Minima; Low approach and landing minima are issued to qualified operators. While the operating rules for each type of operation (Light or heavy transport aircraft), may vary significantly, the approval guidelines do not. Approval for low or minimum approaches in all categories will require regulatory compliance in the following three major areas:

1. Airborne equipment and systems

2. Flight crew and maintenance personnel qualifications
3. Lowered minimum procedures, including a maintenance/inspection programme

C. Deviations ; Commitments to deviations should not be made without coordination between the Airworthiness and Operations Inspectors. All requests for deviations must be forwarded to the DGCA by the inspectors. The applicant should be advised not to proceed in operating under its lower minimum proposal until the deviation request is resolved.

14.3 CATEGORY I OPERATIONS

The airworthiness avionics inspector's responsibilities for Category I authorizations are primarily limited to the evaluation of the flight director and/or autopilot systems. The Operations Inspector is responsible for determining the overall suitability of an operator's Category I capabilities.

14.4 CATEGORY II EQUIPMENT APPROVAL FOR LIGHT AIRCRAFT

A. Lower Approach Minimum Approval. An application for lower approach minimum authority should specify the basis for the aircraft approval to conduct lower minimum approaches. This authority may be based on:

1. Type certification and the Airplane/Rotorcraft Flight Manual
2. Supplemental type certification
3. Operational evaluation
4. Any acceptable combination of the above

B. Requirements for Category II Approval

1. Requirements for Category II approval for general aviation operators have been established in some states regulations (For info refer to FAR 91.189, 91.205, 91.191. These sections specify:

   * Required instruments and items of equipment
   * Methods of approval
   * Evaluation programme conduct
   * Calibration standards
   * Maintenance/inspection programmes

C. Operational Evaluation Programmes; Engineering coordination should be requested when necessary, particularly for those aircraft in which the functions and limitations of the automated systems are significant factors for safe operation.

D. Flight Director Systems; Inspectors should be aware that single flight director systems with dual displays in which the second display repeats only the ILS information on the pilot's display will not meet the requirements for two ILS receiving systems.

E. Optional Avionics Equipment; Optional avionics equipment installed by the operator will either be approved in the field or referred to the Airworthiness Section for evaluation. The engineering evaluation can assist in determining if flight-testing is required, what limitations may apply, and whether or not the installation may require a Supplemental Type Certificate. If a Supplemental Type Certificate is required, avionics personnel will assist in the accomplishment of a compliance and conformity inspection, as necessary, when requested by the engineering and manufacturing office(In case capability is not available to CAASL, the Operator / Applicant should arrange to consult an organization which is approved for the purpose). Optional equipment that may be installed and require approval includes the following:

1. Flight director systems
2. Automatic throttle control systems
3. Autopilot and approach coupler systems
4. Speed control command systems
5. System fault detection and warning systems
6. Radio altimeters

F. Modifications; Proposals to alter installed avionics equipment required for a particular category of operation should be carefully reviewed and handled in accordance with established procedures. Each proposal should be evaluated for its effect on system performance, compatibility with the original standard, and compliance with Category II criteria.

1. When manufacturer proposed modifications to existing avionics equipment appear to be major, the AWI should verify the approval status before sanctioning incorporation of the change by the operator. If CAASL approval of the modification is not clearly indicated in the manufacturer's instructions, the operator should obtain such approval before performing the modification.

2. An Inspector should exercise a cautious approach to field approval of modifications. Pressure from any source should not discourage the Inspector from verifying that the modification is being made in accordance with approved technical data and that the technical evaluation is clearly within the scope of the inspector's training, experience, and approval authority.

3. Modifications originating in an operator's engineering department should also be examined carefully and, when necessary, referred to the appropriate CAASL Airworthiness Section.

14.5 CATEGORY II EQUIPMENT APPROVAL

A. Large Aircraft Criteria; Operators using large aircraft required to be operated under Transport category rules should meet all of the relevant requirements. (FAA AC 120-28D, Criteria for Approval of Category III Landing Weather Minima, or 120-29A, Criteria for Approving Category I and Category II Landing Minima for Large Transport Aircraft Operators, are acceptable standards)

B. Turbojet Criteria; All operators using turbojet aircraft may be required to comply with the aircraft systems evaluation criteria that applies to transport category operators. Applicants operating under light aircraft operating rules using turbojet aircraft should also use the aircraft equipment evaluation standards for heavy transport aircraft. (FAA AC120-28D or 120-29A).

C. Systems Evaluation Approval; Systems evaluation approval should be accomplished in accordance with approved data. (120-28D, or 120-29C, as applicable).

D. **The aircraft requirements for Category IIIA** authorization include requirements for the total aircraft performance and associated systems. The acceptance of an aircraft for this category must be completely based on performance and approved CAASL data.

1. Upon receiving an operator's request for Category IIIA authorization, the Avionics Inspector should immediately determine whether the aircraft has been approved for such operation and what equipment and systems have been approved. If the aircraft has not been Category IIIA certified, the Inspector should request assistance from the appropriate Aircraft Certification Office at the cost of applicant/operator, so that an application for a Supplemental Type Certificate can be properly consolidated.

2. FAA Advisory Circulars contain information outlining the requirements for a maintenance programme. The nature of this type of operation will necessitate a detailed evaluation supported by well-defined maintenance, training, and reliability programmes. All maintenance and reliability supporting documents become part of the accepted programme.

3. The initial programme should also include appropriate programmes identified in the Maintenance Review Board document. The frequency of maintenance actions may be revised when sufficient experience has been gained to justify a change and when there is no conflict with the certification requirements.

4. The reliability of systems and/or components set forth as substantiation for the Category IIIA certification becomes the performance criteria for the programme.

a. Controlled monitoring of the Category IIIA system reliability will require that the operator, after initial evaluation, incorporate the pertinent systems and components into the approved reliability programme. If the Category IIIA system reliability exceeds the approved programme, the operator should be allowed a reasonable time period in which to improve the reliability.

b. The Airworthiness Section specialist should be advised when the monthly removal rate is exceeded and informed of the probable cause. The reliability reporting is a necessity, particularly when operational approval was predicated upon probability analysis.

5. The maintenance manual should identify all special techniques, maintenance/inspection frequencies, and test equipment requirements to support the programme. It should also specify the method of controlling the operational status of the aircraft. Those Licensed Engineers qualified to release an aircraft for Category IIIA must be identified.

6. An approved training and recurrent training programme must be provided. The listing of such personnel must be current. Only those persons trained and qualified should be permitted to perform Category IIIA maintenance/inspections.

7. The operational demand for Category IIIA airborne systems with exposure to numerous hidden functions requires that the aircraft be either periodically exercised or functionally checked. This is to ensure that all systems are operational and that no dormant failure has occurred. The initial programme should provide either a periodic Category IIIA approach or periodic system functional check.

8. Until sufficient experience and data is available (excluding any required demonstration period), it is recommended the aircraft status period not exceed 35 days. Failure to exercise the system by simulated Category IIIA approach or functionally checking the system within 35 days should automatically place the aircraft in a non-category IIIA status. The aircraft must maintain this status until the required functional check is made.

14.6 PROGRAMME DEVELOPMENT

A. Initial Development; At the time of formal application, the Inspector should begin to monitor development activity. Participation in all meetings with an applicant will usually require coordination with the Operations Inspector. It is important for the operator to include all key personnel in any meetings.

B. The Operator's Lower Minima Programme; The operator's lower Minima programme must be developed and the procedures used during the evaluation period. Operations specifications must reflect all special Category II/III maintenance requirements that were developed.

14.7 CATEGORY II MAINTENANCE MANUAL REQUIREMENTS

A. The maintenance manual should identify all special techniques, maintenance/inspection frequencies, and test equipment requirements that support the programme. Those technicians qualified to release an aircraft with lower Minima should be listed or identified.

B. The operator's procedures must include a method for manual distribution to ensure availability to the appropriate maintenance facility.

C. Operators should be encouraged to show the method of approval of required equipment as listed in the maintenance portion of the manual.

14.8 MAINTENANCE/INSPECTION PROGRAMMES

The proposed maintenance/inspection programmes must be tailored to the applicant's operations and maintenance organization. All maintenance and reliability supporting documents become part of the accepted programme.

A. Requirements for Maintenance/Inspection Programmes; (FAA AC 120-28D and 120-29A, as amended, outline acceptable requirements for the maintenance/inspection programmes). Maintenance/inspection programmes must provide for the proper maintenance and inspection of equipment and aircraft systems.

B. Control and Accountability; Emphasis must be placed on control and accountability of all areas associated with lower landing Minima approvals. These areas primarily encompass the following:

1. Initial and recurrent training on flight guidance control systems
2. The use of test equipment
3. The differences in aircraft systems between aircraft in an operator's fleet
4. Special procedures for airworthiness release and control of the aircraft approach status
5. Initial and recurrent training in all areas of the lower Minima programme
6. Training for new personnel and equipment types

C. Operational Status of the Aircraft; The method for controlling the operational status of the aircraft lower Minimum required equipment must ensure that flight, dispatch, and maintenance personnel are kept aware of the current status.

D. Purchase of Avionics Equipment "Package" Installations; General aviation maintenance/inspection programmes may be developed by some manufacturers and repair stations in conjunction with their Category II avionics equipment installation "package". The contents of such programmes should be thoroughly evaluated for compliance and maintainability with Category II regulations.

E. Requalification Procedures; The programme must include procedures for requalification of an aircraft for lower Minima following maintenance on any required system. This must include tests after replacements, resetting in rack, and interchange of components.

F. Approval; The inspector will indicate approval of maintenance programme portion of the operator's Category II manual by signing and dating each page of the programme.

14.9 MAINTENANCE TRAINING PROGRAMMES

Airworthiness avionics inspectors, during the course of normal surveillance, should evaluate the maintenance facilities performing Category II equipment maintenance to ensure that the training provided meets the requirements of lower minimum standards.

14.10 EXISTING MAINTENANCE/INSPECTION PROGRAMMES

A. Programmes can be developed to be compatible with the existing maintenance/inspection programme, as long as there is a clear distinction between normal and lower minimum requirements.

B. When an operator's proposal is based on an existing maintenance/inspection programme, the inspector must ensure that all procedures will provide for the lower minima programme requirements. Caution should be exercised when an applicant has used a programme approved for use by another operator for developing its own.

C. The following areas of the proposal and or existing programmes should be closely reviewed:

1. The existing reliability programme
2. The training programme
3. The initial evaluation checks for existing aircraft and for new aircraft
4. The existing parts pool, borrowed parts procedure, and control of spare parts, as applicable.

D. Existing Reliability Programmes; An operator's existing reliability programme may be accepted when shown to be adequate for its lower minimum operations.

14.11 TEST EQUIPMENT AND STANDARDS

A. Performance Standards, Tolerances, and Calibration Procedures

1. Performance standards, tolerances, and calibration procedures applicable to ILS equipment have been adequately covered by:

   * Technical Standard Orders (TSO)
   * Radio Technical Commission of Aeronautics (RTCA) documents
   * Manufacturers' instruction manuals

2. These standards or their equivalent are generally considered acceptable for inclusion in maintenance/inspection programmes for equipment operated to landing Cat I minima. Such standards may not be adequate for Category II. Those which will not provide category system performance should be revised to provide the required level of performance.

B. Category II Tolerances; In many cases, the tolerances for Category II airborne equipment are more rigid than those for Category I. Therefore, the equipment used to inspect, test, and bench check Category II equipment may require more frequent test and calibration.

C. Established Standards and Tolerances. Standards and tolerance established in the maintenance/inspection programme for testing and calibrating airborne equipment and systems that are required for Category II operations should not be relaxed following programme approval without adequate substantiation that system performance will not be degraded.

D. Self-Test Features; Self-test features may be used for periodic inspections if:

1. They have been evaluated and found to adequately test the system

2. Instructions for their use and interpretation of self-test indications are included in the maintenance/inspection programme portion of the Category II manual. Inclusion in the approved maintenance/inspection programme will indicate CAASL approval.

14.12 MAINTENANCE PERIOD EXTENSIONS - GENERAL AVIATION

A. Applications for Extensions

1. Applications for extensions of maintenance periods for general aviation operators may be considered at the completion of one maintenance cycle of at least 12 calendar months. Application should be made by letter to the Office having jurisdiction of the area in which the operator is located.

2. The following factors are considered in granting an extension:

* Records of Category II approaches due to malfunctioning equipment
* Number of Category II approaches (actual and simulated)
* Maintenance records of Category II equipment failures
* Service history of known trends toward malfunctioning
* Unit mean time between failures
* Records of functional flight checks

B. Check, Test, and Inspection Extensions; Extensions to the check, test, and inspection periods may be granted if factors indicate that the performance and reliability of the Category II instruments and equipment will not be adversely affected. General aviation extension periods, in most cases, would be one calendar month for tests, inspections, and functional flight checks, and four calendar months for bench checks. The operator's programme should include procedures for obtaining the extensions.

C. Increased Extension Periods; The extension periods suggested in paragraph B may be increased at the discretion of the Avionics Inspector.

14.13 FUNCTIONAL FLIGHT CHECKS

Some operators have submitted programmes that provide for functional flight checks. This procedure must not be approved unless all airworthiness requirements have been satisfied before dispatch. In no instance can a functional flight check be substituted for the certification by maintenance of complete systems or equipment operation.

14.14 REPORTS AND RECORDS - GENERAL AVIATION

A. Responsibilities of Record keeping; The persons responsible for these reports should be provided training in appropriate parts of the proposed lower landing minima programme.

B. Category III or any Autoland Category; Operators authorized for Category III, or any Autoland category, should be encouraged to provide reports of airborne equipment malfunctions during actual approaches. The reports may be provided on a yearly basis or at any time the malfunctions significantly affect the Autoland capability.

14.15 PROGRAMME APPROVAL ROCEDURES

A. Review the Maintenance/Inspection Programme; Review the applicant's maintenance/inspection programme to ensure that it contains control and accountability of the following:

1. All maintenance accomplished on lower minimum required systems and equipment

2. All modifications to systems and equipment

3. Approach status of each aircraft at all times

4. Evaluations of self-test, Built-In Test Equipment (BITE), or Automated Test Equipment (ATE) to ensure suitability

5. Spare equipment

6. Maintenance calibration, use of test equipment, records/reporting requirements

7. Repetitive and chronic discrepancies to ensure the affected aircraft remains out of lower minima approach status until positive corrective actions is made

8. All aircraft in the fleet that have not been evaluated for lower minima approaches

B. Review the Existing Maintenance/Inspection Programmes; Ensure that the existing maintenance/inspection programme has procedures for the following;

1. Identifying chronic discrepancies and corrective action follow up

2. Keeping aircraft with chronic and/or repetitive discrepancies out of a lower minimum status until positive corrective action is taken

3. Training maintenance personnel assigned to reliability analysis

4. Initial evaluation checks for existing aircraft and for new aircraft to the fleet before inclusion in the operator's lower minimum operations

5. Identification of all components used in the lower minimum systems in the existing parts pool, parts borrowing procedure, and control of spare parts

6. Ensuring that calibration standards for all test equipment used for maintaining lower minimum systems and equipment are met

7. Ensuring that each flight crew and persons with operational dispatch authority are aware of any equipment malfunction that may restrict lower minimum operations

C. Review the Functional Flight Checks; If a functional flight check has been submitted, ensure that the following information is included:

1. Maintenance clearance and/or concurrence before an aircraft is returned to a lower minimum status, even if the functional flight check was found to be satisfactory

2. Request for a flight check by maintenance in the aircraft log

3. Maintenance entry acknowledging the results and the action taken

D. Evaluate the Supporting Data; Unless the applicant provides supporting approval data, the Avionics Inspector should coordinate with the Operations Inspector to determine the acceptability of each aircraft for the authorizations requested.

