CIVIL AVIATION AUTHORITY OF VIETNAM

ADVISORY CIRCULAR
AC 10-005

PROCESS & APPLICATION: EDTO CERTIFICATION

SECTION 1 POLICY & GENERAL INFORMATION

1.1 PURPOSE

This Advisory Circular (AC) provides Vietnam aircraft owners and operators with comprehensive information on a means of gaining the approval of the CAAV to undertake EDTO in transport category aircraft.

EDTO approval allows the operation of aircraft over routes where the aircraft will be more than the threshold flying time from an acceptable alternate aerodrome.

1.2 STATUS OF THIS AC

This revision is [B]2015 that replaces [A]2009.

1.3 BACKGROUND

A. This AC provides the policy, procedures and guidelines for obtaining Type Design and/or Operational Approval for two-engine transport category aeroplanes to operate over a specified route containing a point farther than 60 minutes flying time at the approved one-engine-inoperative cruise speed (under standard conditions in still air) from an adequate aerodrome regardless of terrain.

B. The original 60-minute requirement was based primarily on engine reliability. But engine reliability has improved to a level where the safety of the operations is not impacted so much by the number of engines, but by other factors that affect operations of all airplanes whose routings take them great distances from adequate airports. These factors include—

1) The requirement applies to all areas of operation, and has not been limited to overwater operations.

2) Any additional restrictions imposed or, alternatively, any deviations granted to operate in excess of the basic requirements, are based on a finding by the CAAV that adequate safety would be provided in the proposed operation and current levels of safety would be maintained when all factors were considered.

   ♦ This finding was never limited to engine reliability alone.

3) The airports used in meeting the provisions of the rule must be adequate for the airplane used (that is, available for safe landings and takeoff with the weights authorized).

- Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.
- Where an AC is referred to in a 'Note' below the regulation, the AC remains as guidance material,
- ACs should always be read in conjunction with the referenced regulations.

4) Adequate levels of safety within the operation are to be maintained.

   ♦ Operations over increasingly remote areas and the possibility of increased diversion lengths have a potentially negative impact on the safety of the diversion, and thus the operation as a whole.

Additional regulatory requirements are intended to ensure that this potential increase in risk is mitigated and that adequate levels of safety within operations are retained.

5) When considering the impact of operating at greater distances from airports, the AOC holder must show that the operation can be conducted at a level of reliability that maintains an acceptable level of risk.

C. Previously issued approvals for EDTO programs will continue to be valid.

- Requests for new EDTO authorizations or changes to existing programs will be assessed under the criteria outlined in this document.

1.4 APPLICABILITY

A. This AC is applicable to Vietnam AOC holders who operate either Vietnam- or foreign-registered aircraft.

B. Vietnam AOC holders wishing to engage in EDTO operations anywhere in the world must obtain certification from CAAV before engaging in those operations.

EDTO does not apply to flights conducted wholly within Vietnam domestic airspace.

C. This AC focuses on all twin-engine aeroplanes with a MCTOW of more than 8618 kilograms (19,000 pounds) for which the type certificate has been issued authorizing the transport of 20 or more passengers (whether or not the individual aircraft is configured for 20 or more passengers) operated by an Vietnam air operator in an commercial air transport.

1.5 RELATED PUBLICATIONS

For further information on this topic, operators may wish to review the following publications/ regulatory requirements.

1) Federal Aviation Administration (CAAV). Website: www.faa.gov

   ♦ AC 120-42B

2) Joint Aviation Authorities (JAA)

   ♦ JAA Information Leaflet 20

1.6 DEFINITIONS

The following definitions are applicable to EDTO. , as well as terms that are used within the context of this AC with respect to EDTO—

- This list of definitions is applicable in the context of this AC only.
- Words, such as "aerodrome" may be found in other publications with a different definition.

1) **Aircraft Flight Manual**. In this publication, the term Aircraft Flight Manual will be used in lieu of the terms "Aeroplane Flight Manual" and/or "Approved Flight Manual".

2) **Aerodrome**.

