สำนักงานการบินพลเรือนแห่งประเทศไทย
The Civil Aviation Authority of Thailand

GUIDANCE MATERIAL

FOR

Extended Diversion Time Operations (EDTO/ETOPS)

Approved by

.....

(Chula Sukmanop)
Director General
The Civil Aviation Authority of Thailand

Revision 02, 30 April 2019

Intentionally Left Blank

ISSUE APPROVAL

This Guidance Material (GM) contains the standards, policies, procedures and guidelines concerning the Thai Air Operator Requirement (AOCR) and is published for use by The Civil Aviation Authority of Thailand (CAAT) personnel delegated with the responsibility of certifying Air Operators shall comply with all provisions in this GM during the certification process

In addition, this GM contains instruction in respect of certification to be eligible to conduct by Air Operators for guidance to reach the CAAT requirement. Amendments to this GM will be notified through www.caat.or.th.

Intentionally Left Blank

TABLE OF CONTENTS

Contents Page

LIST OF EFFECTIVE PAGES

Title	Page	Rev.	Date
Table of Contents	A/1	02	30 April 2019
List of Effective Pages	A/2	02	30 April 2019
Records of Revision	A/3	02	30 April 2019
Revision Highlights	A/4	02	30 April 2019
Acronyms	A/5	02	30 April 2019
Definitions	A/7-12	02	30 April 2019
Extended Diversion Time Operations	1-22	02	30 April 2019
Appendix A	23-34	02	30 April 2019
Appendix B	35-41	02	30 April 2019
Appendix C	42-48	02	30 April 2019
Appendix D	49-51	02	30 April 2019

RECORDS OF REVISION

Revision No.	Issue Date	Date Inserted	Inserted by
Original	31 August 2015	31 August 2015	DCA
01	19 September 2016	19 September 2016	OPS
02	30 April 2019	30 April 2019	OPS

REVISION HIGHLIGHTS

Chapter/Section	Description of Change
All	New Template
Chapter 2, 2.5	Adding - EDTO significant systems
Attachment 1	Delete Attachment 1
Appendix A, 1.1	Amend reference of EDTO/ETOPS application form to AOCR Appendix A.

ACRONYMS

AD	Airworthiness Directive
ADCA	Announcement of Department of Civil Aviation (Thailand)
AFM	Aircraft Flight Manual
AMC	Acceptable Means of Compliance (EASA)
AOC	Air Operators Certificate
APU	Auxiliary Power Unit
ATC	Air Traffic Control
CAAT	The Civil Aviation Authority of Thailand
CASA	Civil Aviation Safety Authority (Australia)
CAAP	Civil Aviation Advisory Publication (Australia)
CAO	Civil Aviation Order (Australia)
CMP	Configuration Maintenance and Procedures
DH	Decision Height
EASA	European Aviation Safety Agency
EDTO/ETOPS	Extended Diversion Time Operations /
FAA	Federal Aviation Administration (of the USA)
FAR	Federal Aviation Regulations (of the USA)
HF	High Frequency (3000 to 30 000 KHZ)
ICAO	International Civil Aviation Organization
IFSD	In-flight Shut Down
INTER	Intermittent
ISA	International Standard Atmosphere
MCM	Maintenance Control Manual
MDA	Minimum Descent Altitude
MEL	Minimum Equipment List
MMEL	Master Minimum Equipment List
NOTAM	Notice to Airmen

PDSC	Pre-departure Service Check
PIC	Pilot-in-command
QFE	Q code – nautical height (see definitions)
QNH	Q code – field elevation (see definitions)
PROB	Probability
RAT	Ram Air Turbine
RFFS	Rescue and firefighting services
SATCOM	Satellite Communication
STC	Supplemental Type Certificate
TCDS	Type Certificate Data Sheet
TEMPO	Temporary

DEFINITIONS

ADEQUATE AERODROME – An aerodrome at which the aeroplane landing distance performance requirements at the expected landing weight can be met and which is expected to be available, if required, and which has the necessary facilities and services, such as air traffic services, lighting, communications, meteorological services, navigation aids, aerodrome rescue and fire-fighting services and at least one suitable authorized instrument approach procedure.

APPROVED ALL ENGINE OPERATING (AEO) SPEED – The approved AEO cruise speed for the aeroplane must be a speed, within the certified limits of the aeroplane, selected by the operator and approved by DCA. The AEO speed may be different from the speed used for the maximum diversion time and threshold time.

AREA OF OPERATION – The area within which EDTO/ETOPS operations are approved where the EDTO/ETOPS diversion time, at any point along the proposed route of the flight, to an EDTO/ETOPS en-route alternate aerodrome, is within the operators approved EDTO/ETOPS maximum diversion time, in ISA conditions, still air, at the approved OEI or AEO cruise speed, as applicable.

APPROVED ONE ENGINE INOPERATIVE (OEI) SPEED – The approved OEI cruise speed for the intended area of operation must be a speed, within the certificated limits of the aeroplane, selected by the operator and approved by DCA. The speed should be the same speed used to determine the fuel reserves for one engine inoperative flight, but may be different from the speed used for the maximum diversion and threshold time.

COCKPIT DOCUMENTATION – means any document taken into, or downloaded in the cockpit of an aeroplane by (or for) the PIC, for the purpose of flying and navigating the aeroplane, and includes, for example, a computerized flight plan.

CRITICAL POINT (CP) – is the point along a route which is most critical from a fuel requirement point of view from which an aeroplane can proceed towards the destination or initiate a diversion to another aerodrome. The CP is usually, but not always, the last equal- time point (ETP - see below).

DIVERSION DECISION – Procedures for flight crew should outline the criteria that indicate when a diversion or change of routing is recommended whilst conducting an EDTO/ETOPS flight. For an EDTO/ETOPS flight, in the event of the shutdown of an engine, the diversion decision should take into account the procedure for the engine shutdown, the diversion to fly to and land at the nearest aerodrome appropriate for landing.

EDTO/ETOPS –Any flight by a turbine-engine aeroplane where the flight time from a point on the route to an adequate aerodrome, at the OEI cruise speed for aeroplanes with two engines or at the AEO cruise speed for aeroplanes with more than two engines, is greater than the threshold time.

EDTO/ETOPS ALTERNATE AERODROME – is an adequate aerodrome that is listed in the operator's operations manual and the weather requirements of the EDTO/ETOPS alternate aerodrome planning minima requirements in Sections 6 of Appendix B to this manual.

EDTO/ETOPS — configuration, maintenance and procedures (CMP) document – The document approved by the Primary Certifying Authority and which contains the particular aeroplane configuration minimum requirements, including any special inspection, hardware life limits, master minimum equipment list (MMEL) constraints and maintenance practices found necessary to establish the suitability of an airframe-engine combination for extended diversion time operation.

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

EDTO/ETOPS DISPATCH – is when the aeroplane first moves under its own power for the purpose of taking-off for an EDTO/ETOPS flight.

EDTO/ETOPS MAXIMUM DIVERSION DISTANCE – is the approved EDTO/ETOPS maximum diversion time at the approved OEI cruise speed, or in the case of aeroplanes with more than two engines the approved AEO cruise speed, used throughout the flight profile.

EDTO/ETOPS SIGNIFICANT SYSTEMS – EDTO/ETOPS-significant system An aeroplane system whose failure or degradation could adversely affect the safety particular to an EDTO/ETOPS flight, or whose continued functioning is specifically important to the safe flight and landing of an aeroplane during an EDTO/ETOPS diversion.

ENTRY POINT – is the first point along the aeroplane's outbound route beyond which the aeroplane is no longer continuously within the threshold time, at the approved cruise speed (OEI or AEO), in still air and international standard atmosphere (ISA) conditions, from an adequate aerodrome.

EQUAL TIME POINT (ETP) – is a point along the route which his located at the same flight time from two points. (Note: also referred to as Equi-Time Point)

ETOPS – previously used term for extended range operations by twin-engined aeroplanes, may still be used instead of "EDTO/ETOPS" as long as the concepts are correctly embodied in the concerned regulation or documentation.

EXIT POINT – is the first point along the aeroplane's route where the aeroplane can fly continuously within the Threshold time, at the approved cruise speed (OEI or AEO), in still air and ISA conditions, from an adequate aerodrome.

FLIGHT/DISPATCH RELEASE – can take many forms (i.e. a computerized flight plan) and will include references to:

- the EDTO/ETOPS alternates for the flight
- the approved EDTO/ETOPS maximum diversion time under which the flight has been released or dispatched.

The release will also take into account the Minimum Equipment List (MEL), weather and Notice to Airmen (NOTAM) information relevant to the flight.

MAXIMUM DIVERSION TIME – is the time approved by DCA for an operator's airframe/engine combination.

- For an aeroplane with 2 turbine engines the approved maximum diversion time should not exceed the most limiting EDTO/ETOPS significant system time limitation identified in the AFM reduced by an operational margin of at least 15 minutes.
- For an aeroplane with more than 2 turbine engines type design approval is not required. The maximum diversion time should take into consideration the aeroplane's EDTO/ETOPS significant systems (i.e. time limiting system) – if any – indicated in the AFM or in the OEM Operations Manual. It must be relevant to that particular operation for a particular aeroplane type and the operator's operational and EDTO/ETOPS experience with the aeroplane type; or, if relevant, with another aeroplane type or model. For aeroplanes with more than two engines the maximum diversion time may be limited by the capability of the Cargo Fire Suppression Systems (CFSS).

OPERATOR'S APPROVED DIVERSION TIME – is the maximum time authorised by DCA that the operator can operate an aeroplane type at the approved OEI cruise speed (under standard conditions in still air) from an adequate aerodrome for the area of operation.

QFE – is the barometric altimeter setting that causes an altimeter to read zero when at the reference datum of a particular airfield (in practice, the reference datum is either an airfield center or a runway threshold). In ISA temperature conditions the altimeter will read height above the airfield/runway threshold in the vicinity of the airfield.

QNH – is the barometric altimeter setting that causes an altimeter to read airfield elevation when on the airfield. In ISA temperature conditions the altimeter will read altitude above mean sea level in the vicinity of the airfield

THRESHOLD TIME – is not an operating limit. It is a flight time to an en-route alternate aerodrome which is established by CAAT as being the EDTO/ETOPS threshold beyond which particular consideration is given to aeroplane capability, as well as the operator's relevant operational experience before granting an *EDTO/ETOPS* approval up to the maximum diversion time. The CAAT approved threshold time for aeroplanes with two turbine engines is 60 minutes and for aeroplanes with more than two turbine engines is 180 minutes. The maximum threshold time approved by CAAT is 180 minutes.

Intentionally Left Blank

EXTENDED DIVERSION TIME OPERATIONS

1. INTRODUCTION.

1.1. EDTO/ETOPS definition;

a) Transport category aeroplanes with two turbine engines. These are flights whose planned routing contains a point farther than 60 minutes threshold time from an adequate airport at an approved one-engine inoperative cruise speed under standard conditions in still air.

b) Transport category aeroplanes with more than two turbine engines. These are flights whose planned routing contains a point farther than 180 minutes threshold time from an adequate airport at an approved all engine operative cruise speed under standard conditions in still air.