E. Review the Minimum Equipment List (MEL); Appropriate sections of the MEL must be revised to identify Category II required systems and special procedures, if applicable.

F. Review the Personnel Training Requirements; Ensure there are procedures for the following:

1. Ensuring personnel contracted to perform Category II related maintenance are qualified and the programme requirements are made available to these persons

2. Training and/or recurrent training for the air taxi maintenance personnel. Personnel not qualified to perform maintenance on Category II systems and equipment, including flight crew and dispatch, should be trained in the airworthiness release requirements of the lower minima programme.

14.16 TASK OUTCOMES

The Operations Inspector has the primary responsibility to grant the operator approval for lower minima. It is the Avionics Inspector's responsibility to evaluate and approve the avionics requirements and associated support programmes. Successful completion of this task will therefore consist of coordination with the Operations for sending all original Category II and IIIA documentation to DGCA for approval.

The following data is useful.

- FAR Parts 23, 25, and 61
- FAA AC 120-28D, Criteria for Approval of Category III Landing Weather Minima,
- FAA AC 120-29A, Criteria for Approving Category I and Category II Landing Minima

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 15 - CERTIFICATION MAINTENANCE REQUIREMENT

15.1 INTRODUCTION

15.1.1 Annex 6, Part 1, Chapter 11.3 requires an operator to provide: "An aeroplane maintenance programme, approved by the Sate of Registry, containing maintenance tasks and intervals at which these tasks are to be performed."

15.1.2 Annex 8, Part III, Chapter 10 places an obligation on state of Design to ensure information is provided for use in developing procedures for maintaining the aeroplane in an airworthy condition. Paragraph 10.4 contains the following requirement:

"10.4 Maintenance information resulting from the type design approval"

Maintenance tasks and frequencies that have been specified as mandatory by the State of Design in approval of the type design shall be identified as such."

15.1.3 The maintenance tasks specified in 15.1.2 which results from a system safety analysis are usually known as Certification Maintenance Requirements (CMR). The operator has to take them into account in preparation of the maintenance programme

Note- Other maintenance information, including life limits for structural components, may arise from the type design approval. This chapter is concerned only with CMR.

15.1.4 Certification Maintenance Requirements (CMRs) are task arising from the Type Certification processes which are associated with the most significant failure conditions. These have been shown to be necessary either by System Safety Assessment or, in a minority of cases, by engineering judgement. These requirements are allocated to one of two categories (identified as One Star or Two Star) according to authority manufacturing authority agreed methodology.

15.1.5 The airworthiness limitations items include mandatory replacement times and structural inspection intervals which may only be changed with concurrence of the Primary Certification Authority.

This airworthiness limitation section is approved by the CAASL and specifies maintenance required under the regulation of manufacturing authority, unless an alternative programme has been approved by the CAASL.

15.1.6 This chapter is intended to provide an introduction to the concept of CMR, their relevance to an aircraft maintenance programme and their maintenance programme and their importance as an integral part of the in-service validation of the type design. It is not intended to provide comprehensive guidance on the subject to organizations responsible for the type design; reference should be made to the documents listed in 15.6 if further information is required.

15.1.7 It should be noted that some tasks may be included as mandatory flight crew procedures in the flight manual or equivalent document. It is likely that future design developments will limit the use of CMR to maintenance tasks.

15.2 BACKGROUND

15.2.1 For a number of years, aeroplane systems were evaluated to specific requirements, to the single fault criterion, or to the fail-safe design concept.

15.2.2 As a result of modern day developed aircraft, 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 aeroplane 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 also did the interaction between systems performing different functions.

15.2.3 These developments led to the general principle that an inverse relationship should exist between the probability of loss of function(s) or malfunction(s) leading to a serious failure condition and the degree of hazard to the aeroplane and its occupants arising therefrom. Airworthiness codes were amended to recognize this principle. Two examples being the introduction of paragraphs 25.1309 in the United States Federal Aviation Regulations Part 25 or the equivalent in EASA 25. To satisfy these requirements, it is necessary to complete safety requirements, it is necessary to complete a safety analysis of all system and power plant installations to determine the effect on the aeroplane of a failure condition or malfunction.

15.2.4 In assessing the acceptability of a design it was recognized that rational probability values would have to be established and these were set on the following basis:

a. Historical evidence indicates that the risk of a serious accident due to operational and airframe-related causes is approximately one per million hours of flight. Of these figure, ten per cent can be attributed to failure conditions caused by aeroplane system problems. On this basis, it was considered that serious accidents caused by systems should not be allowed a higher probability than this in new designs. It is therefore required that the probability of a serious accident from all such failure conditions should not be grater than one in ten million flight hours, i.e. a probability of less than I x 10^{-7} and

b. To be satisfied that this target can be achieved, it is necessary to collectively analyze numerically all the systems on the aeroplane. For this reason, it is assumed, arbitrarily, that there are about 100 potential failure conditions, which would prevent continued safe flight and landing. The target risk of I x 10^{-7} was apportioned equally amongst these conditions, resulting in a risk allocation of not grater than I x 10^{-9} to each one. Thus, the upper risk for an individual failure condition, which would prevent continued safe flight and landing, is set at I x 10^{-9} for each hour of flight.

15.2.5 Various analytical techniques were developed to assist designers in completing the necessary safety analysis to satisfy the requirements:

a. **Quantitative**: by the application of mathematical methods. Such analysis is often used for hazardous or catastrophic failure conditions of systems that are complex, which have insufficient service experience to help substantiate their safety, or that have attributes that differ significantly from conventional systems; and

b. **Qualitative**: by assessment in a subjective, non-numerical manner. Examples of typical types of qualitative analysis are:

i. A review of the integrity of the installation and the design, based on experienced judgment: and
ii. A systematic review of each component failure and an evaluation of its effect on the systems of the aircraft. An advantage to this approach is the identification of potential hidden effects of these failures

15.2.6 Tasks associated with the following criteria are not identified as CMRs;

i. Tasks associated with qualitative assessment (unless specifically requested by regulations).
ii. Tasks for which the maximum acceptable interval is in excess of aircraft life.
iii. Tasks normally accomplished by the flight crew.
iv. Tasks considered to be routine state of the art maintenance activity. For these, the safety reason for

performing the task is considered to be immediately evident to the operator and the CAASL.

15.3 FAILURE MONITORING AND WARNING SYSTEMS

Completion of a safety analysis, using the techniques described in 16.2.5, may identify potential latent failures. Such failures should be identified to the flight crew by failure monitoring and warning systems. However, it is prove by failure monitoring and warning systems. However, it is axiomatic that these systems should be practical and reliable, i.e. within the state of the art; a reliable system is one, which will not result in either excessive failures of a genuine warning or excessive or untimely false warnings which can sometimes be more hazardous than lack of provision for, or failures of, genuine but infrequent warnings. If a practicable and reliable monitoring and warning system cannot be provided, other means must be provided to detect significant latent failures, as described in the following paragraph.

15.4 IMPLEMENTATION OF CERTIFICATION MAINTENANCE REQUIREMENTS

15.4.1 The frequency at which an item is checked can directly affect the probability of the existence of a latent failure. Checks can be developed to identify significant latent failures and are published as CMR. Some checks of this nature may be performed by flight crews: if this is the case, they will be incorporated as procedures in the flight manual.

15.4.2 Current design philosophy is to eliminate CMR from flight crew procedures in future designs and to limit CMR to maintenance tasks.

15.4.3 CMRs are developed using rational methods, such as quantitative analysis or service experience. The tasks are intended to be implemented concurrently with routine maintenance inspection tasks, i.e. tasks not associated with the design compliance process described in previous paragraphs.

15.4.4 CMRs are produced by the organization responsible for the type design and approved by the State of Design as part of the type certification process. For aircraft with maintenance manuals formatted in accordance with Air Transport Association of America specification 100 (ATA 100). CMR can be included in Chapter 5, but are sometimes contained in a separate Airworthiness Limitations Manual.

15.5 HANDLING OF CERTIFICATION MAINTENANCE REQUIREMENTS

15.5.1 ONE STAR CMRs (*)

The tasks and intervals specified in the CMR document are mandatory and cannot be changed, escalated or deleted without the concurrence of the type certification Authority.

15.5.2 TWO STAR CMRs (**)

Task intervals may be adjusted in accordance with an operator's approved escalation practices or an approved reliability programme, but the task content may not be changed or deleted without type certification Authority approval.

This statement has been agreed on the basis that operators with approved escalation practices or an approved reliability programme make adjustments to their maintenance programme based on data collection and analytical techniques. It has been demonstrated that the use of such methods to manage a maintenance programme does not give rise to undue escalation.

15.6 THE INCORPORATION OF CMRS INTO AIRCRAFT MAINTENANCE PROGRAMMES

15.6.1 From the previous text, it will be apparent that CMRs are an integral part of the validation of the type design and essential to continuing airworthiness. In approval of maintenance programmes, State of Registry should ensure that the CMRs (including their associated intervals and tolerances) are included exactly as approved by the State of design. CMRs are type certification requirements which have no relationship whatsoever with the Maintenance Review Board (MRB) process: the latter is used to develop the initial maintenance programme for a new aircraft type.

15.6.2 No changes should be made to CMR without the approval of the State of Design. Some type design may include procedures which allow the aircraft operator to vary CMR task intervals; it is essential that any such variation is completed in accordance with the procedures approved by the State of Design.

15.6.3 Based on service experience it is the normal practice for operators to develop maintenance programmes in terms of variation of task content and escalation of inspection and check intervals. CMRs are not included in this evolutionary process. It is strongly recommended that State of Registry should ensure that:

a. CMRs are clearly identified as such in approved maintenance programmes; and
b. Procedures exist to prevent CMR being varied in any way without the approval of the Sate of Registry.

15.7 REFERENCE MATERIAL

Advisory Circular AC25. 1309-1, published by the United States, Federal Aviation Administration.

Advisory Material Joint AMJ25.1309, published by the European Joint Aviation Authorities.

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 16 - STRUCTURAL INTEGRITY PROGRAMME (SIP) FOR AGING AIRCRAFT

16.1 BACKGROUND

This chapter provides background information and guidance for Airworthiness Inspectors in understanding and approving a structural inspection programme for aging transport aircraft.

As airplanes age, the probability of both fatigue and corrosion damage occurring on primary structure increases. Maintenance requirements to detect such damage are very important. Corrosion accelerates fatigue damage, and increases the potential for multiple-site damage, which can significantly reduce residual strength below certification requirements. Therefore, more frequent structural inspections may be required to ensure early detection of fatigue and corrosion damage. In general, as airplanes become older, a more conservative approach should be taken with the SIP. Intervals should be more toward reduction in time between successive planned inspections then to increasing the time between inspections.

On April 28, 1988, a Boeing 737 airplane experienced an in-flight decompression and separation of approximately 18 feet of the fuselage skin and structure at the top of the airplane. A post-accident investigation revealed the fuselage had many fatigue cracks and corrosion, despite the operator's compliance with the maintenance programme. The National Transportation Safety Board (NTSB) determined the probable cause of this accident was the failure of the airline's maintenance programme to detect the presence of significant disbonding and fatigue damage, which ultimately led to failure of a fuselage lap joint and the separation of the fuselage upper lobe.

The NTSB made 21 safety recommendations as a result of its investigation of the accident .One of the safety recommendations, A-89-53, states the following:

"Provide specific guidance and proper engineering support to Inspector's to evaluate modifications of airline maintenance programmes and operations which propose segmenting major maintenance inspections."

16.2 DEFINITIONS

SIGNIFICANT STRUCTURAL ITEM (SSI); an SSI is defined as a principal structural element that could fail and consequently reduce the structural integrity of the airplane.

REPAIR ASSESSMENT PROCESS; A Repair Assessment is a process by which an operator evaluates the impact structural repairs have on damage tolerance. It includes the repair examination, classification, and (if required) determination of inspection requirements.

DAMAGE TOLERANCE; Damage Tolerance is the ability of structure to sustain anticipated loads in the presence of damage, such as fatigue cracks, until it is detected through inspection or malfunction and repaired

16.3 GENERAL

A. AGING AIRPLANE STRUCTURAL MAINTENANCE PROGRAMMES

After the accident, a task force, including airline operators, manufacturers, and regulatory authorities, was established to address aircraft structure and other issues relating to aging airplanes. This task force dealt with issues affecting continuing airworthiness of aging large transport category airplanes and identified five structural initiatives which would be the cornerstone of the aging airplane programme. These initiatives are:

1. Structural modifications,
2. Corrosion prevention and control (CPCP),
3. Supplemental structural inspections, (SSIP)
4. Structural repair assessment requirements; and
5. Structural maintenance programme general guidelines, as well as airplane manufacturer model specific guidelines.

One of the basic elements of a continuing airworthiness maintenance programme is structural inspection and airframe overhaul. This element addresses the structural inspections identified in such documents as Maintenance Review Board (MRB) report, airplane manufacturers maintenance planning data documents, service bulletins, airworthiness directives (AD), and the airworthiness limitations section in the Instructions for Continued Airworthiness. In order for the structural inspection programme (SIP) to be effective it must be continually reviewed as part of the operator’s continuing analysis and surveillance system. A periodic structural assessment of each airplane model, based on service experience, should be accomplished by the operator in order to determine if the operators maintenance programme is effective.

It is recognized that each operator should have a maintenance programme when the aeroplanes enter service. In addition, the organization responsible for the type design 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 behaviours of the structure in service. From this assessment, the organizational responsible for the type design and the operators are jointly responsible for developing and issuing information to supplement the on-going operator in 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's experience, and should be included in a continuing structural integrity programme.

The continuing structural integrity programme should be checked from time to time against current service experience. Any unexpected defect that occurs should be assessed as part of the continuing assessment of structural integrity to determine the need for revision of the programme. Future structural service bulletins should state their effect on the programme.

B. THE CONTINUING STRUCTURAL INTEGRITY PROGRAMME

1. Supplemental inspections

   a. supplemental inspection programme should contain the recommendations for the inspection procedures and replacement or modification of parts or components necessary for the continued safe operation of the aeroplane. The programme should include the following information:

      i. Identification of the variants of the basic aeroplane type to which the programme relates.
      ii. A summary of the operational statistics of the fleet in terms of hours and flights and a description of the typical mission or missions;
      iii. Reference to documents giving any existing inspections, or modifications of parts or components and to existing structural service bulletins which may still need to be plied, in addition to those given in the programme; and
      iv. The types of operations for which the inspection programme are considered valid.

2. The following points should be addressed:

   i. Description of the part or component and any relevant adjacent structure. Means of access to the part should be given;
   ii. Type of damage which is being considered (i.e. fatigue, corrosion, accidental damage);
   iii. Any service experience and service bulletins which may be relevant;
   iv. The likely site(s) of damage;
   v. Recommended inspection method and procedure and alternatives;
   vi. Minimum size of damage considered detectable by the method(s) of inspection;

vii. Guidance to the operator on which inspection findings should be reported to the manufacture;

viii. Recommended initial inspection threshold;

ix. Recommended repeat inspection interval;

x. Reference to any optional modification or replacement of part or component as terminating action to inspection;

xi. Reference to the mandatory modification or replacement of part or components at given life if fail- safety by inspection is impractical; and

xii. Information related to any variations found necessary to safe-lives already declared.