1.1.1. The EDTO/ETOPS approval process for Transport category aeroplanes is valid for schedule or charter operations. For aeroplanes with two turbine engines to be eligible for EDTO/ETOPS, the specified airframe/engine combination must have been certified to the airworthiness standards of Transport Category aeroplanes Federal Aviation Regulation (FAR) Part 25/33, the EASA CS25 or the equivalent.

1.1.2. The airworthiness considerations for aeroplanes with more than two turbine engines were discussed, among major regulators, during the development of the EDTO/ETOPS criteria. In this context, a review was performed of the reliability of operations on extended diversion time routes with aeroplanes with more than two engines, and it was concluded that both the basic Type Certification standard and maintenance program provided the required level of safety for EDTO/ETOPS, and remained suitable for EDTO/ETOPS operations

1.1.3. Application for an EDTO/ETOPS approval is regulated under Section 3 of Appendix A and Section 4 of Appendix A to this manual. At least 60 days should be allowed for processing by DCA, particularly with new applications. It should be noted that the information requested in the form is comprehensive and a complete compilation will assist operators in the planning of these operations.

1.2. EDTO/ETOPS approval process – Transport category aeroplanes with two turbine engines

1.2.1. The approval process in order to gain DCA EDTO/ETOPS approval can be divided into two steps.

1.2.1.1. Eligibility for EDTO/ETOPS:
The applicant must show that the design features of the particular airframe/engine combination are suitable for the intended operations. The considerations for type design approval are currently detailed in the FAR Part 25/33, the EASA CS25 (or equivalent) and associated advisory material.

1.2.1.2. Capability for EDTO/ETOPS:
The applicant must demonstrate that an airframe/engine combination, having been recognized as eligible for EDTO/ETOPS, also has a level of reliability appropriate to the intended operation. Manufacturer's or operator's reliability monitoring programs may be taken into account for this purpose.

1.3. Evidence of type design approval – Transport category aeroplanes with two turbine engines

1.3.1. Evidence that the type design of the aeroplane is approved for EDTO/ETOPS is normally reflected by a statement in the Aircraft Flight Manual (AFM) and Type Certificate Data Sheet (TCDS) or Supplemental Type Certificate (STC), which contains directly, or by reference, the following information:

- Special limitations (if necessary), including any limitations associated with a specific maximum diversion time
- Additional markings or placards (if required)
- Reference to the performance section
- Specific EDTO/ETOPS equipment installation, and related flight crew EDTO/ETOPS procedures
- Description or reference to a document containing the approved aeroplane configuration, maintenance and procedures (CMP) standards.

1.3.2. Detailed compliance documents for the type design approval are not required if DCA has already given approval to another operator to operate EDTO/ETOPS with the same airframe/engine combination.

1.4. Modifications of type design – Transport category aeroplanes with two turbine engines

1.4.1. Modifications or maintenance actions to achieve or maintain the reliability objective of EDTO/ETOPS for the airframe/engine combination are incorporated into the design CMP standard document.

1.4.2. Approval is required for additional modifications or maintenance actions generated by an operator or manufacturer of the aeroplane.

1.4.3. The operator or manufacturer (as appropriate) must thoroughly evaluate such changes to ensure that they do not adversely affect reliability or conflict with requirements for EDTO/ETOPS approval.

1.4.4. The Airworthiness Directive (AD) process may be utilized as necessary to implement a CMP standard change.

1.5. Continuing airworthiness – Transport category aeroplanes with two turbine engines

1.5.1. The type design EDTO/ETOPS approval holder must periodically review the in-service reliability of the airframe/engine combination. Whenever an urgent problem makes it necessary, DCA may require that the type design CMP standard be revised to achieve and maintain the desired level of reliability and safety of the EDTO/ETOPS. In effect, the CMP standards prior to a revision will no longer be considered suitable for continued EDTO/ETOPS.

1.5.2. The CMP standards and their revision may require priority actions to be implemented before the next EDTO/ETOPS flight, and other actions to be implemented according to a schedule acceptable to DCA.

1.6. Operations approval (airworthiness) – Transport category aeroplanes with two turbine engines

1.6.1. The type design approval does not reflect a continuing airworthiness or operational approval to conduct EDTO/ETOPSs; therefore, before approval, each operator must demonstrate the ability to maintain and operate the aeroplane so as to achieve the necessary reliability and to train its personnel to achieve competence in EDTO/ETOPS (Refer to Section 6 of this manual).

1.6.2. To maintain airworthiness approval for specific extended range operations, an operator must show compliance with the latest revision of the applicable CMP standards and any applicable ADs and Service Bulletins.

1.7. Operations approval (airworthiness) – Transport category aeroplanes with more than two turbine engines

1.7.1. The EDTO/ETOPS standards do not introduce additional maintenance requirements or any additional certification requirements for aeroplanes with more than two engines. Nevertheless, a review of the time limitation of relevant time limited systems (if any) was necessary for aeroplanes with more than two engines engaged in EDTO/ETOPS.

2. OPERATIONAL APPROVAL CONSIDERATIONS.

2.1. General

AOC holder wishing to obtain an EDTO/ETOPS authorization must submit an application with all supporting data according to AOCR Appendix A. This application will be for a specific airplane-engine combination and should address all the regulatory requirements for EDTO/ETOPS. The operator may follow the guidance found in this manual to complete the application. The application should be submitted at least 60 up to 90 days for In-Service EDTO/ETOPS operational approval days prior (6 months for the Accelerated EDTO/ETOPS method of application) to the proposed start of extended range operation with the specific airplane-engine combination.

2.1.1 Up to 180-Minute EDTO/ETOPS, an applicant requesting EDTO/ETOPSS up to 180 minutes for two-engine operations may select one of the following two application methods best suited to their proposed operation.

2.1.1.1 In-service experience method, or
(Refer Section 3 of Appendix A to this manual)

2.1.1.2 Accelerated EDTO/ETOPS method.
(Refer Section 4 of Appendix A to this manual)

2.1.2. EDTO/ETOPS beyond 180 minutes, up to and including 240 minutes. (Refer Sub-section 3.1.3 of Appendix A to this manual)

2.1.3. EDTO/ETOPS Operations with Transport category aeroplanes with more than two engines, there are no minimum in-service experience criteria for AOC holders requesting EDTO/ETOPS beyond 180 minutes. Those applicants will request approval under the accelerated EDTO/ETOPS method.

Note: In the case of EDTO/ETOPS flights with maximum diversion times beyond 180 minutes, additional flight dispatch requirements apply.

2.2. Operational assessment process

2.2.1. A comprehensive assessment will be made of the operator's ability to conduct EDTO/ETOPS. This will include, but will not be limited to:

- Past performance
- Flight crew training and experience
- Maintenance program
- Aircraft certification status.

2.2.2. The data provided with the request must substantiate the operator's ability and competence to safely conduct and support these operations, and must include the means used to satisfy the considerations outlined in this section. Any reliability assessment obtained (either through analysis or service experience) will be used as guidance in support of operational judgments regarding the suitability of the intended operation.

2.3. Assessment of the operator's propulsion system reliability – Transport category aeroplanes with two turbine engines

2.3.1. An assessment will be made to ensure the applicant’s ability to achieve and maintain a level of propulsion system reliability acceptable for EDTO/ETOPS approval according to the AMC 20-6 reversion 2, Appendix A – Propulsion System Reliability Assessment, or equivalent. CAAT will need to assess whether the operator’s past experience and compliance record is acceptable for EDTO/ETOPS; or, alternatively, whether the operator has established the processes necessary for successful and reliable EDTO/ETOPS, and shows that such processes can be successfully applied throughout such operations.

2.4. Engineering modifications and maintenance program considerations – Transport category aeroplanes with two turbine engines

2.4.1. Although these considerations are normally part of the operator's continuing airworthiness program, the maintenance and reliability program may need to be supplemented in consideration of the special requirements of EDTO/ETOPS. The following items, as part of the operator's program, will be reviewed to ensure that they are adequate for EDTO/ETOPS.

2.4.2. Engineering modifications: The operator must provide to CAAT all titles and numbers of all modifications, additions, and changes which were made in order to substantiate the incorporation of the CMP standard in the aeroplanes used in EDTO/ETOPS.

2.4.3. Maintenance procedures: Following approval of the changes in the maintenance and training procedures, substantial changes to the procedures, practices, or limitations established to qualify for EDTO/ETOPS must be submitted to DCA before such changes may be adopted.

2.4.4. Reliability reporting for aeroplanes: The reliability reporting program, as supplemented and approved, must be implemented prior to, and continued after the approval of EDTO/ETOPS. Data from this process must result in a suitable summary of problem events, reliability trends and corrective actions and be provided regularly to CAAT and to the relevant airframe and engine manufacturers.

2.4.5. Implementation: Approved modifications and inspections, which would maintain the reliability objective for the propulsion and airframe systems as a consequence of AD actions or revised CMP standards, must be promptly implemented. Other recommendations made by the engine and airframe manufacturers must also be considered for prompt implementation. This would apply to both installed and spare parts.

Note: In principle, the CMPs do not repeat ADs. An operator needs to ensure compliance with both the ADs applicable and the CMP standards when operating EDTO/ETOPS.

2.4.6. Control process: Procedures, and a centralized control process, must be established which would prevent:

- An aeroplane being released for EDTO/ETOPS after propulsion system shutdown or
- EDTO/ETOPS significant 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 the successful completion of one or more non-revenue or non-EDTO/ETOPS revenue flights (as appropriate) prior to being released on an EDTO/ETOPS.

As alternative, the first 60 minutes of an EDTO/ETOPS flight can be used as a verification flight.

2.4.7. Programs: The maintenance program used must ensure that the airframe and propulsion systems will continue to be maintained at the level of performance and reliability necessary for EDTO/ETOPS, including such programs as engine condition monitoring and engine and auxiliary power unit (APU) (if required for EDTO/ETOPS) and oil consumption monitoring.

2.4.8. Qualified personnel: The maintenance program must ensure that adequate numbers of qualified personnel are trained and authorized to competently perform the maintenance program.

2.5. EDTO significant systems

2.5.1. EDTO significant systems may be the aeroplane propulsion system and any other aeroplane systems whose failure or malfunctioning could adversely affect safety particular to an EDTO flight, or whose functioning is specifically important to continued safe flight and landing during an aeroplane EDTO diversion.

2.5.2. Many of the aeroplane systems that are essential for non-extended diversion time operations may need to be reconsidered to ensure that the redundancy level and/or reliability will be adequate to support the conduct of safe extended diversion time operations.

2.5.3. The maximum diversion time should not exceed the value of the EDTO significant system limitation(s), if any, for extended diversion time operations identified in the aeroplane flight manual, directly or by reference, reduced by an operational safety margin, commonly 15 minutes, specified by the State of the Operator.

2.5.4. The specific safety risk assessment to approve operations beyond the time limits of an EDTO significant time limited system should be based on the safety risk management guidance contained in the Safety Management Manual (SMM) (Doc 9859). Hazards should be identified and safety risks assessed according to predicted probability and the severity of the consequences based on the worst foreseeable situation. When addressing the following components of the specific safety risk assessment it should be understood that:

a) capabilities of the operator refer to the operator's quantifiable in-service experience, compliance record, aeroplane capability and overall operational reliability that:

1) are sufficient to support operations beyond the time limits of an EDTO significant time-limited system;

2) demonstrate the ability of the operator to monitor and respond to changes in a timely manner; and

3) there is an expectation that the operator's established processes, necessary for successful and reliable extended diversion time operations, can be successfully applied to such operations;

2.5.5. The maximum diversion time should not exceed the value of the EDTO significant system limitation(s), if any, for extended diversion time operations identified in the aeroplane flight manual, directly or by reference, reduced by an operational safety margin, commonly 15 minutes, specified by the State of the Operator.

2.5.6. The specific safety risk assessment to approve operations beyond the time limits of an EDTO significant time limited system should be based on the safety risk management guidance contained in the Safety Management Manual (SMM) (Doc 9859). Hazards should be identified and safety risks assessed according to predicted probability and the severity of the consequences based on the worst foreseeable situation. When addressing the following components of the specific safety risk assessment it should be understood that:

a) capabilities of the operator refer to the operator's quantifiable in-service experience, compliance record, aeroplane capability and overall operational reliability that:

1) are sufficient to support operations beyond the time limits of an EDTO significant time-limited system;

2) demonstrate the ability of the operator to monitor and respond to changes in a timely manner; and

3) there is an expectation that the operator's established processes, necessary for successful and reliable extended diversion time operations, can be successfully applied to such operations;

b) overall reliability of the aeroplane refers to:

1) quantifiable standards of reliability taking into account the number of engines, aircraft EDTO significant systems and any other factors that may affect operations beyond the time limits of a particular EDTO significant time-limited system; and

2) relevant data from the aeroplane manufacturer and data from the operator reliability programme used as a basis to determine overall reliability of the aeroplane and its EDTO significant systems;

c) reliability of each time-limited system refers to quantifiable standards of design, testing and monitoring that ensure the reliability of each particular EDTO significant time-limited system;

d) relevant information from the aeroplane manufacturer refers to technical data and characteristics of the aeroplane and worldwide fleet operational data provided by the manufacturer and used as a basis to determine overall reliability of the aeroplane and its EDTO significant systems; and

e) specific mitigation measures refer to the safety risk management mitigation strategies, which have manufacturer concurrence, that ensure an equivalent level of safety is maintained. These specific mitigations shall be based on:

1) technical expertise (e.g. data, evidence) proving the operator's eligibility for an approval of operations beyond the time limit of the relevant EDTO significant system; and

2) an assessment of relevant hazards, their probability and the severity of the consequences that may adversely impact the safety of the operation of an aeroplane operated beyond the limit of a particular EDTO significant time-limited system.

3. FLIGHT PREPARATION AND IN-FLIGHT CONSIDERATIONS.

The flight preparation includes completion of the flight release. The flight release can have many steps and take many different forms such as a computerized flight plan with references to the EDTO/ETOPS alternate aerodromes for the flight, and the approved EDTO/ETOPS maximum diversion time under which the flight has been released or dispatched. The release will also take into account the MEL, weather and NOTAM information relevant to the flight. The following flight release considerations apply to EDTO/ETOPS.

3.1. MEL

3.1.1. System redundancy levels appropriate to EDTO/ETOPS must be reflected in the Master Minimum Equipment List (MMEL). An operator's MEL may be more restrictive than the MMEL, considering the kind of EDTO/ETOPS proposed and equipment and service problems unique to the operator. Systems considered to have a fundamental influence on flight safety may include, but are not limited to, the following:

- Electrical, including battery
- Hydraulic

- Pneumatic
- Flight instrumentation
- Fuel
- Flight control
- Ice protection
- Engine starts and ignition
- Propulsion system instruments
- Navigation and communications
- Auxiliary power unit
- Air conditioning and pressurization
- Cargo fire suppression
- Engine fire protection
- Emergency equipment
- Any other equipment necessary for EDTO/ETOPS.

3.1.2. MEL considerations for more than two engines aeroplanes on an EDTO/ETOPS should include reference to system requirements appropriate for the approved maximum diversion time (e.g. communications, fuel and cargo fire suppression systems requirements). Engine and APU oil consumption should also be considered.

3.2. Communication and navigation facilities

3.2.1. An aeroplane must not be released for an EDTO/ETOPS unless communications facilities are available to provide, under normal conditions of propagation at the appropriate OEI cruise altitudes, reliable:

- Two-way communications between the aeroplane and the operator's operational control center
- Two-way communication between the aeroplane and the appropriate air traffic service (ATC) unit over the planned route of flight over the routes to any suitable alternate to be used in the event of diversion
- Non-visual ground or other navigation aids are available and located to provide the navigation accuracy necessary for the planned route and altitude of flight, and the routes to any alternate aerodrome and altitudes to be used (taking into account the navigation equipment installed in the aeroplane)
- Visual and non-visual aids are available at the specified alternates for the anticipated types of approaches and operating minima.

3.2.2. Where EDTO/ETOPS approval exceeds 180 minutes, a second means of communication is required.

(Refer Sub-section 3.1.3 of Appendix A to this manual)

3.3. EDTO/ETOPS alternate aerodromes

3.3.1. An aeroplane must not be released for an EDTO/ETOPS unless the required take-off, destination and alternate aerodromes (including EDTO/ETOPS alternate aerodromes) to be used in the event of a propulsion system failure or aeroplane system failure(s) which require a diversion, are listed in the cockpit documentation and specified in the operational flight plan.

3.3.2. Since these EDTO/ETOPS alternates serve a different purpose than the destination alternate aerodrome, and would normally be used only in the event of an engine failure or aeroplane system failures, an aerodrome must not be listed as an EDTO/ETOPS alternate unless the requirements of Adequate Aerodromes - physical requirements are met.

3.3.3. The aerodrome services and facilities are adequate to permit the conduct of an instrument approach procedure to the runway expected to be used while complying with the applicable aerodrome landing minima i.e. approach lights requirements etc.

3.3.4. Prior to dispatch of the flight, the latest available forecast weather conditions for the period commencing at one hour before the earliest time of landing and ending at one hour after the latest time of landing at that aerodrome equals or exceeds the authorized alternate aerodrome planning minima requirements for EDTO/ETOPS in Section 6 of Appendix B to this manual. DCA may approve an AOC holder to use RNAV approach and low visibility CAT II or CAT III approaches at an EDTO/ETOPS alternate aerodrome.

3.3.5. In addition, for the same period, the forecast crosswind component (including gusts) for the landing runway expected to be used must not:

- Exceed the manufacturer's recommended crosswind for a one-engine inoperative landing (if published); or
- The maximum demonstrated crosswind (whichever is less), taking into account the runway condition (dry, wet or contaminated).

3.3.6. When planning and conducting the flight, adverse weather conditions at EDTO/ETOPS alternates having forecast probabilities of less than 40% may be disregarded.

3.3.7. When planning and conducting the flight, adverse weather conditions at EDTO/ETOPS alternates forecasting intermittent (INTER) or temporary

(TEMPO) should be taken into account when determining the amount of fuel to be carried.

3.3.8. During the course of the flight, the operator must inform the flight crew of any significant changes in conditions at required EDTO/ETOPS alternates. Before proceeding beyond the EDTO/ETOPS entry point, the forecast weather for the time periods established above, the following must be evaluated:

- Aeroplane status (e.g. inflight un-serviceability's or MEL items that may affect the operation)
- Fuel remaining
- Runway surface conditions
- Landing distances
- Aerodrome services and facilities at designated EDTO/ETOPS alternates.

3.3.9. After an EDTO/ETOPS flight has proceeded beyond the applicable EDTO/ETOPS entry point, the operator must keep the PIC informed of any significant changes in conditions at required EDTO/ETOPS alternates. The pilot may continue the flight as planned if the meteorological forecast is subsequently revised below the landing minima for a required EDTO/ETOPS alternate aerodrome.

3.3.10. Operators should provide flight crews with information on adequate aerodromes appropriate to the route to be flown which are not suitable aerodromes, such as the weather forecast for these aerodromes does not meet EDTO/ETOPS alternate aerodrome requirement. Pilots should monitor the conditions at adequate aerodromes relevant to the flight throughout the flight.

3.3.11. Aerodrome facility information and other appropriate planning data concerning these aerodromes should be provided to flight crews in the event that a diversion is required at any stage during the flight.

3.3.12. For EDTO/ETOPS planning purposes, the minimum International Civil Aviation Organization (ICAO) rescue and firefighting services (RFFS) CAT 4 (or equivalent) must be available within 30 minutes notice at each aerodrome listed as an EDTO/ETOPS alternate aerodrome.

3.4. Aeroplane performance data

3.4.1. The operator's operations manual should contain sufficient data to support the most critical fuel scenario (ensuring reserves) and area of operations calculation (i.e. maximum diversions distance rings).

3.4.2. The following data should be based on information provided in the AFM:

3.4.2.1. Detailed OEI performance data, including fuel flow for standard and non-standard atmospheric conditions, as a function of airspeed and power setting (where appropriate) covering:

- Approved OEI cruise speed
- Drift down (includes net performance)
- Cruise altitude coverage (including 10,000ft.)
- Holding
- Altitude capability (including net performance)
- Missed approach.

3.4.2.2. Detailed AEO performance data, including nominal fuel flow data, for standard and non-standard atmospheric conditions, as a function of airspeed and power setting (where appropriate) covering:

- Approved AEO cruise speed
- Cruise altitude coverage (including 10,000ft.)
- Holding

3.4.2.3. Details of any other conditions relevant to EDTO/ETOPS which can cause significant deterioration of performance, such as ice accumulation on the unprotected surfaces, Ram Air Turbine (RAT) deployment, etc.

3.5. Aeroplane performance

3.5.1. In determining an EDTO/ETOPS area of operation, for any given airframe/engine combination, operators will nominate the performance data used (altitudes, airspeeds, thrust settings and fuel flow). The resulting aircraft performance must ensure compliance with terrain and obstacle clearance requirements.

3.6. Flight dispatcher and operational control

3.6.1. For EDTO/ETOPS flights flight dispatcher and operational control:

- Provide operational control exercising responsibility for initiation, continuation,
- Termination or diversion of an EDTO/ETOPS flight
- Incorporate flight dispatch procedures for the control and supervision of EDTO/ETOPS flights.

3.6.2. Flight dispatch officers:

- Assist the PIC in flight preparation and provide relevant information
- Assist the PIC in preparing the operational flight plan.
- In the case of an emergency:
  – initiate procedures as outlined in the operations manual
  – Convey safety related information to the PIC that may be necessary for the safe conduct of the flight.

4. FLIGHT CREW TRAINING AND DOCUMENTATION

4.1. Adequacy of flight crew training and operations manuals

4.1.1. An operator should ensure that prior to conducting EDTO/ETOPS, each crew member has completed EDTO/ETOPS training and checking successfully in accordance with a syllabus approved by DCA and detailed in the operations manual. (Refer Appendix D to this manual)

4.1.2. The training should be aeroplane type and area of operation specific in accordance with the applicable operational requirements.