C. CORROSION PREVENTION AND CONTROL PROGRAMME

1. This programme should contain recommendations for the definitions of corrosion levels, inspection techniques, re-application of protective treatments and recording/ reporting of findings.

2. A simple, unambiguous way of defining corrosion severity should be stated, e.g.:

   Level 1. Corrosion damage that is occurring between manual limits or can be ‘ attributed to an event not typical of an operator usage of other aircraft in the same fleet (e.g. mercury spill), or the latest inspection and cumulative blend-out after several inspections now exceeds the allowable limits requiring a repair or partial replacement of a primary structural member.

   Level 2. Corrosion damage occurring between successive inspections requiring re-work which exceeds the structural repair manual limits; requiring a repair or partial replacement of a primary structural member, but is not of immediate airworthiness concern.

   Level 3. Corrosion if found, consideration should be given to actions required on other aeroplanes in the operator’s fleet. The State of Registry should ensure that details of corrosion findings and proposed actions are expeditiously reported to the State of Design.

   Note: When Level 3 corrosion is found, consideration should be given to actions required on other aeroplanes in the operator’s fleet. The State of Registry should ensure that details of corrosion findings and proposed actions are expeditiously reported to the State of Design.

3. The action to be taken upon finding corrosion of different severities should be clearly specified.

4. The inspections should be specified in areas of the aircraft rather than specific components.

5. The required access and cleaning required prior to inspection should be stated

6. The circumstances in which inspection methods other than visual are required should be clearly defined.

   i. Details of re-protection, both primary and secondary, should be adequately specified for each area.
   ii. Recording and reporting procedures should be defined.

Note 1: Recording is particularly important in the case of corrosion control so that at subsequent inspection the control of inspection can be demonstrated.

Note 2: In some cases it may be appropriate to include the corrosion control programme directly in the aircraft inspection programme.

D. STRUCTURAL INSPECTION INTERVALS

The maintenance programme should include provisions to reduce the time between inspections as the airplanes age. This can be achieved by reducing the time between inspections or by transferring inspections to a lower level check. These actions are considered appropriate under the following circumstances:

1. When findings from successive inspections, performed at the same frequency, reveal an increasing number of discrepancies.

2. When discrepancies begin to occur in the operators fleet which require extensive repair or replacement of primary structural components.

3. When findings following the implementation of the CPCP indicate the need for more frequent corrosion inspections.

E. AIRPLANE DOWN-TIME (days out of service)

Aging airplane programme requirements are expected to increase the amount of work required during heavy maintenance visits by up to 50 percent during implementation and by 10 to 15 percent during subsequent visits. Normally there will be a point in the operational life of the airplane when more down- time should be allocated to perform structural inspections. Continuous Analysis and Surveillance programme (if the operator is required to have one) may be a useful tool to identify this point. Any of the following could be an indicator that additional down-time is needed. They are:

1. Maintenance release schedules not being met.

2. Maintenance actions deferred to a higher level or next check.

3. A sudden increase in down-time to correct significant structural discrepancies resulting from non- routine findings.

If the maintenance programme correlates with requirements for airplane age and utilization, the down-time to accomplish identical structural work packages for successive structural inspections should remain relatively constant. If the maintenance programme is effective, the number of structural discrepancies in a given airplane zone should not change significantly between successive checks.

F. AIRPLANE UTILIZATION

Airplane utilization is an important factor to consider in the evaluation of the total maintenance programme. The SIP is especially important as utilization rates change. The number of takeoffs and landings, taxi loads, in-flight gust loads, and pressurization cycles has a direct impact on crack initiation and growth. For example, if a change in route structure decreases the average flying time between two points, there will be an increase in the number of flight cycles between checks. If inspection intervals are defined in flight hours, a reduction in flight hour utilization will extend the calendar time between inspections.

G. LOW UTILIZATION AIRPLANE PROGRAMMES

Airplanes with utilization well below that intended by the airplane manufacturers original design estimate are subject to a higher degree of environmental damage on both the airframe and engines. Maintenance programmes should recognize low utilization airplanes and be consistent with the airplane manufacturer’s programme. In most cases, airplane manufacturers have developed model specific low utilization programmes. If a manufacturer’s programme does not exist, the operator should tailor its maintenance or inspection programme and overhaul concepts on realistic calendar inspection intervals, with a calendar cap on “C” and “D” or equivalent checks.

H. AIRPLANE STORAGE

Airplanes removed from service and put in short or long term storage are required to have all scheduled ADs, CPCP inspections, and any other scheduled maintenance tasks accomplished prior to returning to service.

I. MAINTENANCE FACILITIES FOR AGING AIRCRAFT

The facility can have a significant influence on the quality of work performed and the effectiveness of the maintenance programme. Aging airplane programme requirements dictate increased access to areas of the airplane that may have had only limited or no access before. Certain primary structure may have to be removed from the airplane to facilitate inspection and repair. This may require the airplane be shored to prevent alignment problems and adverse loading conditions on the structure. Operators should assure adequate facilities are available to perform these types of complex aging aircraft inspection tasks.

J. PHASING OR SEGMENTING STRUCTURAL INSPECTION WORK PACKAGES - BACKGROUND INFORMATION

Phasing or segmenting is the subdivision of scheduled maintenance work packages, into combinations of smaller work packages, to be accomplished at lesser inspection intervals, such that the total work is completed within the required time-frame.

During the accident investigation of the Boeing 737 airplane, the NTSB identified three factors of concern in the airlines maintenance programme. One of these was “the manner in which a highly segmented SIP was implemented.” The airline had adopted the practice of inspecting the airplane in small increments. The airline’s “D” check inspection of the Boeing 737 airplane was covered in 52 independent work packages. Limited areas of the airplane were inspected during each work package and this practice precluded a comprehensive assessment of the overall structural condition of the airplane. The NTSB concluded that 52 block/independent work packages is an inappropriate way to assess the overall condition of an airplane.

Comprehensive aging airplane structural inspections can best be accomplished when the airplane is opened and inspected during a heavy maintenance check, like a “D” or equivalent outlined in the airplane manufacturers maintenance planning data documents. Some operators have found it efficient to use yearly block “C” checks with a phased or segmented ¼ “D” check inspection. In general, phased or segmented inspections that have been broken down into many smaller packages may dilute the intent of the airplane manufacturer’s maintenance planning data and may not provide sufficient depth of inspection that will permit an effective assessment of the condition of aging large transport airplanes or any other large transport category airplane.

16.4 REGULATORY REQUIREMENTS

HISTORY

FAA Advisory Circular 91-56 was released in 1981 to recommend the supplemental structural inspection programme (similar to FAR 25.571 damage tolerance requirements for the airplanes certified to amendment 45) as an alternative to service life limits on the older airplanes. This results in inspection programmes of selected structural details that will detect the first crack in the fleet prior to reaching critical length.

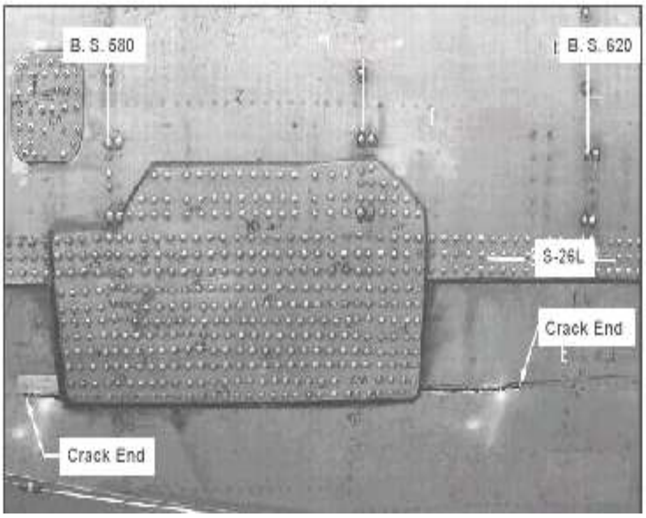
A. CHANGE FROM CANDIDATE TO THRESHOLD FLEET

Switching from a candidate fleet system to a threshold based system is one of the major recent changes to the SSID made by the FAA. With this system, all airplanes exceeding the threshold become part of the SSID programme.

B. REPAIR ASSESSMENT PROGRAMME

Another industry change has been to develop a repair assessment methodology which could be used to efficiently evaluate existing repairs. A survey form was created to record key repair design features needed to do a repair assessment. Airline personnel can use the form to document the configuration of each observed repair as well as classify repairs into one of three categories.
Simplified methods to determine the damage tolerance characteristics of repairs will enable an operator to perform a repair assessment without manufacturer assistance. This methodology is contained in each Repair Assessment Guidelines document, which was recently approved by the FAA and is considered acceptable for incorporation directly in an operator's maintenance programme.

EXAMPLE



The above photograph illustrates the concern of the Repair Assessment Programme. The repair doubler was installed per the SRM when the airplane was in service. During fatigue testing of the fuselage after it was removed from service, a crack initiated beneath this doubler and was not detected until it was 44 inches long. The crack was hidden from visible inspection externally by the doubler and internally by a stringer. Even though the repair was structurally satisfactory (prior to the crack initiation), this programme would require supplemental inspections after exceeding an inspection threshold.

C. ACTION

The FAA has made it mandatory to carry out a repair assessment of the fuselage pressure boundary structure. This new rule will require the incorporation of repair assessment guidelines into the CAASL approved maintenance programmes of each operator. The Repair Assessment Guidelines document will normally be incorporated into the maintenance programme typically (B737 classic) at 60,000 cycles.

The purpose of the assessment guidelines is to establish damage tolerance based supplemental inspections to detect damage, which may develop in repaired areas, before that damage degrades the load-carrying capability of the structure below certification levels. The manufacturer produced Repair Assessment Guidelines document provides the information necessary to evaluate the existing repairs on the airplanes. This evaluation will determine the repair category.

- Category A - Permanent repair: Baseline Zonal Inspections are adequate to maintain the structures damage tolerance.
- Category B - Permanent repair: Supplemental inspections are required to maintain the structures damage tolerance.
- Category C - Time limited repair: Supplemental inspections are required to maintain the structures damage tolerance until it is replaced with a permanent repair.
- Not structurally satisfactory - This repair must be replaced prior to further flight.

If a repair is determined to be Category B or C, the document will provide the data necessary to determine the inspection requirements. This includes the replacement requirements for Category C repairs.

16.5 CONCLUSIONS

Safe operation up to and beyond the design life of an aircraft is achieved by an effective maintenance programme. Structural maintenance tasks can be expected to increase due to fatigue related cracking as airplanes stay in service beyond their design life. To offset this situation, maintenance initiatives have been developed to ensure that the continued airworthiness of airplanes is achieved for operation up to and beyond the design life. Scheduled maintenance checks contained in MPD is used to address environmental and accidental damage that can occur at any time as random events. Inspection requirements to detect fatigue damage are contained in Supplemental Structural Inspection Documents. The Aging Airplane Programme initiatives begin at various stages in an airplane’s service life. The Service Bulletin Modification programme was developed to reduce reliance on continuing inspections as a means to ensure airworthiness. The CPCP was established to make mandatory corrosion inspections which had previously been only recommendations in the basic maintenance programmes.

The Repair Assessment programme will require operators to assess fuselage pressure boundary structure repairs from a Damage Tolerance perspective.

The Widespread Fatigue Damage programme is developing new inspection requirements to address fatigue cracking in similarly stressed and configured structural details.

16.6 PROCEDURES

Inspectors must verify that the operator’s CAASL- approved maintenance or inspection programme conforms to the following:

A. The CAASL-approved maintenance or inspection programme is consistent with the airplane manufacturer's Maintenance Planning Data (MPD), Supplemental Structural Inspection Programme (SSIP), Corrosion Prevention Control Programme (CPCP), and repair assessment guidelines, all with reference to scope and detail of the work to be performed. If phased or segmented maintenance or inspections are being accomplished, the programme must be reviewed to determine an equivalency in scope and detail to the manufacturers' maintenance planning data.

B. Low utilization airplane maintenance or inspection programme is consistent with airplane manufacturers' maintenance planning data for low utilization airplanes, if one exists, or the programme is consistent with realistic calendar inspection intervals with a calendar cap on "C" and "D" checks or equivalent.

Assess the effectiveness of the operator's CAASL-approved maintenance and inspection programme and ensure modifications are implemented in a timely fashion.

SECTION TWO

VOLUME 2

AIR OPERATOR/ MAINTENANCE ORGANIZATION SURVELIANCE

CHAPTER – 17 GUIDE LINES FOR THE APROVAL OF MAINTENANCE SCHEDULE

17.1 PURPOSE

This chapter provides guidance to CAASL Airworthiness Inspectors and industry personnel in the development and approval of aircraft maintenance schedules, including some, but not all, the means by which such schedules can be amended. The basic frame work of the approval of Maintenance Programme described in Chapter 6 to this section.

17.2 APPLICABILITY

The procedures described herein are applicable to all types of aircraft but mainly to the following.

i. Aircraft operated by flight training units.
ii. Commercial Aircraft.
iii. Pressurized turbine powered aircraft.
iv. Other large aircraft.

17.3 BACKGROUD

Certain classes of aircraft (essentially those described in the "applicability" section) must be maintained in accordance with a maintenance schedule which has been approved by the CAASL for the use of the particular air operator. The approved maintenance schedule shall contain details of all scheduled maintenance to be performed including inspections, overhauls, replacements, operational checks, lubrication, etc. Minimum contents of such a schedule are outlined in Annex A to this document.

17.4 MAINTENANCE SCHEDULE DEVELOPMENT

Both the initial maintenance schedule and all amendments to it shall first be approved by the CAASL, unless the air operator's approved Maintenance Control Manual (MCM/MME) includes procedures for incorporating changes solely on the basis of the air operator's own analysis.

The air operator shall ensure that the tasks listed in the maintenance schedule are completed within the intervals specified. In addition, all maintenance schedules must include additional items as are necessary to ensure compliance with mandatory requirements such as Airworthiness limitations, component life limits, and maintenance requirements based on operational approval for IFR, ETOP'S, Cat. I/II & III, RVSM, PBN etc.

Pre-flight walk around performed by flight crew, daily and pre-departure checks, which are intended to be performed by unlicensed personnel, need not form part of the approved inspection programme. These will be addressed in other sections of the appropriate Maintenance Control Manual, or in the case of private aircraft, will be at the discretion of the air operator.

Amendment to a maintenance schedule must be approved for any changes in an aircraft operational role, task deletion, interval increase, or any other significant change that would affect a schedule. The CAASL approval is not essentially required when an amendment involves the addition of a task or the reduction of a task interval (more conservative) however; the air operator should notify the CAASL of these changes to obtain the approval later on. The operator should address this in the MCM/MME for approval before exercising the privilege addressed above.

17.5 INITIAL ESTABLISHMENT OF SCHEDULE

17.5.1 Small Aircraft (piston powered)

Owners of aircraft shall submit to the CAASL a completed Aircraft maintenance schedule for the aircraft for which the approval is sought.

The operators of small aircraft (piston engine) may either use the manufacturer's recommended maintenance schedule or a maintenance schedule meeting the requirements of the Annex A.

If the aircraft is operated in accordance with the inspection requirements of Annex A, part 1, then these requirements will be performed at intervals not exceeding 100 hours air time or 12 months whichever occurs first. However , if the owner chooses to operate their aircraft in accordance with Annex C then the progressive maintenance schedule shall provide for a complete inspection of the aircraft, to at least the same extent as the schedule contained is Annex A part 1, within each 100 hours air-time or 12 month period whichever occurs first.