4.1.3. The operator should ensure that flight crew members are not assigned to operate EDTO/ETOPS routes for which they have not successfully completed the required training, including route qualification training.

4.2. Reviews

4.2.1. DCA will review in-service experience of EDTO/ETOPS significant systems for Transport category aeroplanes with two turbine engines. The review will include system reliability levels and individual event circumstances (including actions taken by the crew in response to equipment failures or malfunctions). The purpose of the review will be to verify the adequacy of information provided in training programs and operations manuals. The operator should provide information for, and participate in, these reviews.

4.2.2. CAAT may use the information resulting from these reviews to require the operator to amend flight crew training program, operations manuals and checklists, as necessary.

4.3. Flight crew training and evaluation program

4.3.1. The operator's training program must provide initial and recurrent training for flight crew members for EDTO/ETOPS operations. This training should be followed by subsequent evaluations and proficiency checks.

4.3.2. Specific initial and recurrent training to prepare flight crews to evaluate probable propulsion and airframe systems failures must be conducted. The goal of this training must be to establish crew competency in dealing with the most probable operating contingencies.

4.3.3. The use of appropriate navigation and communication systems, including appropriate flight management devices is vital to this training.

4.4. Specific EDTO/ETOPS training requirements

4.4.1. The flight crew must be provided with detailed initial and recurrent training which emphasizes abnormal and emergency procedures to be followed in the event of unforeseeable failures for each area of operation, including:

- Procedures for single and multiple failures in-flight affecting EDTO/ETOPS entry and diversion decisions. For example, if standby sources of electrical power significantly degrade cockpit instrumentation, then training which simulates approach with the standby generator as the sole power source should be conducted during initial and recurrent training
- Operational restrictions associated with these failures (including any applicable MEL considerations)
- Crew incapacitation
- Use of emergency equipment
- Procedures to be followed in the event that there is a change in conditions at designated EDTO/ETOPS en-route alternates for the flight, which would preclude safe approach and landing

4.5. Diversion decision making

(Refer Section 5.9 to this manual)

4.5.1. The operator's operations manual must establish procedures for flight crew outlining the criteria that indicate when a diversion or change of routing is recommended whilst conducting an EDTO/ETOPS.

4.5.2. Contingency procedures should not be interpreted in a way that prejudices the final authority and responsibility of the PIC for the safe operation of the aeroplane.

5. OPERATIONAL LIMITATIONS.

5.1. Flight release limitation

5.1.1. The flight release limitation should specify the maximum diversion time from an EDTO/ETOPS alternate aerodrome for which an operator can conduct a particular EDTO/ETOPS. The maximum diversion time at the approved OEI (or AEO for aeroplanes with more than two engines) cruise speed must not be any greater than the value stated in the Air Operator Certificate (AOC) holder's EDTO/ETOPS approval issued by CAAT.

5.2. Use of maximum diversion time

5.2.1. The procedures established by the operator must ensure that EDTO/ETOPS is limited to flight plan routes where the approved EDTO/ETOPS maximum diversion time to EDTO/ETOPS alternates can be met under standard conditions in still air. Operators must provide:

5.2.1.1. Company procedures to state that, upon occurrence of an in-flight shut down of an engine in a Transport category aeroplanes with two turbine engines, the PIC, considering all the relevant factors must promptly initiate diversion to, and land at, the nearest suitable aerodrome

5.2.1.2. A practice to be established such that, in the event of a single or multiple EDTO/ETOPS significant system failure, the pilot will initiate the diversion procedure to fly to, and land at, the nearest suitable aerodrome taking into account the nature of the diversion and suitability of aerodromes, unless it has been justified that no substantial degradation of safety results from continuation of the planned flight.

5.3. Requirements for EDTO/ETOPS approval

5.3.1. All AOC holders of Transport category aeroplanes with two turbine engines, and all operators of Transport category aeroplanes with more than two turbine engines, operating on EDTO/ETOPS routes must comply with all the operational and process requirements specified in the EDTO/ETOPS regulations in this manual.

5.3.2. Those AOC holders operating Transport category aeroplanes with more than two turbine engines, who have the authority to operate on specific non-EDTO/ETOPS routes that under the new definition are classified as EDTO/ETOPS routes, are not required to re-apply for their specific route authority. However, the AOC holder is required to comply with all the

EDTO/ETOPS flight operational requirements that are described in this manual and must have their EDTO/ETOPS program and all EDTO/ETOPS processes approved by CAAT.

5.4. Validation of operator EDTO/ETOPS maintenance and operations

5.4.1. The operator must demonstrate that they have the competence and capability to safely conduct, and adequately support, the intended operation. Before being granted EDTO/ETOPS operational approval, the operator must provide evidence that:

5.4.1.1. The EDTO/ETOPS maintenance checks, servicing, and programs are properly conducted and certified by qualified personal

5.4.1.2. EDTO/ETOPS flight release practices, policies, and procedures are established for operations to and from representative departure and destination aerodromes.

5.5. EDTO/ETOPS proving flight for Transport category aeroplanes with two turbine engines.

5.5.1. A proving flight, in the aeroplane or an approved flight simulator must also incorporate demonstration of the following emergency procedures:

- Total loss of thrust of one engine
- Total loss of pressurization
- Total loss of normal generated electrical power

Note: APU and electrical systems designed to operate with the total loss of electrical power, are essential for demonstrations.

5.6. Criteria for EDTO/ETOPS beyond 180 minutes – Transport category aeroplanes with two-turbine engines

5.6.1. Each operator requesting approval to conduct EDTO/ETOPSs beyond 180 minutes must hold a current 180 minutes EDTO/ETOPS approval for the airframe/engine combination The amount of service experience may be increased or decreased after a review of the operator's experience, taking into account the operator's capability to conduct operations and implement effective EDTO/ETOPS programs in accordance with the criteria detailed in Sub-section 3.1.3 of the Appendix A to this manual will be examined.

5.6.2. The record of the operator in conducting its 180 minutes program will be considered when granting approvals beyond 180 minutes diversion time.

The area of operation will be defined by a specified maximum diversion time to an adequate aerodrome at the approved one engine inoperative cruise speed.

5.6.3. The release limitation will be a specified maximum diversion time at the approved one-engine-inoperative speed.

5.7. Release considerations

5.7.1. MEL: The MEL should reflect adequate levels of EDTO/ETOPS significant system redundancy to support the EDTO/ETOPS time requested. The systems listed in Sub-section 3.1.1 must be considered.

5.7.2. Weather:

5.7.2.1. An operator should verify that the weather utilized can be relied upon to forecast terminal and en-route weather.

5.7.2.2. If the flight is delayed, pilots or operations personnel should monitor weather forecasts and the nominated EDTO/ETOPS alternate aerodromes to ensure that the weather remains within the EDTO/ETOPS alternate planning minima requirements.

5.8. Flight planning

5.8.1. The effects of wind and temperature for the flight (including flight at the OEI cruise altitude) must be accounted for in the calculation of equal time points. The operator's program must provide flight crew members with information on adequate aerodromes which meet the requirement in Section 6 of Appendix B to this manual.

5.8.2. Aerodrome facility information and other appropriate planning data concerned must be provided to flight crew for use when executing a diversion.

5.9. Diversion decision making

5.9.1. Engine failure;

5.9.1.1. The PIC of a two engines aeroplane with one engine inoperative is require to land the aeroplane at the nearest suitable airport where, in the PIC's judgment after considering all relevant factors, a safe landing can be made. This determination is especially critical for EDTO/ETOPS where the availability of suitable airports may be limited and the diversion decision is therefore more critical. The following is a list of some, but not all, factors that may be relevant in determining

whether or not an airport is suitable, and are consistent with the EDTO/ETOPS principle of protecting the diversion once it occurs:

- Airplane configuration, weight, systems status, and fuel remaining;
- Wind and weather conditions en route at the diversion altitude;
- Minimum altitudes en route to the diversion airport;
- Fuel bum to the diversion airport;
- Airport's nearby terrain, weather, and wind;
- Availability and surface condition of runway;
- Approach navigation aids and lighting available;
- Rescue and firefighting services (RFFS) at the diversion airport;
- Facilities for passenger and crewmember disembarkation, and accommodations
- PIC's familiarity with the airport; and
- Information about the airport provided to the PIC by the certificate holder.

5.9.1.2. When operating a two-engine airplane with one engine inoperative, none of the following factors should be considered sufficient justification to fly beyond the nearest suitable airport:

- The fuel supply is sufficient to fly beyond the nearest suitable airport;
- Passenger accommodation other than passenger safety; and
- Availability of maintenance and/or repair resources.

5.9.1.3. If one engine is shut down on an aeroplane that has more than two engines, the PIC may fly past the nearest suitable en-route alternate aerodrome in point of time if the PIC determines that doing so is as safe as landing at the nearest suitable aerodrome. In making a decision to fly beyond the nearest suitable en-route alternate aerodrome, the PIC should consider all relevant factors that may occur. When an aeroplane with more than two engines bypasses a suitable en-route alternate, the PIC should carefully consider the risk associated with the next possible failure, which could degrade the current engine inoperative condition.

5.9.2. The next possible failure could be a system failure or another engine failure, which in either case, would affect crew workload and their possible

success in completing the associated abnormal approach and landing procedures. It is even possible that a contingency outside of the realm of a system failure, such as a passenger illness, could compound the crew's workload normally associated with the current failure condition.

5.9.2.1. System failure or Partial failure

During EDTO/ETOPS, the limited availability of diversion airports and extended diversion distances require that the impact of a system failure or partial failure be carefully evaluated.

This should include a careful assessment of remaining systems and overall operational capability. Time permitting, full use should be made of the information available through the certificate holder's dispatch facility and a determination made by the PIC as to the plan for the safe continuation of the flight, that is whether it is safer to divert and land or to continue as planned under the circumstances.

5.9.2.2. If, as a result of reevaluating airplane systems, a change in flight plan is required, the PIC should be provided revised flight plan information and an update of conditions, including weather conditions at designated EDTO/ETOPS alternates. Dispatch should advise the flight crewmembers of additional airports on the planned route of flight that could be used for diversion. In no case may the maximum approved diversion authority of the operation be exceeded.

5.9.3. It is possible that an EDTO/ETOPS flight may divert for reasons other than engine or system failure such as medical emergencies, onboard fire, or decompression. The nature of the emergency, and its possible consequences to the aeroplane, passengers and crew, will dictate the best course of action suitable to the specific en route contingency. The flight crew must decide on the best course of action based on all available information. The EDTO/ETOPS Alternate Airports designated for a particular flight provide one option to the PIC. However, these EDTO/ETOPS alternates may not be the only airports available for the diversion and nothing in this guidance in any way limits the authority of the PIC.

5.10. Communications

5.10.1. The operator must show the availability of communications services and facilities for ATC and dispatch. For company

communications, operators must use the most reliable voice-based communications technology available. Rapid and reliable ATC communications are determined by the facilities operated by ATC units in the areas of operations.