17.5.2 Owners of large aircraft: Commercial operators and pressurized turbine powered aircraft, shall submit to the CAASL a completed maintenance schedule for review. Owners of these categories of aircraft will have their maintenance schedule based on Annex A and Annex B to this chapter.

17.5.3 Annex C compliance

When complying with the requirements of Annex C, the proposed maintenance schedule must be based on one of the following sources.

I. Maintenance review Board (MRB) reports

Maintenance schedules based on an MRB report must include all the tasks listed in the report, plus any additional tasks arising from the role in which the aircraft is to be employed or the environment in which the aircraft is to be operated. The intervals between tasks specified in the MRB should be regarded as the maximum intervals for the operator's initial programme, and should be reduced if the operation is in any way non-standard.

MRB reports usually address only the "Green" aircraft and must therefore be supplemented by additional tasks to ensure the serviceability of optional equipment, including galley and passenger service equipment, life jackets, medical kits, etc.

Aircraft manufacturers will usually produce a maintenance-planning document (MPD) in addition to an MRB report. The MPD may be used to develop a maintenance schedule. This means that the MPD must contain, as a minimum, the contents of the MRB report thus ensuring compliance with the approved basis.

It should be noted that in the case of older aircraft the MPD may be the most current document for the development of the maintenance schedule, as the MRB report may have been inactive for many years. These cases would have to be assessed on an individual basis to determine the correct basis for the maintenance schedule. If the MPD was found to be more current than the MRB and it contain the applicable tasks of the MRB, then the MPD number and revision should be indicated under the manufacturer's recommendations on the application.

II. Manufacturer's recommendations

Schedules based upon manufacturer's recommendations will generally be approved after a minimum of investigation, provided that all necessary additional items resulting from the operator's role, environment and optional equipment are also included.

It should be noted that the term "manufacturer's recommendations" is not limited to the basic recommended schedule. The manufacturer often makes additional recommendations in service bulletins, service letters, letters to operators, etc. and all these should be taken into account, as should those of the engine, propeller and appliance manufactures.

In certain cases, individual tasks recommended by the manufacturer may be omitted from the operator's initial programme, but approval for such action will be dependent upon the operator's ability to demonstrate to the satisfaction of the CAASL, that the omission will not have any adverse effect on safety.

III. Maintenance Schedules approved for other Sri Lankan operators

Although maintenance schedules are not transferable, an operator may base their schedule upon that of another Sri Lankan operator. Schedules developed in this way will involve a comparison between the two Sri Lankan operators, and will depend upon the applicant's ability to demonstrate that the <u>role, aircraft configuration, route structure, type of evaluation programme and environment are essentially the same in both cases, comparison of the reliability programmes of the previous operator and the new operator would be a requirement</u>. In addition, the assessment will take in to account the relative experience of each operator with the aircraft type. <u>An operator may not take credit of another operators established TBO's .-</u>

Applications to base a schedule upon that of another operator usually occur when an operator purchases or leases an aircraft and wishes to take over the vendor's maintenance schedule as part of the package. If the assessment of the application results in changes to tasks or intervals, it will be necessary to re-calculate (prorate) the times when the approval of a new maintenance schedule and the transfer of aircraft on to that schedule, are two separate operations. Approval of the schedule does not in itself establish when the tasks are next due for a particular aircraft.

IV. Other data acceptable to the Civil Aviation Authority

This heading covers a wide range of possible sources, including schedules approved by other Airworthiness Authorities, military schedules and in rare cases, completely new schedules resulting from the operator's analysis of the aircraft design. The depth of review required for approval would depend upon the circumstances of the individual case.

17.6 SCHEDULE AMENDMENT

Each air operator who uses an individually approved maintenance schedule shall employ some means to assess its continued effectiveness. This is usually known as an Evaluation and the programme will depend on the type and the fleet size of the operation (mainly for transport category aircraft).The Air Operators programme should be sufficiently comprehensive to identify any need for changes to the maintenance schedule and would usually consist of the day to day analysis of PIREPS or a full fledge reliability programme, etc. All of the above form part of an operator's evaluation programme.

Changes to the maintenance schedule will consist essentially of five types

i. Addition of tasks or reduction of intervals, to ensure that acceptable levels of safety and reliability are obtained.
ii. Deletion of tasks or extension of intervals, to achieve reductions in operating costs
iii. Re-arrangement of existing tasks and intervals into different check packages, to cater for changes in route structure or timetables, or to obtain improved equipment availability.
iv. Change in tombstone data involving fleet size, type of operation, etc.
v. CAASL may direct that safety related changes be incorporated, based on their own analysis or on the experience of other operators.

A maintenance schedule amendment requires approval from the CAASL. When applying for amendment approval, a maintenance schedule amendment request must be completed indicating the affected item, action to be taken, and justification.

17.7 TOLERANCES

<u>Tolerances shall be permitted only when the scheduled checks prescribed by the maintenance Schedule, or documents in support of the schedule, cannot be complied with, due to circumstances which could not reasonably have been foreseen by the Operator.</u>

Where an air operator wishes to include a tolerance, the application must contain full details of the tolerance, including its means of control, and demonstrate that the items concerned can safety be operated at the resulting higher intervals- These tolerances must be non accumulative.

The application of the tolerance must be under the control of the person responsible for maintenance control system. Prior to the commencement of any tolerance to a task required by the maintenance schedule, the aircraft shall be inspected to the degree necessary to ensure that it is airworthy, and in satisfactory condition to operate for the period of the tolerance. The procedures to vary any of the prescribed periods of a maintenance schedule shall be detailed in the Air Operator's MCM/MME.

The operator shall amend the programme to remove tolerance approval when directed by the Authority, or when the Authority believes the operator has not followed the tolerance procedure set forth in the MCM/MME.

<u>Tolerance is not permitted for those components with an ultimate or retirement life (Life Limitation) has been prescribed, or those periods included in the maintenance schedule, which have been classified as mandatory by a regulatory authority (Airworthiness Limitation) or Airworthiness Directive or CMRs unless specified therein.</u>

The tolerance examples referenced below are for Guidance purposes only and the CAASL regional office (if available) having jurisdiction should issue tolerance on a conservative basis. Tolerance may be granted for items controlled by flying hours, calendar time, and landing/cycles. Examples of tolerance for a prescribe period to be approved by the CAASL are as follows:

ITEMS CONTROLLED BY FLYING HOURS:	
Period Involved	**Maximum Tolerances of the Prescribed Period**
5000 flying hours or less More than 5000 flying hours	10% 500 Flying hours
ITEMS CONTROLLED BY CALENDER TIME:	
Period Involved	**Maximum Tolerance of the Prescribed Period**
1 Year or less More than 1 year but not exceeding 3 years More than 3 years	10% or 1 month, whichever is less 2 months 3 months
ITEMS CONTROLLED BY LANDING / CYCLE	
Period Involved.	**Maximum Tolerance of the Prescribed period**
500 landings/cycles or less More than 500 landings/cycles	10% or 25 Landing/Cycles, whichever is less 10% or 500 Landing/Cycles whichever is less

17.8 MAINTENANCE SCHEDULE APPROVAL

17.8.1 GENERAL

Upon receipt of the Application Forms, the CAASL office will determine if formal submission of the check package is required or if it would be more appropriate to visit the air operator’s facility to review the applicable data. In either case, the CAASL will need to review the application comparing it with the programme basis and suitability to the operation.

In addition to the airframe and systems, the maintenance schedule must also address the engines, propellers, appliances, survival equipment, emergency equipment etc., and must take into account any modifications made to the aircraft. Some items to consider are listed below:

i. Type of operations, routes, stops, stage lengths, company experience with similar operations, etc.
ii. Environment, such as industrial pollution, salt-air, arctic, desert, etc.

iii. Maintenance history.
iv. Age of aircraft in fleet.
v. Maintenance schedules for similar aircraft types in use by the company.
vi. Additional equipment required by regulations.
vii. Experience of operating personnel.
viii. Compliance with the supplemental Inspection Document (SIDs), Airworthiness Directives (ADs), Airworthiness Limitations, Corrosion and prevention Control; programme (CPCP).
ix. Repairs to damage tolerant structures.

All scheduled tasks not forming part of the actual check packages should be listed as “out of phase” items.

17.8.2 Approval Criteria of Maintenance Schedule address in Annex C

When reviewing the requirements of Annex C the correct basis must be used for the applicable maintenance schedule. Where an MRB report exists, it will take priority over the recommendations of the manufacturer. Manufacturer recommendations may be preferred to programmes approved for other air operator’s or other data acceptable to the Authority. Where an applicant wishes to use data which is in conflict with the preferred programme basis, the onus is on the applicant to demonstrate that the proposed programme is more appropriate to their operation.
If the schedule is based upon that of another Sri Lankan air operator, the applicant must be able to demonstrate that the new operation is for all practical purposes equivalent to the original one, and that his experience with similar types of aircraft is sufficient to justify assuming the other air operator’s inspection intervals. Where the operations differ substantially, the use of another air operator’s programme as the basis can not be permitted. Where the operations are similar, but appropriate experience cannot be demonstrated, the air operator may be allowed to base his programme upon the other air operator’s, but with amended intervals.

17.8.3 Schedule Amendment

Approval of changes which consist solely of a re-arrangement of existing tasks and intervals is a simple matter, and will consist primarily of ensuring that sufficient skilled personnel are available to perform the work, and that the operating schedule allows for sufficient down-time to enable rectification of likely defects which may be detected during the checks.

Changes for economic reasons will require the demonstration not only of an acceptable level of reliability, in the form of reliability data which can include an assessment of workshop reports, inspection findings, etc. Increases in the time between overhaul

(TBO) of major items such as engines and propellers will usually be supported by a trial/sampling programme.

Substantive changes to tasks and intervals will require detailed supporting data. This supporting data will usually result from an approved reliability programme.

The maintenance schedule amendment request page should be submitted with each amendment request. Detailed supporting data will also be included with the amendment request, detailing the item changed, action to be taken, and justification of proposed change as indicated in the maintenance schedule amendment example below.

17.8.4 Administrative Procedure

When approving an air operator to use a Maintenance Development programme (MDP) the procedures for using such programme must be identified in the air operator's MCM/MME.

Operators should make allowance for the time needed to assess the application, which will be dependent upon the work load at the time. Applications will normally be assessed on a first come first served basis.

In the case of a new aircraft type, it is possible that the MRB report will not be completed early enough to allow the first operations to develop their inspection programmes. In such cases, approval may be granted for an interim programme based on the MPD, or for a partial programme which addresses only the short interval items, such as A & B checks. This will enable the carrier to commence operation with the aircraft while developing the programme.

When satisfied that the proposed schedule is adequate, the Inspector should sign and stamp the applicable maintenance schedule form and any continuation sheets, return the original to the applicant, and retain a copy on the aircraft file maintain in the Airworthiness Section for this purpose.

ANNEX A

MAINTENANCE SCHEDULES

GENERAL PROCEDURES

The Maintenance Schedules includes:

Part I - Scheduled Inspections for Aircraft other than Balloons;

Part II - Scheduled inspections for Balloons.

It must be supplemented by the applicable requirements of Annex B for out of phase tasks and equipment maintenance requirements

Each person performing inspections required by the maintenance schedule shall record the inspections in the aircraft technical record, using a check list that includes all items in Parts I or II that are applicable to the aircraft concerned. Additionally, all tasks required by Annex B shall be recorded in the aircraft technical record.

Note: Aircraft manufacturers' checklists can be used, provided that they include all the applicable items listed herein.

The tasks listed in the maintenance schedule are described in general terms only, as the specific items applicable to particular aircraft will vary according to aircraft type.

The method of inspection for each item on the maintenance schedule shall be in accordance with the manufacturer's recommendations or standard industry practice.

NOTE: The following is provided as a quick reference chart.

Type of Aircraft & Operation	Content & Interval
Non-commercial	
Small aircraft – Excluding pressurized turbine- powered aircraft & balloon	Annex A, Part I @ 12 months + Annex B
Balloon	Annex A, part II @ 12 months + Annex B
Commercial	
Small Aircraft – Excluding Pressurized turbine-powered Aircraft & balloons	Programme approved for operator in accordance with Annex C. May be based upon Annex A, part I @ 100 hours or 12 months whichever comes first + Annex B.
Balloon	Annex A, part II @ 100 hours + Annex B

Commercial & Non- commercial	
• Large aeroplanes and helicopters operated by flight training units. • Large commercial aircraft operation. • Pressurized turbine-powered aircraft. • Other large aircraft	Programme approved for operator in accordance with Annex C. Must include the applicable items of Annex B

The depth of inspection of each item on the schedule shall be determined by the person performing the inspection, and shall be consistent with the general condition and operating role of the aircraft.

This schedule is considered to be approved for use by owners of small non-commercial operation aircraft and all balloons. Owners need only to make an entry in the aircraft technical records that the aircraft is maintained pursuant to the maintenance schedule.

This maintenance schedule can be used as the basis for a commercial air operator's maintenance schedule. With the exception of a balloon inspection schedule, commercial air operator's maintenance schedules based on this Schedules for aircraft operated in commercial air service (including balloons) shall applicable, and the accomplishment of out of phase tasks and equipment maintenance requirements specified in Annex B.

Where the aircraft utilization is sufficient to ensure that all items listed in parts I or II of this Annex are performed within a 12 month period, an owner can request that inspections under this maintenance schedule be performed progressively. In this case, a revised maintenance schedule shall be submitted for the approval of the Authority.

Where a flight training unit operating aeroplanes and helicopters part I of this Annex as a basis for inspections to be carried out at 100 hour intervals, it must be approved in accordance with the procedures outlined in Annex C of these standards.

This maintenance schedule is not an inspection checklist prior to performing the inspections tabled herein, an appropriate checklist containing these requirements must be developed.

NOTE: 1. Many aircraft manufacturers produce detailed inspection checklists. In many cases the location of system components is clearly identified on those documents. In the interest of efficiency an owner may wish to use manufacturers check list in order to accomplish this inspection. Manufacturer's checklist may be used, provided they include at least the items listed in parts I or Part II of this annex, as applicable. Where an owner has chosen to use a manufacturer's checklist, it should be clearly marked to indicate that the check is following the general maintenance schedule. In addition, any references in those checklists concerning compliance with Airworthiness directives must be stricken out as not applicable, as it is the owner's responsibility to advise the certifying staff of any outstanding Airworthiness Directives or Airworthiness limitations.

2. Large aircraft comply with a detailed maintenance schedule as per Annex B and C of these guidelines.

Part I

SCHEDULED INSPECTIONS FOR SMALL AIRCRAFT OTHER THAN BALLOONS

At intervals prescribed in the General procedures to this appendix, inspect the aircraft as follows;

1. Aircraft Generally

   a. Remove or open all necessary inspection plates, access doors, fairings and cowlings. Thoroughly clean the aircraft and engine.

   b. Inspect panel, door and cowling closing and locking mechanisms for improper installation and function.

   c. Lubricate in accordance with the manufacturer's recommendations.

2. Fuselage and hull Group.

   a. Structure - inspect for deterioration, distortion, evidence of failure and defective or insecure attachment of fittings

   b. System and components- inspect for improper installation, apparent defects and unsatisfactory operation.

3. Cabin and Cockpit Group

   a. Generally – inspect for dirt and loose equipment that might foul the controls;

   b. Seats and safety belts – inspect for poor condition, fraying, and any other apparent defects;

   c. Windows and windshield – inspect for deterioration and breakage;

   d. Instruments – inspect for poor condition, mounting, marking and, where practicable, for improper operation;

   e. Flight and engine controls – inspect for improper installation and improper operation;

   f. Batteries – inspect for improper installation and improper charge;

   g. All systems – inspect for improper installation, poor general condition, apparent and obvious defects and insecurity of attachment.