5.10.2. Communication systems in addition to those normally required are necessary for flights where the EDTO/ETOPS maximum diversion time is more than 180 minutes. Satellite communication (SATCOM) and aircraft communications addressing and reporting system (ACARS) may be used to supplement communication systems.

5.11. Navigation facilities

5.11.1. Operators must show the availability of adequate navigation facilities, taking into account the navigation equipment installed on the aeroplane, the navigation accuracy necessary for the planned route and altitude of the flight. Navigation facilities required to ensure a safe approach and landing must be available.

6. CONTINUING SURVEILLANCE.

6.1. **AOC holder approved to conduct EDTO/ETOPS using Transport category aeroplanes with two turbine-engines shall demonstrate the ability to maintain the reliability and competency in EDTO/ETOPS.**
(Refer Appendix C to this manual.)

6.1.1. CAAT will monitor the authorized operator to ensure that the levels of reliability achieved in EDTO/ETOPS remain at the necessary levels. The fleet average in-flight shut down (IFSD) rate for the specified airframe/engine combination will also be monitored. If the IFSD rate computed on a 12-month rolling average exceeds the values in the following table, the AOC holder, in conjunction with its CAAT representative, must investigate common cause effects or systemic errors and submit the findings to CAAT office within 30 days.

NOTE: It may be applicable to combine some similar airplane- engine combinations, due to the commonality of engine type, e.g., 777-200LR and 777-300ER with GE90-110/115B engine, where the engine builds is the same and operations are similar.

In Flight Shut Down Rates

Number of Engines	Engine Hours EDTO/ETOPS	EDTO/ETOPS Authorization
2	05/1000	Up to and including 120 minutes.
2	03/1000	Beyond 120 minutes up to and including 180 minutes and 207 minutes in North Pacific.
2	02/1000	Greater than 180 minutes (Except for 207 minutes in North Pacific.

6.1.2. In the event that an acceptable level of reliability is not maintained if significant deficiencies are detected in the type design or the conduct of the EDTO/ETOPS operation, DCA will:

- Initiate a special evaluation
- Impose operational restrictions (if necessary)
- Stipulate corrective action for the operator to adopt in order to resolve the problems in a timely manner.

The relevant regulations and other references

- ICAO Annex 6, Part I – Operation of Aircraft.
- ICAO EDTO/ETOPS manual (Draft)
- Federal Aviation Administration (FAA) AC 120-42B- Extended Operations (ETOPS) and Polar Operations.
- European Aviation Safety Agency (EASA) AMC 20-6 Rev. 2 Extended Range Operation with Two-Engine Aeroplanes ETOPS Certification and Operation.
- CAAP 82-1(1) EDTO/ETOPS (Australia)
- Civil Aviation Order (CAO) 82.0 (Australia)
- CASA Form 977 (Australia)
- CAA UK Form SRG1814
- CAA Form CA 91-19 (South African)

APPENDIX A

EDTO/ETOPS approval for Transport category turbine-engine aeroplanes

Definitions

In this Appendix, words and phrases have the following meanings:

Airframe system means any system on an aeroplane that is not a part of the propulsion system.

EDTO/ETOPS critical fuel means the fuel quantity necessary to fly to an en-route alternate aerodrome considering, at the most critical point on the route, the most limiting system failure, EDTO/ETOPS significant system. An aeroplane system whose failure or degradation could adversely affect the safety of an EDTO/ETOPS flight, or whose continued functioning is important to the safe flight and landing of an aeroplane during an EDTO/ETOPS diversion.

EDTO/ETOPS qualified maintenance personnel means maintenance personnel who have completed the operator's EDTO/ETOPS maintenance training.

EDTO/ETOPS significant system means: An airplane system, including the propulsion system, the failure or malfunctioning of which could adversely affect the safety of an ETOPS flight, or the continued safe flight and landing of an airplane during an ETOPS diversion. Each ETOPS significant system is either an ETOPS Group 1 significant system or an ETOPS Group 2 significant system.

a) An ETOPS Group 1 Significant System:

1) Has fail-safe characteristics directly linked to the degree of redundancy provided by the number of engines on the airplane;
2) Is a system, the failure or malfunction of which could result in an in-flight shutdown (IFSD), loss of thrust control, or other power loss;
3) Contributes significantly to the safety of an ETOPS diversion by providing additional redundancy for any system power source lost as a result of an inoperative engine; and
4) Is essential for prolonged operation of an airplane at engine inoperative altitudes.

b) An ETOPS Group 2 significant system is an ETOPS significant system that is not an ETOPS Group 1 significant system. Group 2 system failures will not cause aircraft flight performance loss or cabin environment problems but may result in diversions or turn backs.

Engine means a unit used, or intended to be used, for aircraft propulsion, which consists of at least those components and equipment necessary for functioning and control, excluding the propeller (if any).

FQIS means fuel quantity indicating system.

IFSD* or *in-flight shutdown, means an engine ceases to function (when the airplane is airborne) and is shut down, whether self-induced, flight-crew initiated or caused by an external influence. The CAAT considers IFSD for all causes, such as flameout, internal failure, flight crew initiate shutdown, foreign object ingestion, icing, inability to obtain or control desired thrust or power, and cycling of the start control; however briefly, even if the engine operates normally for the remainder of the flight. This definition excludes the airborne cessation of the functioning of an engine when immediately followed by an automatic engine relight and when an engine does not achieve desired thrust or power but is not shut down.

Multiple identical system maintenance, for a twin turbine-engine aeroplane, means a maintenance action performed on the same element of identical but separate EDTO/ETOPS significant systems during the same routine or non-routine maintenance actions.

Performance Deterioration Allowance or ***PDA***, means the difference between an aeroplane manufacturer's published fuel consumption model and the actual fuel consumption applicable to a specific aeroplane.

Propulsion system means a system consisting of an engine and all other equipment used to provide the functions necessary to sustain, monitor and control the power and thrust output of any 1 engine following its installation on the airframe.

Note: For this definition, auxiliary power unit (APU) is not an engine.

Proving flight means a flight conducted under Section 5 of this Appendix to demonstrate that the AOC holder has the capability and competence to safely conduct and adequately support proposed or approved EDTO/ETOPS with a particular airframe/engine combination.

System includes all items of equipment necessary for the control and performance of a system, including the equipment specifically provided for the function in question and other basic equipment such as that necessary to supply power for the operation of the system or of specific items of equipment.

Time-limited system means any system:

- on whose availability the duration of the flight depends; and
- whose capacity has a time limit.

1. Application for EDTO/ETOPS approval

1.1. The AOC holder must apply to CAAT, in writing, for the EDTO/ETOPS approval and applications should be made using Form in AOCR Appendix A.

The application should be submitted at least 60 up to 90 days for In-Service EDTO/ETOPS operational approval days prior (6 months for the Accelerated EDTO/ETOPS method of application) to the proposed start of extended range operation with the specific airplane-engine combination.

1.2. In addition to any other requirements imposed by this Appendix, the application must include the following:

1.2.1. details of the particular airframe/engine combination, including the latest revision number of the CMP standards document required for EDTO/ETOPS as normally identified in the AFM, the type certificate data sheet or supplemental type certificate;

1.2.2. details of the requested areas of operations;

1.2.3. details of the maximum diversion time, at the approved 1 engine inoperative cruise speed (in ISA and still air conditions) that the aeroplane may be from a suitable aerodrome for landing;

1.2.4. details of the fuel and oil policy as it relates to EDTO/ETOPS;

1.2.5. a list of the EDTO/ETOPS alternate aerodromes en-route that are designated for the operation;

1.2.6. either:

(i) a statement confirming that each EDTO/ETOPS alternate aerodrome will have the facilities to ensure the care and safety of a full complement of passengers and crew; or

(ii) details of the recovery plan, if requested max diversion time is 240 minutes or more to any EDTO/ETOPS alternate aerodrome that can ensure the protection and well- being of a full complement of passengers and crew at the aerodrome itself or in its immediate area until the passengers and crew are transported to another place

1.3. In addition to any other requirements imposed by this Appendix, in considering whether to give EDTO/ETOPS approval, CAAT must take into account safety compensating factors including the number of airports in the region, the weather conditions normally prevailing in the area, the availability of communications, the safety and reliability of operations with the particular airframe/engine combination and any additional MEL restrictions.

1.4. CAAT may issue an approval with or without conditions.

Note: To ensure the safety of air navigation, conditions on an EDTO/ETOPS approval may impose obligations on an AOC holder additional to the requirements mentioned in the Section 3 to this Appendix.

1.5. An approval may specify aerodromes for which the holder must prepare a passenger recovery plan. (If requested max diversion time is 240 minutes or more)

1.6. If it is considered necessary in the interests of safety, CAAT may:

1.6.1. refuse to give an approval; or

1.6.2. suspend or cancel an approval.

2. Aeroplane eligibility for EDTO/ETOPS

2.1. For the AOC holder to be eligible for EDTO/ETOPS approval, each relevant aeroplane for EDTO/ETOPS must:

(a) have an EDTO/ETOPS type design approval contained in:
  (i) the AFM or supplement; or
  (ii) the type certificate data sheet or supplemental type certificate; or
(b) meet an equivalent standard acceptable to CAAT.

3. In Service EDTO/ETOPS Operational Approval

3.1. Approval Levels - EDTO/ETOPS Operations with two turbine engines aeroplane.

3.1.1. Up to 90 min approval

(i) A minimum of 3 months of domestic operating experience with the aeroplane-engine combination for which approval is requested;

(ii) An EDTO/ETOPS type design approved for a minimum 120 minutes EDTO/ETOPS criteria;

(iii) An approved CMP; and

(iv) Minimum Equipment List requirement for 120 minutes.

3.1.2. Beyond 90 minutes up to 180 minutes approval

3.1.2.1. For 120 minutes approval

(i) A minimum of 6 months of EDTO/ETOPS operating experience with the aeroplane-engine combination for which approval is requested; ii) An EDTO/ETOPS type design approved for a minimum 120 minutes EDTO/ETOPS criteria;

(ii) An approved CMP; and

(iii) Minimum Equipment List requirement for 120 minutes.

3.1.2.2. For 138 minutes approval

(i) 15% Extension of EDTO/ETOPS 120 minutes approval;

a) A minimum of 3 months of 120 minutes EDTO/ETOPS operating experience with the aeroplane-engine combination for which approval is requested;

b) Approved on a case by case basis;

c) An EDTO/ETOPS type design approved for a minimum 120 minutes EDTO/ETOPS criteria;

d) An approved CMP;

e) An aeroplane time limited system capability not be less than the authorized 138 minutes diversion time

in still air conditions at the approved one engine inoperative cruise speed plus 15 minutes to allow for a hold, an approach and a landing;

f) A Minimum Equipment List requirement modified to satisfy the MMEL policy for system component/relief for EDTO/ETOPS operation beyond 120 minutes; and

g) Flight crew, flight dispatcher and maintenance personnel training provided to address the differences between 120 minute and 138 minutes approval.