4. Engine and Nacelle Group

   a. Leaks – inspect for oil, fuel or hydraulic leaks;

   b. Studs and nuts – inspect for defects, evidence of improper torque and safety locking;

   c. Cylinder compression – checks; if compression test indicates problems, check internal condition and tolerances:

d. Screens and sump drain plugs – check for metal particles or foreign matter;

e. Engine mounts – inspect for cracks, looseness of mounting and looseness of engine to mount;

f. Flexible vibration dampeners - inspect for poor condition and deterioration;

g. Engine controls –inspect for defects, improper travel and improper safety locking;

h. Lines, hoses and clamps – inspect for leaks, improper condition and looseness;

i. Exhaust stacks – inspect for cracks, defects, and improper attachment;

j. Accessories – inspect for apparent defects in security of mounting;

k. All systems – inspect for apparent defects in security of mounting;

l. Cowlings – inspect for improper installation, poor general condition, defects and insecure attachment;

m. Internal corrosion – inspect engines which have not been inhibited and have been out of service in excess of 12 months.

n. Engine performance – during the ground run, run the engine in accordance with the manufacture's recommendation to determine satisfactory performance of the following:

   a. Idle and maximum RPM;
   b. Magneto RPM drop;
   c. Fuel and oil pressures;
   d. Engines maintained to an On-condition programme– check reference RPM.

5. Landing Gear Group

a. All units – inspect for condition and security of attachment;

b. Shock absorbing devices – check oleo fluid level

c. Linkage, trusses and members – inspect for under or excessive wear, fatigue and distortion;

d. Retracting and locking mechanism – inspect for improper operation;

e. Hydraulic lines – inspect for leakage;

f. Electrical system– inspect for chafing and improper operation of switches;

g. Wheels – inspect for cracks, defects and condition of bearings:

h. Tires – inspect for wear, cuts and incorrect inflation; inspect for improper installation and improper operation.

i. Brakes – inspect for improper adjustment;

k. Floats and skis – inspect for insecure attachment and apparent defect;

6. Wing and Centre Section Assembly

7. Inspect structure for general condition, deterioration, distortion, and evidence of failure and insecurity of attachment.

8. Empennage Assembly

9. Inspect structure for general condition, detritions, evidence of failure and insecure attachment, improper component installation and improper component operation.

10. Propeller Group

   a. Propeller assembly – inspect for cracks, nicks, binding and oil leakage;

   b. Bolts- inspect for improper torque and safety locking;

   c. Anti-icing devices – inspect for improper operation and defects;

   d. Control mechanisms – inspect for improper operation, insecure mounting and improper range of travel.

11. Radio Group

   a. Radio and electronic equipment – inspect for improper installation and insecure mounting.

   b. Emergency Locater transmitters – test performance in accordance with the procedure specified in Annex A

   c. Wiring and conduits – inspect for improper routing, insecure mounting and apparent defects.

   d. Bonding and shielding – inspect for improper installation and poor condition.

   e. I Antennas, including trailing antennas – inspect for poor condition, insecure mounting and improper operation.

Miscellaneous Items not Otherwise Covered by this Listing.

12. Aircraft Generally, Including Technical Records.

   a. Enter details of all deficiencies found during the inspection in the aircraft technical records

   b. Upon completion of the inspection, replace or close all inspection plates, access doors, fairings and cowlings.

Part II

SCHEDULED INSPECTIONS FOR BALLOONS

1) At intervals prescribed in the general procedures, inspect the:

a. Envelope;
a. Basket (gondola) and its attachments;
b. Load tapes and support lines;
c. Instruments;
d. Controls;
e. Burners;
f. Fuel tanks, hoses and clamps; and
g. Radios and other installed equipment

Where the checklist used differs from the manufacture's recommended checklist, the list shall be approved by the Authority.

ANNEX B

OUT OF PHASE TASKS AND EQUIPMENT MAINTENANCE REQUIREMENTS

1. This Annex listed the maintenance requirements for specific equipment. Unless otherwise specified, these intervals apply to all installed equipment of a type listed herein.

2. In the case of operators having maintenance schedules approved in accordance with Annex C the intervals specified in this annex are initial intervals that must be followed by a new operator of the type. They may be amend once experience on that type has been gained, based on the results of the owner's maintenance monitoring programme.

3. Nothing in these guidelines relieves the owner from the responsibility for determining the applicability of these requirements to his/her aircraft, or for identifying any other maintenance requirements relating to equipment not listed here.

   Note: Where doubt exists as to the compliance requirements in respect of a specific aircraft installation, the owner can contact the CAASL office for assistance.

4. Out of phase Task Listings

5. Carry out the following tasks at the times indicated:

   All Aircraft

   Ensure that any applicable equipment maintenance task required by this annex is performed at, or before, the next inspection interval listed therein.

   Aircraft used in Dual Role Operations

   Upon conversion between roles, inspect to ensure that contamination, structural damage and other defects incurred during operation in the special purpose role, are rectified prior to operation in the normal role.

   Rotorcraft Dynamic Components

   At the intervals recommended by the aircraft manufacture, inspect:

   - The drive shafts or similar systems;
   - The main rotor transmission gearboxes;
   - The main rotors and hubs;
   - The tail rotor.

Variable pitch propellers

a. Where the manufacture has specified a TBO in flying hours or cycles, this recommendation shall apply.

b. Where the manufacture has not made any recommendations regarding TBO, the propeller (s) shall be overhauled at the following intervals:

- In the case of propeller installed on turbine engines; 2,000 hours air time or ten years, whichever comes first;
- In the case of single acting propellers installed on piston engines;1,500 hours air time or ten years, whichever comes first;
- In the case of double acting propellers installed on piston engines: 2,000 hours air time or ten years, whichever comes first;

c. At intervals of not more than 5 years, the propeller shall be subjected to an internal inspection by an approved propeller overhaul organization. If significant corrosion is found during the internal inspection, overhaul shall be required; the inspection shall consist of;

- Complete dismantling to the lowest level of assembly – including removal of blade root ferrules, de- icer boots, decals, etc;
- Complete inspection – using, where appropriate, the applicable non-destructive inspection technique, for corrosion or other calendar related defects; and,
- Re-assembly.

NOTE: The inspection described in paragraph © does not constitute overhaul. It is intended to meet the needs of those owners who operate in a benign environment and have extremely low utilization.

Fixed Pitch Ground Adjustable propellers

At intervals of not more than 5 years, the propeller shall be removed from the aircraft and inspected for corrosion or other defects over its entire surface, including the hub faces and the mounting hole bores. While the propeller is removed, it shall also be checked for correct dimensions. However, if defects which require repairs beyond those recommended as field repairs by the propeller manufacture are found, the propeller shall be repaired by an organization approved for the overhaul of propellers.

Engines

All piston and turbine engines installed in aeroplane and helicopters shall be overhauled at the intervals recommended by the engine manufacturer, or in accordance with an alternative hard time interval or an engine on- condition maintenance programme approved in accordance with Annex C.

Weight and Balance

All large aircraft shall be reweighed and an updated prepared every five years.

Non- stabilized magnetic Direction Indicators (MDIs)

a. Except as provided in (b), non- stabilized magnetic direction indicators shall be calibrated, and a dated correction card installed for each indicator, at intervals not exceeding 12 months;

b. The annual calibration requirements of (a) does not apply to an aircraft operating under an air operator certificate, or to any large or turbine – powered pressurized aircraft

Survival and Emergency Equipment

Survival and emergency equipment shall be overhauled at the intervals recommended by the manufacturer.

Emergency Locater Transmitters (ELTs)

a. Expect where powered by water activated batteries, the ELT shall be checked at intervals not exceeding 12 months, in accordance with manufacturers recommendation.

b. ELTs powered by water activated batteries shall be performance-tested at intervals not exceeding 5 years.

c. ELT batteries shall be replaced at the interval recommended by the ELT manufacture.

Altimetry devices

Sensitive altimeters, pilot and static pressure systems and other altimetry devices, where installed for compliance with the basis of certification listed on the type certificate, or where required by operating rule, shall be inspected and calibrated at intervals not exceeding 24 moths in accordance with the manufactures' recommendation.

Note: For the purpose of this section, the term " other altimetry devices' includes any air data computer, or other barometric device, providing a flight crew station, or an auto pilot, or automatic pressure altitude reporting system with altitude data derived from static pressure.

Air Traffic Control (ATC) Transponders

ATC Transponders, including any associated altitude sensing reporting mechanisms, where installed, shall be tested every 24 calendar months, in accordance with the manufacturer's recommendations.

Cockpit Voice Recorders (CVRs)

a. Cockpit Voice Recorders (CVR), where installed for compliance with the basis of certification listed on the type certificate, or where required by operating rule, shall be subject to the following maintenance, in accordance with a maintenance schedule meeting the following requirements:

- An operational check;
- A fictional check;
- An intelligibility check; and
- Unit overhaul, at the interval recommended by the CVR manufacture.

b. An operational check shall be performed, in accordance with the manufacturers instructions, as follows:

- By maintenance personnel during each line check and following any system maintenance.
- By each new, or partial change of, flight crew; and
- Upon installation in the aircraft

c. A functional check shall be completed in accordance with manufactures maintenance instructions at 3,000 hours, or 12 months, whichever comes first.

d. An intelligibility check shall be performed by means of a test procedures which, when completed under operational conditions, shall enable verification of intelligible recorded audio information from all the various input sources required by the regulations:

- Upon initial installation;
- At 3,000 hours, or 12 months, whichever comes first
- CVR overhaul shall be performed in accordance with manufacturer's recommendations.

Underwater Location devices (ULDs)

a. The beacon case and water switch shall be cleaned at the interval, and in accordance with the ULD manufacturer's recommendations, in order to prevent leakage current from draining the battery.

b. Operational checks shall be conducted on ULDs upon installation and once a year thereafter. The ULD battery shall be replaced on or before the expiry date stamped on the battery and a label affixed to the ULD case indicating the next replacement date.

c. At the intervals specified below the ULD shall be inspected and tested.

- Cleaning of the water switch at interval as recommended by the ULD manufacturer;
- Rectification of the ULD at 12 month intervals; and
- Replacement of the ULD battery at the interval as recommended by the battery manufacturer.

Flight data recorders (FDRs)

For the purpose of these provisions:

a. “calibration” – means the application of a measured input of known accuracy to a physical dimension of unverified accuracy, to detect and define any variation from its performance standards. Calibration includes adjustments and recording of corrected measurements and recording of measurements which require no adjustment; and

b. “correlation” - means the process of comparing data recorded by the FDR against the actual corresponding data derived from flight instruments and control surface position indicators during specified portion(s) of a flight profile or during ground checks which are conducted for that purpose.

At the intervals specified by the manufacturer, and where installed for compliance with the basis of certification listed on the type certificate, or where required by operating rules, FDRs shall be inspected and tested.

ANNEX C

OPERATOR'S APPROVED MAINTENANCE SCHEDULE

1. Applications for approval of maintenance schedules shall be submitted to CAASL

2. An Air Operator's approved maintenance schedule shall ensure that the maintenance requirements listed in Annex B are complied with.

3. The following information shall accompany an application for approval of a maintenance schedule.

   a. The instructions and procedures for the conduct of scheduled maintenance on the particular make and model of aircraft, providing in the form of a check list, the following:

      i. The name of any part of areas of the airframe, engines, propellers, appliances, and emergency equipment to be inspected or otherwise maintained:
      ii. The nature of the inspections or other maintenance tasks to be performed;
      iii. An outline of the proposed intervals for performing the inspections or other maintenance tasks, expressed in flying hours, calendar time, or cycles;
      iv. Any tolerances applicable to the intervals between scheduled inspections or maintenance tasks;

   Note: No tolerances are permitted with respect to tasks recognized by airworthiness limitations or airworthiness directives.

      v. Where the maintenance of any part or areas of the airframe, engines, propellers, appliances, or emergency equipment is required because that part or area of the airframe, engines, propellers, appliances, or emergency equipment is subject to an airworthiness limitation, its identification as such; and

      vi. In the case of schedules approved in respect of air operators and flight training units that develop work instructions for maintenance personnel use in place of the manufacturer's maintenance manuals, a link to those work instructions.

   b. Details of the substantiating data on which the proposed schedule is based.

An operator of a small aircraft, who wishes to use a progressive maintenance schedule, including a schedule recommended by the manufacture, shall submit a written request for approval to the CAASL. The progressive maintenance schedule shall provide for a complete inspection of the aircraft, to at least the same extent as the schedule contained in Annex A within each 12-month period. Once establish such a progressive schedule, if for any reason, the qualifying terms of the schedule cannot be met, the aircraft shall undergo an inspection for conversion to the schedule required by Annex A of these standards. Such inspection shall not be less in scope than the inspection detailed in parts I or II of Annex B of these standards.

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 18 - MAINTENANCE TRAINING ORGANIZATION

18.1 OBJECTIVE

This chapter provides guidance for evaluating and accepting an operator / applicant's maintenance training organization and training programmes.

18.2 GENERAL

Effective training is the basis for a successful maintenance/inspection programme. Although many procedures for maintaining and inspecting aircraft may be similar, the equipment, procedures, and task documentation used may all be unique to the operator/applicant's specific programmes.

A. CAASL requires that maintenance/inspections be performed in accordance with the approved operator/applicant's manual.

B. Maintenance/inspection training programmes are the most efficient manner to inform personnel of the requirements of the operator/applicant's programme.

18.3 COORDINATION REQUIREMENTS AND SCHEDULING

Airworthiness Inspectors (AwIs) should encourage applicants to discuss pending maintenance/inspection training programme development with the certification team before the programme is submitted for final acceptance. It is especially important that programmes be reviewed for conformity with appropriate regulatory requirements. This review can reduce the number of major changes an operator will have to make after a programme has been printed and distributed.

18.4 SCHEDULING MAINTENANCE TRAINING PROGRAMMES

Delays in programme acceptance results in delays in the certification process. To facilitate the evaluation of the training programmes, the applicant should be encouraged to schedule a classroom training session in a timely manner.

18.5 CONTENTS OF MAINTENANCE/INSPECTION TRAINING PROGRAMMES

The operator/applicant's training programme should include company indoctrination and technical training (formal and on the job training). The programme should contain a list of tasks to be taught and a method for recording the training. Completion of the training must be entered in the individual's training record.

A. Company Indoctrination: Each maintenance/inspection employee should receive instruction in the use of the operator/applicant's manuals, policies, procedures, and forms.

B. Maintenance/Inspection Technical Training

1. Training may consist of a combination of formal (classroom) instruction and on the job training. The operator/applicant may give training credit to individuals for experience gained while employed by other operators.

2. Procedures unique to the operator/applicant should be taught. Training records should indicate the amount of formal training, on the job training, and experience each individual receives.

3. Technical training may be contracted to another operator, manufacturer, or in the case of a specialized process, to a person knowledgeable in that specialized process. The operator/applicant is responsible for the content and quality of such training.

4. The CAASL normally does not establish a fixed amount of time for indoctrination training but for technical training courses. However the introduction training should use a minimum time proportional to the operator/applicant's complexity.

C. Responsibilities for persons other than an Operator's employees.

State regulations require each certificate holder to be primarily responsible for having a training programme and ensuring that the training received throughout the operator's system is of equal quality and effectiveness. This covers all persons such as the certificate holder's employees, contract personnel for emergency maintenance and servicing, etc.

1. Each certificate holder or person who performs maintenance shall have a training programme to ensure that each person, including inspection personnel, is fully informed about procedures, techniques, and new equipment in use and is competent to perform the applicable duties.

2. Appropriately certificated, properly trained, qualified, and authorized personnel are the only allowed to carryout duplicate inspections.

NOTE: A person can be defined as an individual, firm, partnership, corporation, company, association, joint stock association, or governmental unit.

D. Recurrent Training: The operator/applicant's training programme should ensure that deficiencies discovered through continuous analysis and surveillance and/or quality assurance programmes are corrected during recurrent training. Additionally, recurrent training should include at least the following:

1. Review, reinforcement, and upgrading of all training given in both indoctrination and technical subjects
2. Input from maintenance bulletins and/or maintenance newsletters
3. Critical tasks, such as run-up/taxi, Duplicate Inspections, and Non-destructive Inspection (NDI)

E. Training Records; Training records must be retained by the operator/applicant to document that personnel are adequately trained. Training records should be maintained at a central location, but may be maintained at other locations provided these locations are listed in the operator/applicant's manual.

F. Special Emphasis Training; Special maintenance/inspection training programmes are required when new or different types of aircraft and/or equipment are introduced.

18.6 APPROVAL OF MAINTENANCE/INSPECTION TRAINING PROGRAMME

The programme prepared by the operator/Applicant in compliance with Air Navigation Regulation shall be submitted for CAASL acceptance, review and approval. A list of effective pages will show approval date of the maintenance/inspection training programme.

18.7 PROCEDURES

A. Review Operator File

B. Review Schedule of Events; If this task is performed as a part of an original certification, review the Schedule of Events to ensure that this task can be accomplished in accordance with the schedule.

C. Review Maintenance/ Training Manual and Programmes; The Manual and programme should include the following elements in the Maintenance Training Programme:

1. The name of the person responsible for the overall administration of the maintenance programme
2. The name(s) of the person(s) responsible for other processes within the maintenance training programme (e.g., recordkeeping, revisions to training programmes, and security of the programme)
3. Designated maintenance training instructors
4. A description of how instructors are determined to be qualified

5. Procedures used to authorize instructors

6. A file on the instructors consisting of qualifications, authorizations, and other documents pertaining to instructor assignments

7. A list describing what type of training is required for new employees (Indoctrination, on the job training, etc.)

8. Procedures for evaluating, crediting, and documenting a new employee's previous training

9. Procedures for determining what additional training is required for a new employee

10. A schedule for recurrent training, a description of recurrent training, and procedures for determining requirements for other training

11. Recordkeeping procedures, including records of the following:

    * Training dates
    * Who performed the training (instructor should indicate by signing)
    * The number of hours of training performed
    * The content of the training performed

12. Criteria for determining the quality of the training programme (training standards)

13. Evaluation of the need to revise training programmes

14. A training syllabus that describes the following:

    * Content of each training course
    * Format of training (classroom, on the job training)
    * Duration of training courses
    * Standards for grading students
    * Training aids

15. Criteria to determine acceptability of contract training, to include:

    * Qualifications of instructors
    * Criteria to establish appropriateness of reference material being taught
    * Reporting procedures to inform operator of student progress
    * Criteria to determine adequacy of facilities. Criteria to evaluate contractor's training syllabus

D. Observe Operator/Applicant Performing Training; This observation is performed regardless of whether the operator performs the training or contracts with another company.

1. Ensure that facilities are adequate, including classrooms, training aids, and reference materials.

2. Evaluate the instructor's presentation and knowledge.

3. Ensure that course content and instruction is in accordance with the training syllabus.
4. Ensure that training recordkeeping is performed in accordance with maintenance/inspection programme.

E. Analyze Findings; Evaluate all deficiencies to determine what changes will be required

F. Debrief the Operator/Applicant

1. If deficiencies are discovered during the review, return the programme to the operator/applicant with a letter describing the problem areas, if necessary. If this review is being performed as a part of a certification, inform the operator/applicant that issuance of the certificate will be withheld until deficiencies are corrected.
2. Schedule a meeting with the operator/applicant to discuss the problem areas if it may be helpful in resolving deficiencies. Discuss how to resolve deficiencies.

18.8 TASK OUTCOMES

A. File Form

B. Successful Completion of this task will result in the following:

1. A approval certificate to the operator/applicant indicating acceptance and approval of the programme
2. The original approved manual and the programme be sent to the operator/applicant along with instructions to provide a copy of the programme and to include in the manual appropriately.

NOTE: Required Checklist of establishment of Maintenance Training Organization is given in Section 3, Check list CL-AW-12 of this manual

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 19 - AIRCRAFT FUELING

19.1 BACKGROUND

Improper fueling procedures may cause aircraft accidents. If operators of fueling facilities establish procedures for safe and proper fueling of aircraft and fueling personnel follow these procedures, many aircraft accidents or incidents will be prevented. Fueling personnel should be familiar with the fuel requirements for the models and types of aircraft they are servicing. This chapter contains a description of fuel contamination and other problems that may be encountered in fueling aircraft and recommended procedures for combating these problems. This chapter provides guidance for an Airworthiness Inspector to inspect and subsequent approval of fueling facility.

19.2 GENERAL

A. An operator must have procedures for handling and dispensing fuels. The following must be included as components of the operator's fueling procedure manual:

- Dispensing equipment procedures
- Electrostatic protection procedures
- Contamination protection procedures
- Related record keeping procedures

B. The operator's manuals must include procedures for vendors and contractors. Though the state aviation regulations may not address standards for fueling facilities, this not relieves the operator of overall responsibility for conducting those operations within established industry standards.

19.3 FUELS

A. AVIATION GASOLINE

The naming system for the grades of aviation gasoline is derived from the general term "AVGAS," a widely used abbreviation of the words "aviation gasoline", followed by the grade marking. The grades are identified by their performance numbers, as recognized by all military and commercial specifications, e.g., 80, 100LL, and 100.

1. The naming system for AVGAS grades is printed on all containers in white letters and numbers on a red background.

2. Storage containers are also marked with a circular band around the piping, the color of which matches the dye in the AVGAS flowing through the line. The dyes are red for AVGAS 80, blue for AVGAS 100LL, and green for AVGAS 100. A minimum 4 inch wide band is recommended. If the pipeline is painted the color of the AVGAS, then no banding is needed.

B. JET FUELS

The three classifications of aviation turbine fuels are universally referred to as “jet fuels”.

1. The naming system for the jet fuel is printed on all containers in white letters on a black background to distinguish it from aviation gasoline.

2. Examples of jet fuel storage container markings include the following:

   - Jet A fuel containers marked with a single 4-inch wide (minimum) black band around the piping
   - Jet A-1 fuel containers marked with two 4-inch wide (minimum) black bands
   - Jet B-1 fuel containers marked with three 4-inch wide (minimum) yellow bands

19.4 FUEL CONTAMINATION

A. WATER IN THE FUEL

1. Water occurs in aviation fuels in three forms:

   a. Dissolved water occurs similar to the humidity in the atmosphere that converts to droplets and settles out as the fuel temperature decreases during flight.

   b. Suspended water appears in the form of droplets that reflect light. High concentration of droplets will cause fuel to have a cloudy or hazy appearance.

   c. Solid bodies of water may be caused by leakage of storage tanks, leaking filler neck seals, or the settling out of suspended water droplets.

2. Accumulation of water; There is no way of preventing the accumulation of water formed through condensation in fuel tanks. The accumulation is certain, and the rate of accumulation will vary; so it is recommended that storage tanks, fuel truck tanks and aircraft fuel tanks be checked DAILY for the presence of water. Any water discovered should be REMOVED immediately.

In addition to the daily water check, fuel tanks should be CHECKED AFTER EACH DELIVERY as insurance against inadvertent water contamination.

3. The minimum settling time; Adequate settling time is NECESSARY for accurate testing. The minimum settling time for aviation gas is 15 minutes per foot-depth of fuel and 60 minutes per foot-depth of turbine fuel.

4. Water checks of storage tanks and fuel trucks may be made by attaching water detecting paste, or litmus paper, to the bottom of the tank dip stick.

   a. Push the dip stick to the bottom of the tank and hold for 30 seconds. When the stick is removed, the detecting paste or litmus paper will have changed color if water is present.

   b. The source of excessive amounts of water must be determined and corrected before further use of fuel from the tank.

B. RUST AND SCALE

Rust and scale dislodged from the inside of fuel storage tanks may enter the aircraft fuel tanks and clog systems. Turbine fuel tends to dislodge rust and scale and carry the particles in suspension. Because of this, fuel dispensing equipment filters should be serviced frequently. Aviation gasoline should not be stored in tanks or equipment that have been used for turbine fuel storage.

C. MICRO-ORGANIC GROWTH

Micro-organic growth thrives in turbine fuel and appears as a soapy, slippery slime on the inside surfaces of fuel storage tanks. Micro-organisms of bacteria and fungi multiply rapidly and may cause serious corrosion in aircraft fuel tanks, as well as clog fuel filters, screens, and control units. Therefore, turbine fuel storage tanks should be checked frequently for the presence of slime or micro-organic growth. If found, the tank should be cleaned thoroughly to assure removal of the micro-organic growth and prevent further contamination.

D. DIRT, LINT, AND DUST

Dirt, lint, and dust may collect on fuel dispensing hose nozzles when proper storage receptacles are not used. Fuel hose nozzles should not be stored in such a manner that dirt or moisture will collect in them. Always check the nozzle for dirt and water before using it.

E. CONTAMINATION WITH OTHER TYPES OR GRADES OF FUEL

Contamination with other types or grades of fuel can cause aircraft engine damage and possible failure in flight. Turbine fuels mixed with aviation gasoline reduce the antiknock and volatility of fuels required for reciprocating engines. Quantities of aviation gasoline mixed with turbine fuels will cause damaging lead deposits to collect in jet engines when used indiscriminately. Transportation or storage of turbine fuel in tanks previously used for storage or transportation of aviation gasoline is not recommended as contamination from rust and scale, or a possible change of fuel specification, may result.

F. ADDITIVES

Additives. Certain turbine engine powered aircraft require the use of fuel containing anti-icing additives. Therefore, fuel personnel must know whether or not the fuels they dispense contain additives. When anti-icing additives are to be added to the fuel, the manufacturer's instructions (usually printed on the container) should be followed to assure proper mixture. Anti-icing additive content in excess of 0.15% by volume of fuel is not recommended as higher concentration can cause the aircraft fuel capacitance system to give erroneous indications. Concentrations of at least 0.05% additive by volume of fuel are effective in eliminating microbial growth.

19.5 FUEL DISPENSING EQUIPMENT

Fuel servicing vehicles should be conspicuously and legibly marked to indicate the type and grade of fuel.

1. Markings should be displayed on each side and on the rear of the vehicle in CONTRASTING colors.

2. Fuel hydrants and pit installations should be identified similarly, according to type of fuel and grade.

3. Turbine fueling vehicles should be marked to show whether or not anti-icing additives are contained in the fuel being dispensed.

4. Leaking or otherwise defective pumping equipment, plumbing, hoses, nozzles, and grounding cables of fuel dispensing vehicles and stationary facilities should be repaired before further use. Fuel/nozzle/lever stop notches should be removed to avoid the possibility of an inadvertent blocking open of the valve.

5. Fuel dispensing vehicles, and stationary facilities, should be equipped with appropriate fire extinguishers, fire blankets, static grounding cables, explosion proof flashlights, and ladders. Fire extinguishers should be located so they are accessible from either side of the vehicle and remote from probable fire hazard.

6. Fueling vehicles should be positioned as distant from the aircraft as permitted by the length of the fuel dispensing hose. Mobile units should be parked parallel to or heading away from the aircraft wing leading edge, so it may be moved away quickly in the event of an emergency. When the fueling operation is completed, the fueling vehicle should be parked at least fifty feet from aircraft or buildings and positioned in a manner to permit removal from the area without delay.

19.6 FUELING PROCEDURES

A. GENERAL

Fueling procedures. Fueling personnel should first check with the flight crew to determine the type and grade of fuel required, including additives for the aircraft. It is a good practice to have the pilot sign a demand, identifying the grade and quantity of fuel desired. In the absence of the flight crew, fueling personnel should check the placard located near the aircraft fuel tank filler port, or the aircraft owner's manual that is usually carried in the aircraft, to determine the type and grade of fuel required.

1. Check to ensure that:

   a. No electrical or radio equipment in the aircraft is energized or being maintained while fuel is being dispensed into the aircraft, except those switches that may require energizing to operate fuel selector valves and quantity gauge systems.

   b. Qualified personnel should be stationed at the aircraft fuel control panel during pressure fueling operations.

   c. Fueling personnel should not carry objects in the breast pockets of their clothing when servicing aircraft or filling fuel service vehicles because loose objects may fall into fuel tanks.

   d. Matches or lighters should never be carried during fueling operations.

   e. Because of the high lead content, direct avgas fuel contact with skin or the wearing of fuel saturated clothing should be avoided. Skin irritation or blisters may result from direct contact with fuel.

   f. Immediate medical attention should be sought if fuel enters the eyes.

   g. In the event of fuel spillage, discontinue fueling operations until the spill can be removed, using proper safety precautions.

B. FUELING FROM MOBILE EQUIPMENT

The following sequence should be followed by the fueling crew.

a. Connect a grounding cable from the fueling vehicle to a satisfactory ground. Grounding posts usually consist of pipes or rods driven far enough into the ground to result in a zero potential.

b. Connect a ground cable from ground to the aircraft (on landing gear axle or other unpainted surface). Do not attach ground cables to the propeller or radio antenna.

c. Connect a grounding cable from the fueling vehicle to the aircraft. The fueling vehicle may be equipped with a **"**T**"** or **"**Y**"** cable permitting ground attachment first and grounding of the aircraft with the other end.

d. Connect a grounding cable from the fuel nozzle to the aircraft before removing the aircraft tank cap. This bond is most essential and needs to be maintained throughout the fueling operation and until the fuel cap is replaced.

CAUTION: Conductive-type fuel hose does not provide a satisfactory method of bonding.

e. The fuel dispensing equipment grounding cables should be removed in the reverse order of the sequence outlined above.

C. FUELING FROM HYDRANTS, PITS, AND CABINETS

a. Connect the grounding cable from the dispenser to the aircraft.

b. Connect the grounding cable from the hose nozzle to the aircraft before removing the fuel cap.

D. OVERWING FUELING

The fuel filler hose should be draped over the wing leading edge. Never lay the fuel filler hose over the wing trailing edge because aircraft structural damage may result. A simple rubber shower mat may be used to provide protection for wing leading edges during fuel operation. Step ladders or padded upright ladders may be used to provide easy access to high wing and large aircraft. Standing on wing surfaces should be avoided and never stand on wing struts. Hold the fuel nozzle firmly while it is inserted in the fuel tank filler neck and never block the nozzle lever in the open position. Be sure that fuel filler caps are replaced and securely latched when fueling is completed.