(ii) Use of 180 minutes EDTO/ETOPS approval;

a) A minimum of 3 months of 120 minutes EDTO/ETOPS operating experience with the aeroplane-engine combination for which approval is requested;

b) Exercised on an unlimited basis;

c) An EDTO/ETOPS type design approved for a minimum 180 minutes EDTO/ETOPS criteria;

d) An approved CMP;

e) A Minimum Equipment List requirement beyond 120 minutes; and

f) Flight crew, flight dispatcher and maintenance personnel training provided to address the differences between 138 minute and the 180 minutes approval.

3.1.2.3. For 180 minutes approval

a) A minimum of 12 months of 120 minutes EDTO/ETOPS operating experience with the aeroplane-engine combination for which approval is requested;

b) An EDTO/ETOPS type design approved for a minimum 180 minutes EDTO/ETOPS criteria;

c) An approved CMP; and

d) Minimum Equipment List requirement beyond 120 minutes.

3.1.3. Beyond 180 min approval

a) Hold a current 180 minutes EDTO/ETOPS approval with the aeroplane-engine combination for which approval is requested;

b) During flight planning, attempt to minimize the potential diversion time along the preferred track and plan the EDTO/ETOPS flight at a maximum diversion distance of 180 minutes of less;

c) If conditions prevent the use of adequate aerodromes within 180 minutes, as EDTO/ETOPS alternates, the route may be flown beyond 180 minutes subject the requirements of the applicable specific area of operation;

d) Max approved diversion time must not exceed the most time limited system capability as per conditions below:

- at the all engine operating cruise speed, corrected for wind and temperature, exceeds the airplane's most limiting fire suppression system time minus 15 minutes for those cargo and baggage compartments required by regulation to have fire suppression systems, or
- at the one-engine-inoperative cruise speed, corrected for wind and temperature, exceeds the airplane's most limiting EDTO/ETOPS Significant System time (other than the airplane's most limiting fire suppression system time minus 15 minutes for those cargo and baggage compartments required by regulation to have fire-suppression systems)

e) Minimum Equipment List requirement for 180 minutes, including the following systems operational for dispatch;

- Fuel Quantity Indicating System (FQIS);
- APU Including electrical and pneumatic supply to its design capability;
- Auto throttle system;
- SATCOM Voice required, but in the area that SATCOM Voice is not available (Polar region) a backup voice system is required (HF);
- One engine inoperative auto land capability (if flight planning is predicted on its use

3.1.4. For specific area of operations beyond 180 minutes approval
For flights operating in the North Pacific area, the area covering the Pacific Ocean areas north of 40N latitudes including NOPAC ATS routes and published PACOT track system between Japan and North America;

a) To be operated only a case by case basis based on criteria set in the air operator's company operation manual when an EDTO/ETOPS alternate aerodrome is not available within 180 minutes in the North Pacific Area of operation; The nearest available EDTO/ETOPS alternate aerodrome should be specified within 207 minutes (15% increases) maximum diversion time;

b) Air Traffic Services preferred tracking, if available, should be given first consideration;

c) volcanic activity, aerodrome weather below dispatch requirements, temporary aerodrome condition and other weather related events;

d) EDTO/ETOPS type design should be approved for a minimum 180 minutes EDTO/ETOPS criteria;

e) Approved CMP; and

f) The time required to fly the distance to the planned EDTO/ETOPS alternate or the alternate, at the approved one engine inoperative cruise speed, in still air and standard day temperature, should not exceed the time specified in the Airplane Flight Manual for the airplane's most time limiting system time minus 15 minutes.

3.1.5. For 240 minutes approval

a) EDTO/ETOPS type design should be approved for minimum 240 minutes EDTO/ETOPS criteria;

b) Approved CMP;

c) Nearest available EDTO/ETOPS alternates aerodromes along the planned route of flight should be designated.

3.1.6. 15% increases

a) On case by case basis, for 120 minutes and 180 minutes EDTO/ETOPS approved.

3.2. Approval Levels - EDTO/ETOPS Operations with more than two turbine engines aeroplane.

3.2.1. Operations up to 180 minutes
Does not require EDTO/ETOPS approval

3.2.2. Operations beyond 180 minutes approval

a) The airplane-engine combination is recommended to be type-design-approved for EDTO/ETOPS, or Equivalent standard acceptable to CAAT.

b) Max approved diversion time must comply with the time limited system capability as per conditions below:

- at the all engine operating cruise speed, corrected for wind and temperature, not exceeds the airplane's most limiting fire suppression system time minus 15 minutes for those cargo and baggage compartments required by regulation to have fire suppression systems.

c) The operator must designate the nearest available EDTO/ETOPS alternate or alternates within 240-minutes diversion time (at one engine inoperative cruise speed under standard conditions in still air). If an EDTO/ETOPS alternate is not available within 240 minutes, the operator must designate the nearest available EDTO/ETOPS alternate or alternates along the planned route of flight.

d) The minimum equipment list (MEL) limitations for the authorized EDTO/ETOPS diversion time apply.
- The Fuel Quantity Indicating System must be operational.
- SATCOM Voice required, but in the area that SATCOM Voice is not available (Polar region) a backup voice system is required (HF).

e) The AOC holder must operate in accordance with the EDTO/ETOPS authority as contained in its Ops Specs.

4. Accelerated EDTO/ETOPS Operational Approval

4.1. General

4.1.1. This section is a means to identify factors, which the DCA may consider to allow a reduction or substitution of in- service experience

requirements on a case by case basis, prior to granting Accelerated EDTO/ETOPS Operational Approval for a specific airframe-engine combination up to and including 180 minutes EDTO/ETOPS.

4.1.2. In addition to the requirements of this Appendix, an air operator wishing to be considered for an accelerated EDTO/ETOPS approval up to and including 180 minutes for a specific airframe-engine combination, should either conduct actual EDTO/ETOPS operation at 120 minutes for a minimum period of at least 3 months. On a case-by-case basis, an air operator already operating at 180 minutes with a different airframe-engine combination may obtain 180 minutes approval in less than 3 months provided that all the conditions of this Appendix are met.

4.1.3. An excellent propulsion related service safety record for two-engine aeroplanes has been maintained since the introduction of EDTO/ETOPS. Current data indicates that the EDTO/ETOPS process benefits are achievable without extensive in-service experience. Therefore, reduction or elimination of in-service experience requirements may be possible when the air operator demonstrates that adequate and validated EDTO/ETOPS processes are in place.

4.1.4. The Accelerated EDTO/ETOPS Operational Approval Program with reduced in-service experience does not imply that a reduction of existing levels of safety are tolerated but rather acknowledges that an air operator may satisfy the objectives of this document by an equivalent means when considering demonstrated operational capability.

4.1.5. An air operator may be permitted to start EDTO/ETOPS operations under the conditions of this Appendix when it has established and demonstrated that those processes necessary for successful EDTO/ETOPS operations are in place and are considered to be reliable. It should be emphasized that failure to meet the established criteria, milestones or reliability levels may result in the loss of the Accelerated EDTO/ETOPS Operational Approval.

4.2. Application

4.2.1. An “Accelerated EDTO/ETOPS Operational Approval Plan” should be submitted to CAAT a minimum of 6 months before the proposed start of operations.

4.2.2. The application for Accelerated EDTO/ETOPS Operational Approval should:

i. Define proposed routes and necessary diversion times required to support the applicable routes;

ii. Define processes and resources allocated to initiate and sustain EDTO/ETOPS;

iii. Identify the plan for establishing and maintaining EDTO/ETOPS build standard compliance;

4.3. Operational Approvals

4.3.1. Operational approvals are to be considered on individual merit and capability (case-by-case basis). Accelerated EDTO/ETOPS Operational Approval is not guaranteed and air operators are encouraged to await approval prior to planning revenue EDTO/ETOPS operations.

4.3.2. Accelerated EDTO/ETOPS Operational approvals which are granted with reduced in-service experience are to be limited to those areas agreed by CAAT contained within the Accelerated EDTO/ETOPS Operational Approval Plan.

4.3.3. Air operators may be eligible for Accelerated EDTO/ETOPS Operational Approval up to the Type Design Approval limit.

4.4. Accelerated EDTO/ETOPS Surveillance

4.4.1. Deficiencies associated with engineering and maintenance control systems, flight dispatch or flight crew performance may result in the rejection of or amendment to, the claimed credit for reduced in-service experience.

4.4.2. Therefore, an accelerated program leading to an EDTO/ETOPS Operational Approval is considered feasible so long as the air operators retain commitment to the standards which are contained in their EDTO/ETOPS Operational Approval Plan. During the first year of operation close monitoring should be exercised.

4.5. Minimum Requirement

4.5.1. The typical operational experience requirements for a given airframe-engine combination is:

4.5.1.1. Two turbine engines aeroplanes

i. Minimal or no in services experience for 90 minutes approval;

ii. Minimal or no in services experience for 120 minutes approval; and
iii. 3 months with 120 minutes EDTO/ETOPS in service experience for 180 minutes approval.

4.5.1.2. More than two turbine engines aeroplanes, there are no minimum in-service experience.

4.5.2. On a case-by-case basis, the in-service experience requirements for an accelerated EDTO/ETOPS approval specified in this 4.5.1 may be further reduced provided that the air operator can successfully demonstrate to the satisfaction of the DCA Inspector that all of the elements of their EDTO/ETOPS process for the applicable airframe-engine combination are proven and function as intended.

4.5.3. This may either be accomplished via:

i. Supporting documentation and demonstration that the elements of a EDTO/ETOPS process that has been validated for another airframe-engine combination and could be applicable to the new airframe-engine combination would function to an equivalent level of safety on the new airframe-engine combination; and
ii. Those elements of the EDTO/ETOPS process that are unable to be proven until the new airframe-engine combination enters service, should be validated prior to the approval of the requested authority.

5. EDTO/ETOPS proving flights

5.1. In addition to any other requirements imposed by this Appendix, in considering whether to give an AOC holder an EDTO/ETOPS approval, CAAT may require the AOC holder to conduct a proving flight to demonstrate that the AOC holder has the capability and competence to safely conduct and adequately support the intended operation.

5.2. If a proving flight is required, CAAT must give the AOC holder a statement of the conditions that will apply for the flight, including the presence of DCA officers as observers on the flight.

5.3. Any condition of the proving flight stated by CAAT to be critical to airworthiness, crew workload or performance risks must be successfully demonstrated during the proving flight unless CAAT has witnessed a successful demonstration for that particular condition before the proving flight.

APPENDIX B

General conditions for EDTO/ETOPS approval for Transport category turbine-engine aeroplane

Definitions

In this Appendix, words and phrases have the same meaning as in Appendix A.

1. General prerequisites for EDTO/ETOPS

The AOC holder must ensure that an EDTO/ETOPS flight does not commence unless:

i. the safety operational specifications of the Air Operator's Certificate permit the EDTO/ETOPS; and
ii. procedures for the EDTO/ETOPS to meet the requirements for EDTO/ETOPS mentioned in this order are set out in the AOC holder's operations manual.

2. Flight dispatch requirements for EDTO/ETOPS

2.1. The AOC holder must ensure that an aeroplane is only dispatched on an EDTO/ETOPS if the communication facilities required by the AIP are available.

2.2. The AOC holder must ensure that an aeroplane is only dispatched on an EDTO/ETOPS if it meets the requirements of the CMP standards document for the EDTO/ETOPS flight.