E. UNDERWING FUELING

Discharge possible static buildup in the fuel dispensing hose by touching the pressure nozzle to an unpainted part of the aircraft, such as a landing gear axle, before attaching to the aircraft filler receptacle. **No static ground wire between the filler nozzle and the aircraft is necessary.**

F. FUELING FROM DRUMS

Refueling from drum storage or cans should be considered as an unsatisfactory operation and one to be avoided whenever possible. All containers of this type should be regarded with suspicion and the contents carefully inspected, identified, and checked for water and other contamination.

a. Drums or cans should, if practicable, be protected from the sun and weather. All drums should be stored off the ground and on their sides, with the bungs below the liquid level, and in such a manner that they are visible and accessible. Drums stored vertically can accumulate water around the bungs which can be sucked into the drum by thermal heating and cooling of the fuel. Additionally, fuel in the drums or cans should be used according to the fueling delivery date - oldest stock first. **Avgas has a 6 month shelf life** therefore old fuel should be sampled and checked by a laboratory before use in an aircraft.

b. Only sound clean drums with good interiors should be used. Where fuel storage in drums has occurred for long periods, the use of the fuel is questionable unless it has been tested for quality. Bungs should always be screwed tightly into empty drums because an open bunghole allows hazardous vapors to escape from the drum after the drum has been emptied.

c. When fueling from drums, it is advisable to use a **5 micron filtered portable** pumping unit, the best filtering equipment available locally or, as a last resort, a chamois skin filter and filter funnel.

Remember refueling from drums or cans is considered to be unsatisfactory. Extraordinary precautions are necessary to eliminate the hazards of water and other contaminants.

G. WATER DRAIN

The aircraft fuel tank sumps should be drained before each fuel servicing to remove water that may have accumulated from condensation or entered the tank during fueling operations. Draining fuel sumps immediately after fueling serves little purpose because the agitation action of fuel entering the tank may suspend water and contaminants - which can remain suspended for many minutes and may not settle out until the aircraft is airborne.

19.7 PROCEDURES

A. REFERENCES

- FAA AC 150/5230-4B, Aircraft Fuel Storage, Handling, and Dispensing on Airports, as amended
- FAA AC 20-125, Water in Aviation Fuel

B. REVIEW PROCEDURES

1. Review the Operator's Manual. Ensure that the manual indicates whether services will be performed by the operator or contracted out.

   a. Review the operator's manual to ensure that it defines the following:
      - Lines of authority and responsibilities
      - The operator's training programme
      - The vendor's training programme, if applicable

   b. Ensure that the manual contains procedures for the following:
      - Inspection of incoming fuels
      - Elimination of fuel contamination
      - Use of dispensing equipment
      - Refueling and defueling, by specific make and model of aircraft

   c. Ensure that the manual includes procedures for record retention and ongoing inspections of the following:
      - Fuel (Millipore checks, etc.)
      - Storage facilities and dispensing equipment
      - Filters
      - Safety equipment
      - Training programmes for servicing personnel
      - Individual training records
      - Vendors (in accordance with operator's programme)

   d. If the manual is acceptable at this point, continue on to the facilities inspection. If the manual is unacceptable, return it to the operator for corrections and/or revisions.

2. Inspect the Facility

   a. Ensure that:

      - Personnel training requirements are documented and current
      - Training is conducted according to the manual curriculum

- Piping is marked and color coded to identify fuel type and grade
- Control/cutoff valves are clearly marked with instructions for emergency use, e.g., on/off

b. Ensure that the fuel farm/storage area provides for the following:

- Proper security (fenced and posted)
- Proper display of “Flammable” and “No Smoking” signs
- Markings to identify type/grade of fuel

c. Ensure that the equipment includes the following:

- A positive low point sump
- Adequate fire extinguishers

d. Ensure that fuel filters/filter separators contain, at a minimum, the following:

- An inlet strainer
- Inflow and outflow filter/separators sized to match maximum pump flow capacity
- Differential pressure check system
- Positive water defense system
- Sump drain with outlet located to facilitate capture of outflow
- Fuel sampling (Millipore or equivalent) fittings downstream of all filters and filter/separators

e. Ensure that hoses, nozzles and outflow connectors are:

- Specifically designed and tested for delivery of aviation fuels
- Controlled by spring loaded, non-by-passable automatic (dead-man) fuel flow cutoff valves
- Equipped with dust cap or other feature that will minimize contaminant introduction into fuel/system
- Equipped with non-by-passable 100 mesh nozzle/connector screens
- Color coded to identify fuel type

f. Ensure that electrical equipment, switches, and wiring are of a type or design approved for use in hazardous locations (explosion proof, e.g., free of exposed conductors, contacts, switches, connectors, motors, etc).

g. Verify that grounding and bonding equipment ensures that piping, filters, tanks, and electrical components are electrically bonded together and interconnected to an adequate electrical ground. The system should have ground wires, bonding wires, and clamps adequate to facilitate prompt, definite electrical ground connection between fueler/pit/cabinet, grounding system, and aircraft being fueled.

h. Ensure that fuel tenders and fueling pits have the following:

- Appropriate markings displayed, e.g., “DANGER”, “FLAMMABLE”, “NO SMOKING”, fuel grade, standard hazardous material placard, filter due dates, and emergency fuel shutoff
- Appropriately placed fire extinguishers
- Air filter/spark arrestor and a leak-free exhaust system terminating in a standard baffled original equipment type muffler, if equipped with internal combustion engine

NOTE : Refueling Inspection Checklist for the Airworthiness Inspectors attached in Check list CAA/AW/CL/18 of Section 03 to Airworthiness Office Procedures Manual.

SECTION TWO

VOLUME 2

AIR OPERATOR/MAINTENANCE ORGANIZATION ADMINISTRATION AND SURVEILLANCE

CHAPTER 20 - MAINTENANCE MISTAKE AND SYSTEM SOLUTIONS

20.1 OBJECTIVE

The objective of this chapter is to discuss human factors as related to aircraft maintenance for the purpose of Airworthiness Inspectors to understand the application of Human Factor concept. This Chapter has been adapted from an article written by Alan Hobbs, Human performance investigator, with the Australian Bureau of Air safety Investigation. The literature in this chapter gives an opening for the Airworthiness Inspector to study about the human factor applications in aircraft maintenance.

Human factors Is not just about people: it is also about improving systems. While the focus of this article is on airline maintenance, there are also lessons for general aviation.

Most people will say that the common threats to the airworthiness of an aircraft are metal fatigue, corrosion, and excessive wear of components or other results of ageing and use.

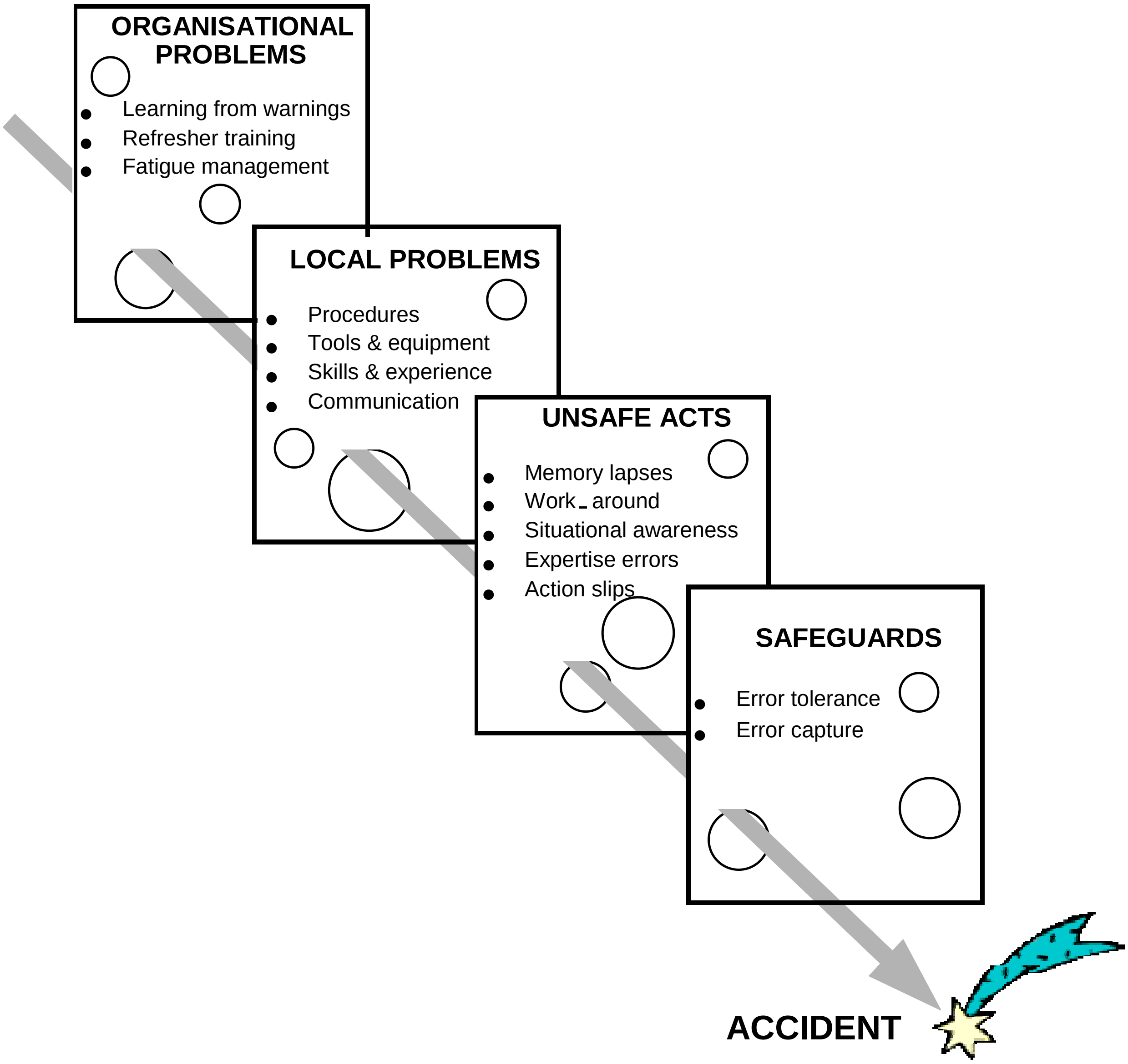
Yet today, as aircraft become increasingly reliable, we have reached the point where the actions of the maintainers themselves lie at the heart of many airworthiness problems. According to Boeing, around 15% of major aircraft accidents involve maintenance error.

Human errors, and the frustration, sleepiness, misunderstandings and memory lapses which produce them, are powerful forces affecting the quality of maintenance and hence the airworthiness of aircraft.

There is now a worldwide effort to understand more about the human side of maintenance problems. This article deals with just a few of these issues.

Maintenance errors can have a significant impact not only on safety, but also on the financial performance of large and small operators alike. A single in-flight turn-back of a Boeing 747, with the need to accommodate passengers overnight, can easily wipe out $250,000 of profit. It has been estimated that in the USA, maintenance error could cost airlines one billion US dollars per year!

The term 'human error' is used throughout this article in recognition of the fact that most aviation accidents do involve human error at some point in the chain of events. However, we need to recognize that these errors (or unsafe acts) tend to be just one link in a chain of events. A useful framework to use when considering human factors issues is the Reason model of accident causation outlined in the next paragraph.



Unsafe acts are not just problems in their own right, but can be seen as *symptoms* of wider problems. For example, in March 1994 the number one engine and pylon of a 747-200 rotated downward during the landing roll and contacted the runway. There were no injuries to passengers or crew. The aft fuse pin on the pylon diagonal brace had migrated from its fitting and was found loose in the pylon structure. The type of pin fitted to this aircraft was normally secured in place by two retaining devices, but on this occasion, neither of these retainers could be found.

Approximately 10 hours after the accident, the missing retainers were found in an unmarked cloth bag on a work stand near where the aircraft had recently undergone a C-check. The C-check had included an -inspection of the diagonal brace fuse pin lugs on the two outboard engines.

It was never established who had made the errors that culminated in the accident; however, finding the people responsible may not have helped prevent future accidents. The most important lessons learnt from this accident were not about individuals, but about the way maintenance was organized and carried out.

The US National Transportation Safety Board (NTSB) identified a range of system problems including an error-producing work environment, potentially dangerous scaffolding, poor lighting, inappropriate storage of parts, a lack of training in company maintenance policies and inadequate oversight by the US Federal Aviation Administration (FAA). Addressing each of these upstream problems would not only reduce the chance of the same errors happening again, but should also help to prevent a host of other quality problems.

20.2 Unsafe acts: What goes wrong?

In order to understand the types of errors made by maintenance engineers, the Bureau of Air Safety Investigation (BASI) has collected information on over 120 maintenance unsafe acts from interviews with airline engineering personnel and from incident reports received during a study of the regional airline industry. Most of the unsafe acts were corrected before the aircraft flew, or resulted in only minor consequences.
Over 80% of the unsafe acts of maintenance mechanics fell into one of five types.

1. Memory lapse: 24%

Memory lapses do not generally happen randomly, but often occur when a person is interrupted to go and do something else. Juggling maintenance tasks on several aircraft is a common situation which can lead to a memory lapse.
Being the only person on shift, I was responsible for both hangar and line maintenance. There was a fuel quantity problem on and, had to move fuel plumbing to gain access. I was distracted from my task by heavy commitments with line defects. I forgot to check the tightness of the B-nuts causing the aircraft to develop a potentially disastrous fuel leak.
-De-identified incident report

2. Work- arounds : 23%

Typically, work-arounds involve performing a task without all the necessary equipment, or in a more convenient manner than in the approved procedures. However, some are more serious, as in the case of workers faced with time pressure who decide not to document their actions or decide not to perform all the required steps in a task. On their own, work-arounds may not necessarily result in an incident, but serious problems can result when other people are not aware that someone has taken a shortcut, or when a work-around is followed by an error.

It was a Friday afternoon and I was about to knock off for the weekend I decided to do one last-minute job and tighten the nose-wheel steering cables on a twin-engine aircraft. Not having an appropriate flagged rig pin I used a bolt through the aircraft floor to hold the rudder pedals in neutral. It got dark and everyone was anxious to go home, and I was holding them up. At the end of the job I signed off the Maintenance Release but forgot to remove the bolt. On Monday I was asked if the aircraft was ready and I said yes'. The aircraft was flown for a whole day checking out a pilot with landings every 20 minutes. If they had feathered an engine or there had been an engine failure they would have been in real trouble, as the limited rudder movement was from this bolt flexing in the floor structure.

-De-identified incident report

Maintenance mechanics are often faced with the pressure of being informed by companies to follow the procedures, but at the same time are encouraged to get work done to deadlines. One mechanic summed it up this way: 'Management tells us to follow the procedures to the letter, but then they tell us not to be obstructive and to use common sense' A recent European study found that a third of maintenance tasks involved a deviation from official task procedures.

3. **Situational awareness: 18%**

Situational awareness errors occur when the mechanic starts work without first gaining an accurate picture of the situation being dealt with. Often, they don't realise that the situation is different from normal, as when a mechanic activates hydraulics without noticing that cockpit controls have been moved while the hydraulics were off. In other cases, an engineer may not be aware of work being done by other workers on the same aircraft.

4. **Expertise: 10%**

Errors of expertise happen when someone doesn't have the knowledge, skills or experience to do all aspects of their job. As might be expected, errors of expertise tend to involve less experienced workers. The fact that 10% of errors are of this kind could indicate deficiencies in training.

5. **Action slips: 9%**

Action slips occur when someone accidentally does something unintentionally. Slips tend to occur on routine, highly familiar tasks.

A mechanic accidentally put engine oil into the hydraulics system of an aircraft. Oil and hydraulic fluid were stored in nearly identical tins in a dark storeroom.

-De-identified incident report

20.3 Local problems: Why do things go wrong?

The BASI analysis of maintenance incident reports found that for incidents which had airworthiness implications, the most common factors in the work area at the time of the incident were:

1. Confusion or misunderstandings or differences of opinion about procedures

It is not unusual to find that workers have a fairly limited understanding of a company's formal policies and procedures and instead follow informal practices developed on the job. Older, experienced workers will sometimes develop their own practices, which may be different from the approved procedures. Unworkable or inconvenient procedures prompt the sort of work-arounds described earlier.

2. Communication breakdowns between people

In a recent survey, senior US maintenance mechanics were asked to describe the most challenging part of their job. Their most common answer was 'human relations or dealing with people'[4] Performing in a team requires more than technical know-how, and we often overlook the need to develop these important communication and people skills.

3. Pressure or haste

Since the early days of aviation maintenance personnel have faced pressures to get aircraft back into service. However, as aircraft become more complex and operators strive to reduce the amount of time that aircraft spend in maintenance, pressure is a growing fact of life for maintenance engineers. A particular risk is that engineers faced with real or self-imposed time pressures will be tempted to take shortcuts to get an aircraft back into service more quickly.

Maintenance systems have built-in safeguards such as independent inspections and functional tests designed to capture errors on critical tasks. By necessity, these error-capturing safeguards generally occur at the end of jobs, at exactly the time when pressures to get the aircraft back into service are likely to be greatest and the temptation to leave out or shorten a procedure is strongest.

In the recent BASI survey, 32% of mechanics reported that there had been an occasion when they had not done a required functional check because of a lack of time. At the time, such a decision may have seemed safe and reasonable; however, decisions made under pressure do not always stand the test of hindsight.

4. Inexperience

Younger personnel need to know about the traps lying in wait for them, yet too often they are allowed to discover these for themselves.

5. A lack of tools, or equipment, or spares

Many work-arounds occur in response to a lack of appropriate hardware or spares. It is understandable that airlines will try to reduce their stocks of expensive spares; however in some cases relatively inexpensive spares such as O-rings are nil-stock items. Furthermore, a lack of major spares can lead to increased cannibalization of parts from other aircraft, which in turn doubles the disturbance to systems and increases the potential for human error.

A common theme underlying these problems is that maintenance personnel may need training in human factors areas such as communication, supervision, and dealing with pressure and frustration.

The great benefit of human factors training is not only that people change, but that people can see the opportunities to change the systems in which they work. For this reason, managers, who have the most power to change things, should not be excluded from human factors training.

'My company ran a human factors course for all mechanics in 1996. It was very informative and I learnt a lot of things I hadn't even thought about before. As a result I have changed my attitudes and actions to increase my personal safety and awareness. This course should be given to all apprentices or new hires. If is invaluable'.
-Survey comment

20.4 Organizational factors: What are the weaknesses In the overall system?

Maintenance incidents can reflect a range of organizational problems. Three of the most important of these are dealt with below.

1. Lack of refresher training

The Regulations state that maintenance personnel must receive 'proper and periodic instruction' however, in reality, few maintenance engineers receive refresher training once they have gained their licences. Without such training, non-standard work practices can develop or engineers can lose touch with changes in regulations or company procedures. One senior airline manager put it this way: 'Maintenance engineers are like torque wrenches: they need to be re-calibrated from time to time'

2. Lack of learning from incidents

The conventional wisdom among safety experts is that for every accident there may be 30 or more previous minor incidents. When BASI interviewed maintenance engineers about incidents, it became apparent that before a serious quality lapse occurs, there are usually earlier incidents which could have acted as warnings of a problem.

Unfortunately we do not always learn the right lessons from these 'warning incidents; sometimes because they are never reported. It is never easy to admit a mistake; however, it is even harder when an organization punishes people who make honest mistakes, perhaps by docking pay or placing notes on personnel files. A punitive culture within the company or the regulatory authority creates an atmosphere in which problems are quietly corrected and places barriers in the way of learning from our mistakes. In the recent BASI survey of maintenance personnel, 66% of respondents reported that they had corrected an error made by one of their colleagues without documenting it, in order to avoid getting them into trouble.

One action which managers can take to ensure that they hear about the 'warning incidents' is to have a clear 'responsibility policy; which outlines how the organization will respond to maintenance incidents. Figure 2 illustrates how a responsibility policy might work, although every operation will need to tailor such a policy to its own requirements. Needless to say, no policy such as this can be expected to function if the regulatory authority penalises those who report their mistakes.

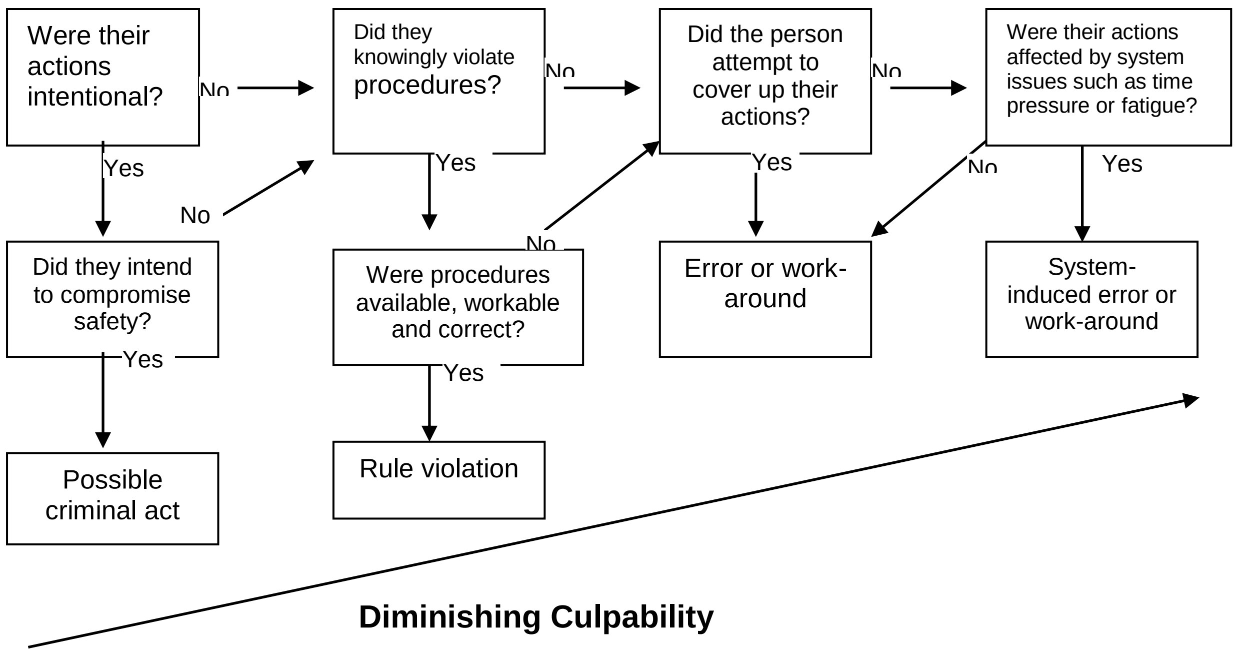
Until the regulator's inspectors move away from the blame culture that is currently implemented, maintenance defects and incidents will always be covered up and hidden.
-Survey comment

Once an incident has been reported, the focus of an internal investigation should normally be on identifying system problems, not on identifying personal deficiencies of individuals.

There may be rare times when incidents are related to intentional acts of malice, but the great majority of maintenance mechanics do their jobs with diligence and integrity and most incidents reflect system problems which go beyond individual workers.

An internal investigation that only results in recommendations directed at the level of individuals, (such as reminders to engineers to 'be more careful' or to 'follow procedures more closely') are sure signs that the investigation did not identify the system failures which led to an occurrence. There are now structured methods to help managers identify system failings in maintenance, such as the Boeing maintenance error decision aid (MEDA) system.

Figure 2. An example of a 'responsibility polity', adapted from James Reason



3. Fatigue

There is probably no way to avoid the need for maintenance to be done at night; however, this does not mean that fatigue levels cannot be managed. Unfortunately, almost all night-shift workers suffer from a lack of quality sleep.

Recent Australian research has shown that moderate sleep deprivation of the kind experienced by shift workers can produce effects very similar to those produced by alcohol. After 18 hours of being awake, mental and physical performance on many tasks is affected as though the person had a blood alcohol concentration (BAC) of 0.05%. Boring tasks which require a person to detect a rare problem (like some inspection jobs) are most susceptible to fatigue effects. After 23 hours of being continuously awake, people perform as badly on these tasks as people who have a BAC of 0.l2%.

One in five of the engineering personnel who responded to the recent BASI survey claimed they had worked a shift of 18 hours or longer in the last year, with some having worked longer than 20 hours at a stretch. There is little doubt that these people's ability to do their job would have been degraded. An important point to note is that like people who are intoxicated, fatigued individuals are not always aware of the extent to which their capabilities have degraded.

At a time when the dangers of fatigue are being recognized in areas as diverse as medicine and road transport, we must ask why there are no regulations to control the risks of fatigue among aircraft mechanics.

4. Time of the day

Because fatigue was mentioned by many engineers as a problem, it is worth considering the time at which occurrences occurred. In high-capacity airlines, maintenance occurrences were most frequent at around 1100, but then reduced in frequency between 1200 and 1300, presumably as workers took meal breaks. The next most frequent time for occurrences in high-capacity airlines was around 0300. These occurrence patterns do not reflect variations in the number of workers present, because for high-capacity airlines there are almost as many workers present at night as during the day.

The time of occurrences in non-airline maintenance showed a different pattern, largely reflecting the fact that most work is carried out during daylight hours. There were two definite peaks in occurrence times, one just before 'knock off' time and the other just before lunch.

Just as there are 'black spots' on our roads, so there are also 'black times' for shift workers. For maintenance workers on night shift, it seems that 0300 is a black time. Late morning and early afternoon are also danger times. There is a clear lesson here for those who schedule maintenance tasks: *0300 is an undesirable time to be carrying out complex or crucial maintenance tasks.*

For those who work more conventional hours, the times immediately before breaks appear to be danger periods. In particular, the end of the working day can produce a hazardous combination of pressure and fatigue.

Safeguards: Reducing the consequence of maintenance error

Minimizing the consequences of errors VS 'working without nets'

Functional checks and independent inspections are examples of safeguards designed to capture errors before they cause harm.

However, there is another approach to managing error which is sometimes overlooked. This is to acknowledge that errors will occur from time to time and that we need to design procedures and systems that can minimize the consequences of such errors. Special maintenance precautions applied to extended-range twin-engine operations (ETOPS) are an example of such an approach. When an aircraft is being maintained in accordance with ETOPS procedures, the performance of identical maintenance actions on multiple elements of critical systems is avoided wherever possible. Engines, fuel system, fire-suppression systems and electrical power are examples of ETOPS critical systems on twin engined ETOPS aircraft.

However, these precautions are not generally applied to aircraft with more than two engines, or to twin-engine aircraft which are not being maintained in accordance with an ETOPS maintenance programme.

For example, in 1995, a European-operated Boeing 737-400 was forced to divert shortly after departure following a loss of oil quantity and pressure on both engines. Both of the aircraft's CFM- 56 engines had been subject to boroscope inspections during the night prior to the incident flight. High-pressure rotor drive covers were not refitted on each engine and as a result, nearly all the oil was lost from the engines during the brief flight.

Several months after this incident a similar overseas incident occurred on a Boeing 747-400. Shortly after departing on an over-water flight, the crew noticed reducing oil quantities on the number one and number two engines. The aircraft was turned back to its departure point, where it arrived safely without any need for the engines to be shut down in flight. After landing, oil could be seen leaking from the engines.

Boroscope inspections had been carried out on all four of the GE-CF6 engines. This inspection normally involves removing and then refitting the starter motor from each engine, and in fact the starter motors were removed from the number one and number two engines in preparation for the job. Because the tool to enable the engines to be turned by the starter drive could not be found, the starter motors for engines 3 and 4 were not removed and all engines were turned by an alternative method. A lack of spares had led to a practice of not replacing O-rings when refitting starter motors. However, on this occasion a mechanic did comply with documented procedures and removed the O- rings from the number one and two starters.

The workers who refitted the starters apparently assumed that the situation was 'normal' and did not notice that the O-rings were missing 'situational awareness' error.

This incident had a variety of causal factors, such as informal procedures which had evolved to work around the frequent 'nil stock' state of spares, poor lighting and inadequate leak check inspections. However, an important point is that because the aircraft had four engines, it was not protected by ETOPS standards. In essence, the mechanics were 'working without nets'. Had the job proceeded as originally planned, the starter motors would have been removed from all four engines, with serious consequences.

The extension of some ETOPS precautions to non-ETOPS operations would help to contain such maintenance-induced problems.

Boeing has encouraged operators as a general practice to institute a programme by which maintenance on similar or dual systems by the same personnel is avoided on a single maintenance visit' BASI has also published the following suggested safety action: 'Where possible, the simultaneous performance of the same maintenance tasks on similar redundant systems should be avoided, whether or not the aircraft is an ETOPS aircraft".

20.5 CONCLUSIONS

Unfortunately, advances in aviation technology have not necessarily been matched by improvements in the way we organize the work of the people who maintain aircraft.

The remarkable aspect about maintenance incidents is that many of them share similar features. A relatively limited number of unsafe acts, such as work-arounds, memory lapses and situational awareness errors typically occur in the context of problems such as unclear or poor procedures, a lack of equipment or spares, communication breakdowns, time pressure and fatigue. Because unsafe acts are generally symptoms of wider problems, human factors are not just about focusing on people but on the systems within which people work.

This article concludes with just five system-level improvements that may help to ensure safer maintenance:

1. Introduce refresher training, particularly on company policies and procedures.
2. Introduce a clear 'Responsibility Policy' to remove barriers that discourage people from reporting incidents.
3. Introduce a fatigue management programme. This will almost certainly involve ensuring that workers get adequate sleep opportunities. If 12-hour shifts are being worked, a ban on extending shifts with overtime may be necessary.
4. Introduce human factors training for management and workers.
5. Minimize the simultaneous disturbance of multiple or parallel systems.

While striving for perfect performance by those maintaining aircraft, we should recognize that making mistakes is an unfortunate but unavoidable consequence of being human.

20.6 REFERENCES

1. Marx D. (1998) *Learning from our Mistakes: A review of maintenance error investigation and analysis Systems,* FAA.
2. NTSB Special Investigation Report NTSBISIR-94102.
3. Eggerling U. (1998) Airbus Industry, *Human Factors in Maintenance: The Need for Dialogue and Feedback,* Paper Presented to Association

of Asia Pacific Airlines Maintenance Human Factors Conference, Sydney February 1998.

4. Predmore S. and Werner T. *Maintenance Human Factors and Error Control Eleventh* FAA Meeting on Human Factors Issues in Aircraft Maintenance and Inspection. Washington, DC: FAA

5. Reason J. (1997) *Managing the Risks of Organizational Accidents* Ashgate, Aldershot.

6. Rankin W and Allen J (1996) Boeing Introduces MEDA: Maintenance Error Decision Aid Airliner April-June 20-27.

7. Dawson, D. and Reid, K. (1997) Fatigue and Alcohol Intoxication Have Similar Effects on Performance. *Nature,* 38, 17 July,235.

8. Wilhamson A. and Feyer A. Moderate sleep deprivation produces comprehensive cognitive and motor performance impairments equivalent to legally proscribed levels of alcohol intoxication.

9. Air Accidents Investigation Branch (1996) Aircraft Accident Report 3/96.

10. Boeing Service Letters *Dual System Maintenance Recommendations* 17 July 1995.

11. Bureau of Air Safety Investigation (1997) *Human factors in airline maintenance: A study of incident*