2.3. The AOC holder must ensure that an aeroplane is only dispatched on an EDTO/ETOPS if the required take-off, destination and alternate aerodromes, including EDTO/ETOPS alternate aerodromes to be used in the event of engine shutdown or aeroplane system failure which require a diversion, are listed in the cockpit documentation.

2.4. The AOC holder must ensure that an aeroplane is only dispatched on an EDTO/ETOPS if EDTO/ETOPS alternate aerodromes are identified and listed in the EDTO/ETOPS dispatch release.

2.5. The AOC holder must ensure that an aerodrome is listed as an EDTO/ETOPS alternate only if:

2.5.1. the latest available forecast weather conditions for a period from one hour before the earliest to one hour after the latest time of landing at the aerodrome, equal or exceed the relevant aerodrome planning minima for an EDTO/ETOPS alternate aerodrome in Section 6 of this Appendix; and

2.5.2. the forecast crosswind component, including gusts, for the landing runway expected to be used is not more than the maximum permitted crosswind for a 1 engine inoperative landing.

Note *for the purposes of this provision, forecast probabilities of less than 40% may be disregarded. However, INTER and TEMPO conditions, when forecast, must be taken into account when calculating fuel requirements.*

3. Additional flight dispatch requirements for EDTO/ETOPS more than 180 minutes

3.1. The AOC holder must ensure that an aeroplane is only dispatched on an EDTO/ETOPS more than 180 minutes from an EDTO/ETOPS alternate aerodrome if an additional communication facility will be available to provide direct landline quality voice communication at all stages of flight between the flight crew and air traffic services, and the flight crew and the operator.

3.2. The AOC holder must ensure that an aeroplane is only dispatched on the EDTO/ETOPS if:

3.2.1. the time limit specified in the AFM for the aeroplane cargo fire suppression system will not be less than the EDTO/ETOPS time requested, based on a diversion time:

(i) at the all-engines-operating cruise speed; and
(ii) that includes appropriate corrections for wind and temperature; and
(iii) that includes the addition of a 15 minutes allowance for holding, approach and landing; and

3.2.2. the time limit specified in the AFM for the aeroplane's most time-limited system, other than the cargo fire suppression system, will not be less than the EDTO/ETOPS time requested, based on a diversion time:

(i) at the 1 engine inoperative cruise speed; and
(ii) that includes appropriate corrections for wind and temperature; and
(iii) that includes the addition of a 15 minutes allowance for holding, approach and landing.

4. En route consideration for EDTO/ETOPS

4.1. Before an EDTO/ETOPS flight proceeds beyond the applicable EDTO/ETOPS entry point the AOC holder for the aeroplane must ensure that the PIC is notified of any significant changes in forecast weather, aerodrome availability, or any other required services at EDTO/ETOPS alternate aerodromes designated for the flight.

4.2. The AOC holder must ensure that:

4.2.1. changes notified under 4.1 are evaluated by the PIC; and

4.2.2. if any changes are identified that would preclude a safe approach and landing at an EDTO/ETOPS alternate aerodrome during the time of landing, the PIC must select an acceptable EDTO/ETOPS alternate aerodrome where a safe approach and landing can be made.

4.3. The AOC holder must ensure that the PIC of an EDTO/ETOPS flight does not proceed beyond an extended diversion time entry point unless:

4.3.1. the meteorological forecast for each required aerodrome nominated as an EDTO/ETOPS alternate aerodrome indicates that it will be at, or above, the approved aerodrome landing minima for the expected approach during the possible period of use; and

4.3.2. no other event has occurred that makes the aerodrome unusable.

4.4. The AOC holder must ensure that before the aeroplane goes beyond the EDTO/ETOPS entry point, the PIC ensures that the aeroplane complies with the in-flight operational requirements of the CMP standards document for the EDTO/ETOPS flight.

4.5. After an EDTO/ETOPS flight goes beyond the applicable EDTO/ETOPS entry point, the AOC holder must ensure that the PIC:

4.5.1. is informed of any significant changes in conditions at designated EDTO/ETOPS alternate aerodromes; and

4.5.2. if:

(i) the meteorological forecast is subsequently revised below the EDTO/ETOPS alternate aerodrome landing minima for a required EDTO/ETOPS alternate aerodrome; or

(ii) any other event occurs that makes the aerodrome unusable;

(iii) only continues the flight if the PIC is satisfied that doing so would be safer than an alternative course of action.

5. Fuel requirements for EDTO/ETOPS

5.1. The AOC holder for an aeroplane conducting an EDTO/ETOPS flight must ensure that the aeroplane carries at least the fuel required by 5.2 and 5.3.

5.2. The amount of fuel on board the aeroplane on departure must be the greater of:

5.2.1. that determined under the operations manual for a similar non-EDTO/ETOPS flight; or

5.2.2. that required under 5.3.

5.3. The AOC holder must ensure that the aeroplane does not commence a flight, planned as an EDTO/ETOPS flight unless the aeroplane carries sufficient fuel to satisfy the following requirements:

5.3.1. when departing as an EDTO/ETOPS flight, the aeroplane must carry the greatest amount of fuel by consider the following possible failure scenarios occurring at the Critical Point (CP):

(i) Flight at the approved one-engine-inoperative cruise speed assuming an engine failure at the most critical point followed by descent to the one-engine-inoperative cruise altitude.

(ii) Flight at the approved one-engine-inoperative cruise speed assuming a rapid decompression and a simultaneous engine failure at the most critical point followed by descent to a 10,000 ft or a higher altitude if sufficient oxygen is provided in accordance with the applicable operational requirements.

(iii) A rapid decompression at the most critical point followed by descent to a 10,000 ft or a higher altitude if sufficient oxygen is provided in accordance with the applicable operational requirements.

5.3.2. For computation of the EDTO/ETOPS critical fuel reserves and of the complete EDTO/ETOPS critical fuel planning, the diversion fuel shall include the following fuel provisions:

(i) Fuel burn-off from CP to the diversion airport in the worst case from 5.3.1 (which normally the case (ii) or (iii) from 5.3.1 will required a great amount of fuel);

(ii) if the AOC holder is using a wind forecast model acceptable to CAAT, to allow for errors in wind forecasting, the AOC holder must add a 5% wind speed factor (i.e. as an increment to a headwind or as a decrement to a tailwind) on the actual or forecast wind used to calculate the fuel requirements of paragraph (i); or 5% of the above fuel burn-off in the worst case from 5.3.1, if wind model is not acceptable. A wind aloft forecasting distributed worldwide by the World Area Forecast System (WAFS) is an example of a wind model acceptable to the CAAT.

(iii) 15 minutes holding at 1,500 ft over EDTO/ETOPS en-route alternate airport;

(iv) Instrument approach and landing;

(v) Effect of any MEL item;

(vi) APU fuel consumption, if required as a power source;

(vii) If icing conditions are forecast:

- Effect of airframe icing for 10% of the time during which icing is forecast (including taking into account the fuel that would be used by the use of engine and wing anti-ice during the same period); or
- the fuel that would be used by use of engine anti- ice, and if appropriate wing anti-ice, for the entire time during which icing is forecast;

6. The AOC holder must ensure that the requirements of an EDTO/ETOPS alternate aerodrome are met by satisfying the criteria in Table 1.

Table 1 Standard EDTO/ETOPS alternate aerodrome planning minima

Approach Facility	Ceiling	Visibility
Precision Approach	Authorized DH/DA plus an increment of 200 ft	Authorized visibility plus an increment of 800 m
Non-Precision Approach or Circling approach	Authorized MDH/MDA plus an increment of 400 ft	Authorized visibility plus an increment of 1500 m

7. Maintenance elements for EDTO/ETOPS

This section only applies to an AOC holder approved to conduct EDTO/ETOPS using Transport category with two turbine engines aeroplane.
(Refer Appendix C to this manual.)

8. Flight crew training and evaluation

8.1. The AOC holder must have a program for EDTO/ETOPS training of flight crew members, with associated recurrent training, competency evaluation and proficiency checking.

NOTE: Detail of training requirement has been stated in Appendix D to this manual

8.2. The program must include initial and recurrent training, competency evaluation and proficiency checking for the following:

8.2.1. if standby sources of electrical power significantly degrade cockpit instrumentation to the pilots — simulation of aerodrome approaches using standby power as the sole power source;

8.2.2. contingency procedures for each area of operation intended to be used;

8.2.3. evaluation of, and response to, probable propulsion and airframe systems failures;

8.2.4. diversion procedures and diversion decision-making processes;

8.2.5. the EDTO/ETOPS regulatory framework and operational approvals.

9. Quarterly EDTO/ETOPS reports

9.1. An AOC holder approved to conduct EDTO/ETOPS using aeroplane with two turbine-engines must prepare for DCA a summary report on each of the following for the period of 3 months after receiving EDTO/ETOPS approval, and for every 3 months period after that:

9.1.1. aeroplane operations and utilization;

9.1.2. engine operations and utilization;

9.1.3. for each flight — interruptions, delays or cancellations due to technical reasons;

9.1.4. unscheduled termination or diversion from a route caused by actual or suspected technical malfunctions;

9.1.5. IFSD rates;

9.1.6. reportable defects and events,

9.1.7. system defect summary reports which have exceeded their alert level;

9.1.8. minimum equipment list usage;

9.1.9. unscheduled component removals;

9.2. The AOC holder must ensure that the summary report is received by CAAT not later than 14 days after the end of each 3 months period mentioned in 9.1.

APPENDIX C

Continuing Airworthiness Considerations

1. Applicability

The requirements of this Appendix apply to the AOC holder of the aircraft for which an EDTO/ETOPS operational approval is sought. They specifically affect:

i. Occurrence reporting;
ii. Aircraft maintenance programme and reliability programme;
iii. Continuing airworthiness management exposition;
iv. Competence of continuing airworthiness and maintenance personnel

2. Occurrence Reporting

In addition to the items generally required to be reported, the following items concerning EDTO/ETOPS should be included:

i. in-flight shutdowns;
ii. diversion or turn-back;
iii. un-commanded power changes or surges;
iv. inability to control the engine or obtain desired power; and
v. failures or malfunctions of EDTO/ETOPS significant systems having a detrimental effect to EDTO/ETOPS flight.

Note: status messages, transient failures, intermittent indication of failure, messages tested satisfactorily on ground not duplicating the failure should only be reported after an assessment by the operator.

The report should identify as applicable the following:

i. aircraft identification;
ii. engine, propeller or APU identification (make and serial number);
iii. total time, cycles and time since last shop visit;
iv. phase of flight; and
v. corrective action.

CAAT should be notified within 72 hours of events reportable.

3. Maintenance Program and Reliability

The quality of maintenance and reliability program can have an appreciable effect on the reliability of the propulsion system and the EDTO/ETOPS

Significant Systems. The Competent Authority should assess the proposed maintenance and reliability programme's ability to maintain an acceptable level of safety for the propulsion system and the EDTO/ETOPS Significant Systems of the particular airframe/engine combination.

3.1. Maintenance Program

The maintenance programme of an aircraft for which EDTO/ETOPS operational approval is sought, should contain the standards, guidance and instructions necessary to support the intended operation. The specific EDTO/ETOPS maintenance tasks identified by the (S)TC holder in the Configuration, Maintenance and Procedures document (CMP) or equivalent should be included in the maintenance programme and identified as EDTO/ETOPS tasks.

An EDTO/ETOPS Maintenance task could be an EDTO/ETOPS specific task or/and a maintenance task affecting an EDTO/ETOPS significant system. An EDTO/ETOPS specific task could be either an existing task with a different interval for EDTO/ETOPS, a task unique to EDTO/ETOPS operations, or a task mandated by the CMP further to the in-service experience review.

The maintenance programme should include tasks to maintain the integrity of cargo compartment and pressurisation features, including baggage hold liners, door seals and drain valve condition. Processes should be implemented to monitor the effectiveness of the maintenance programme in this regard.

3.1.1 Pre-Departure Service Check

An EDTO/ETOPS service check should be developed to verify the status of the aeroplane and the EDTO/ETOPS significant systems. This check should be accomplished by an authorised and trained person prior to an EDTO/ETOPS flight. Such a person may be a member of the flight crew.

3.2. Reliability Program

3.2.1 General

The reliability programme of an EDTO/ETOPS operated aircraft should be designed with early identification and prevention of failures or malfunctions of EDTO/ETOPS significant systems as the primary goal. Therefore, the reliability programme should include assessment of EDTO/ETOPS Significant Systems performance during scheduled inspection/testing, to detect system failure trends in order to

implement appropriate corrective action such as scheduled task adjustment.

The reliability programme should be event-orientated and incorporate:

i. reporting procedures in accordance with Section 2
ii. operator's assessment of propulsion systems reliability
iii. APU in-flight start programme
iv. Oil consumption programme
v. Engine Condition Monitoring programme
vi. Verification programme

3.2.2 Assessment of Propulsion Systems

3.2.2.1. The operator's assessment of propulsion systems reliability for the EDTO/ETOPS fleet should be made available to the competent Authority on at least a monthly basis.

3.2.2.2. The assessment should include, as a minimum, engine hours flown in the period, IFSD rate for all causes and engine removal rate, both on a 12-months moving average basis.

3.2.2.3. Any adverse sustained trend to propulsion systems would require an immediate evaluation to be accomplished by the operator in consultation with the competent authority.

3.2.2.4. A high IFSD rate for a small fleet may be due to the limited number of engine operating hours and may not be indicative for an unacceptable trend.

3.2.2.5. If an operator has an unacceptable engine in-flight shutdown rate caused by maintenance or operational practices, then the appropriated corrective actions should be taken.

3.2.3. APU In-Flight Start Program

If APU in-flight start capability is required for EDTO/ETOPS, the AOC holder must have in- flight APU start and run reliability program acceptable to CAAT. The operator should periodically review the APU in-flight start program data to ensure that the in-flight start reliability is maintained. Should the rolling 12-month APU in-flight start rate drop below 95 percent, the operator should initiate an investigation into any common cause effects or systemic errors in procedures and report to CAAT office within 96 Hour.

The operator should make APU in-flight starts subject to the following conditions:

3.3.3.1. In-flight APU starts do not need to be performed on EDTO/ETOPS flights; however, the APU must be in the EDTO/ETOPS configuration in accordance with the appropriate CMP document, if applicable, for credit to be allowed.

3.3.3.2. If in-flight APU start is performed on an EDTO/ETOPS flight, the start may be attempted on the return leg.

3.3.3.3. The start attempt should be initiated before top of descent, or at such time that will ensure a 2-hour cold soak at altitude before the start attempt.

3.3.3.4. If the APU fails to start on the first attempt, subsequent start attempts may be made within the limits of the airframe and APU manufacturer's recommended procedures.

3.2.4. Oil Consumption Monitoring Program

The oil consumption monitoring programme should reflect the (S)TC holder's recommendations and track oil consumption trends. The monitoring programme must be continuous and include all oil added at the departure station.

If oil analysis is recommended to the type of engine installed, it should be included in the programme.

If the APU is required for EDTO/ETOPS dispatch, an APU oil consumption monitoring programme should be added to the oil consumption monitoring programme.

3.2.5. Engine Condition Monitoring Program

The engine condition monitoring programme should ensure that a one-engine- inoperative diversion may be conducted without exceeding approved engine limits (e.g. rotor speeds, exhaust gas temperature) at all approved power levels and expected environmental conditions. Engine limits established in the monitoring programme should account for the effects of additional engine loading demands (e.g. anti-icing, electrical, etc.), which may be required during the one-engine-inoperative flight phase associated with the diversion.

The engine condition monitoring 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 will be used to

detect deterioration at an early stage to allow for corrective action before safe operation of the aircraft is affected.

3.2.6. Verification Program

The operator should develop a verification programme to ensure that the corrective action required to be accomplished following an engine shutdown, any EDTO/ETOPS significant system failure or adverse trends or any event which require a verification flight or other verification action are established. A clear description of who must initiate verification actions and the section or group responsible for the determination of what action is necessary should be identified in this verification programme.

4. Continuing Airworthiness Management Exposition

The AOC holder should establish appropriate procedures to be used by all personnel involved in the continuing airworthiness and maintenance of the aircraft, including supportive training program, duties, and responsibilities.

The AOC holder should specify the procedures necessary to ensure the continuing airworthiness of the aircraft particularly related to EDTO/ETOPS operations. It should address the following subjects as applicable:

a. General description of EDTO/ETOPS procedures

b. EDTO/ETOPS maintenance programme development and amendment

c. EDTO/ETOPS reliability programme procedures
   i. Engine/APU oil consumption monitoring
   ii. Engine/APU Oil analysis
   iii. Engine conditioning monitoring
   iv. APU in-flight start programme
   v. Verification programme after maintenance
   vi. Failures, malfunctions and defect reporting
   vii. Propulsion System Monitoring/Reporting
   viii. EDTO/ETOPS significant systems reliability

d. Parts and configuration control programme

e. Maintenance procedures that include procedures to preclude identical errors being applied to multiple similar elements in any EDTO/ETOPS significant system

f. Interface procedures with the EDTO/ETOPS maintenance contractor, including the operator EDTO/ETOPS procedures that involve the maintenance organisation and the specific requirements of the contract

g. Procedures to establish and control the competence of the personnel involved in the continuing airworthiness and maintenance of the EDTO/ETOPS fleet.

5. Competence of Continuing Airworthiness and Maintenance Personal

The AOC holder should ensure that the personnel involved in the continuing airworthiness management of the aircraft have knowledge of the EDTO/ETOPS procedures of the operator.

The AOC holder should ensure that maintenance personnel that are involved in EDTO/ETOPS maintenance tasks:

a. Have completed an EDTO/ETOPS training programme reflecting the relevant EDTO/ETOPS procedures of the operator, and,
b. Have satisfactorily performed EDTO/ETOPS tasks under supervision.

5.1. Proposed Training Program for Personal Involved in the Continuing Airworthiness and Maintenance of the EDTO/ETOPS Fleet

The operator's EDTO/ETOPS training programme should provide initial and recurrent training for as follows:

5.1.1. Introduction to EDTO/ETOPS Regulations

a. EDTO/ETOPS Type Design Approval – a brief synopsis

5.1.2. EDTO/ETOPS Operations Approval

a. Maximum approved diversion times and time-limited systems capability
b. Operator's Approved Diversion Time
c. EDTO/ETOPS Area and Routes
d. EDTO/ETOPS MEL

5.1.3. EDTO/ETOPS Continuing Airworthiness Considerations

a. EDTO/ETOPS significant systems
b. CMP and EDTO/ETOPS aircraft maintenance programme
c. EDTO/ETOPS pre-departure service check
d. EDTO/ETOPS reliability programme procedures

i. Engine/ APU oil consumption monitoring
ii. Engine/APU Oil analysis
iii. Engine conditioning monitoring
iv. APU in-flight start programme
v. Verification programme after maintenance
vi. Failures, malfunctions and defect reporting
vii. Propulsion System Monitoring/Reporting
viii. EDTO/ETOPS significant systems reliability

e. Parts and configuration control programme

APPENDIX D

EDTO/ETOPS Training Program

The AOC holder EDTO/ETOPS training programme should provide initial and recurrent training for flight crew as follows:

1. Introduction to EDTO/ETOPS Regulations

a. Brief overview of the history of EDTO/ETOPS;

b. EDTO/ETOPS regulations;

c. Definitions;

d. Approved One-Engine-Inoperative Cruise Speed;

e. EDTO/ETOPS Type Design Approval – a brief synopsis;

f. Maximum approved diversion times and time-limited systems capability;

g. Operator's Approved Diversion Time;

h. Routes and aerodromes intended to be used in the EDTO/ETOPS area of operations;

i. EDTO/ETOPS Operations Approval;

j. EDTO/ETOPS Area and Routes;

k. EDTO/ETOPS en-route alternates aerodromes including all available let-down aids;

l. Navigation systems accuracy, limitations and operating procedures;

m. Meteorological facilities and availability of information;

n. In-flight monitoring procedures;

o. Computerized Flight Plan;

p. Orientation charts, including low level planning charts and flight progress charts usage (including position plotting);

q. Equal Time Point;

r. Critical fuel.

2. Normal Operations

a. Flight planning and Dispatch

i. EDTO/ETOPS Fuel requirements
ii. Route Alternate selection - weather minima
iii. Minimum Equipment List – EDTO/ETOPS specific
iv. EDTO/ETOPS service check and Tech log
v. Pre-flight FMS Set up

b. Flight performance progress monitoring

i. Flight management, navigation and communication systems
ii. Aeroplane system monitoring
iii. Weather monitoring
iv. In-flight fuel management – to include independent cross checking of fuel quantity

3. Abnormal and Contingency Procedures

a. Diversion Procedures and Diversion 'decision making'.

Initial and recurrent training to prepare flight crews to evaluate potential significant system failures. The goal of this training should be to establish crew competency in dealing with the most probable contingencies. The discussion should include the factors that may require medical, passenger related or non-technical diversions.

b. Navigation and communication systems, including appropriate flight management devices in degraded modes.

c. Fuel Management with degraded systems.

d. Initial and recurrent training which emphasis abnormal and emergency procedures to be followed in the event of foreseeable failures for each area of operation, including:

i. Procedures for single and multiple failures in flight affecting EDTO/ETOPS sector entry and diversion decisions. If standby sources of electrical power significantly degrade the cockpit instrumentation to the pilots, then training for approaches with the standby generator as the sole power source should be conducted during initial and recurrent training.

ii. Operational restrictions associated with these system failures including any applicable MEL considerations.

4. Flight Operations Personal Other Than Flight Crew

The operator's training programme in respect to EDTO/ETOPS should provide training where applicable for operations personnel other than flight crew (e.g. dispatchers), in addition to refresher training in the following areas:

a. EDTO/ETOPS Regulations/Operations Approval
b. Aeroplane performance/Diversion procedures
c. Area of Operation
d. Fuel Requirements
e. Dispatch Considerations MEL, CDL, weather minima, and alternate airports
f. Documentation