   (a) **Adequate**. For the purpose of this AC, an adequate aerodrome is an aerodrome, which the air operator and the CAAV consider to be adequate, having regard to the performance requirements applicable at the expected landing weight. In particular, it should be anticipated that at the expected time of use—

(i). The aerodrome will be available, and equipped with the necessary ancillary services, such as ATS, aircraft rescue and fire-fighting services, sufficient lighting, communications, weather reporting, navaids and emergency services; and

(ii). At least one approach aid will be available for an instrument approach.

(b) **Suitable.** For the purpose of this AC, a suitable aerodrome is an adequate aerodrome with—

(i). Weather reports, or forecasts, or any combination thereof, indicating that the weather conditions are at or above operating minima, as specified in the operation specifications, and t

(ii). The field condition reports indicate that a safe landing can be accomplished at the time of the intended operation.

3) **Configuration, Maintenance, and Procedures (CMP) Document.** A document approved by the CAAV that contains minimum configuration, operating, and maintenance requirements, hardware life-limits, and Master Minimum Equipment List (MMEL) constraints necessary for an airplane-engine combination to meet EDTO type design approval requirements.

4) **Dual Maintenance.** Dual maintenance means maintenance on the "same" EDTO significant system. Dual maintenance is maintenance action performed on the same element of identical, but separate EDTO Significant Systems during a scheduled or unscheduled maintenance visit.

Dual maintenance on "substantially similar" EDTO significant systems means maintenance actions performed on engine-driven components on both engines during the same maintenance visit.

5) **Equal-Time Point (ETP).** A point on the route of flight where the flight time, considering wind, to each of two selected airports is equal.

6) **ER.** An abbreviation used in the MMEL and in the minimum equipment list (MEL) of some AOC holders to indicate EDTO.

As used in this AC, any EDTO MMEL/MEL restrictions applicable to EDTO.

7) **EDTO.** An airplane flight operation during which a portion of the flight is conducted beyond 60 minutes from an adequate airport for turbine-engine-powered airplanes with two engines, and beyond 180 minutes for turbine-engine-powered passenger-carrying airplanes with more than two engines.

This distance is determined using an approved one-engine inoperative cruise speed under standard atmospheric conditions in still air.

8) **EDTO Alternate Airport.** An adequate airport listed in the AOC holder's operations specifications (OpSpecs) that is designated in a dispatch or flight release for use in the event of a diversion during EDTO.

This definition applies to flight planning and does not in any way limit the authority of the pilot in command (PIC) during flight.

9) **EDTO Area of Operation.** For turbine-engine-powered airplanes with two engines an area beyond 60 minutes from an adequate airport, or with more than two engines in passenger- carrying operations, an area beyond 180 minutes from an adequate airport, and within the authorized EDTO maximum diversion time approved for the operation being conducted.

Any power reduction which results in an EDTO area of operation is calculated at an approved one-engine inoperative cruise speed under standard conditions in still air.

10) **EDTO Entry Point.** The first point on the route of an EDTO flight; determined using a one-engine inoperative cruise speed under standard conditions in still air that is more than 60

minutes from an adequate airport for airplanes with two engines, and more than 180 minutes from an adequate airport for passenger-carrying airplanes with more than two engines.

11) **EDTO Maintenance Entity**. An entity that has been authorized to perform EDTO maintenance and authorized by the AOC holder to complete EDTO pre-departure service checks. That entity is certificated—

(a) To engage in AOC operations; or

(b) As an Approved Maintenance Organization.

12) **EDTO-Qualified Personnel.** A person performing maintenance for the AOC holder, who has satisfactorily completed the AOC holder's EDTO qualification program.

13) **EDTO Significant System.** An airplane system, including the propulsion system, the failure or malfunctioning of which could adversely affect the safety of an EDTO flight, or the continued safe flight and landing of an airplane during an EDTO diversion.

Each EDTO significant system is either an EDTO Group 1 significant system or an EDTO Group 2 significant system.

(a) An EDTO Group 1 Significant System—

(i). Has fail-safe characteristics directly linked to the degree of redundancy provided by the number of engines on the airplane;

(ii). 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;

(iii). Contributes significantly to the safety of an EDTO diversion by providing additional redundancy for any system power source lost as a result of an inoperative engine; and

(iv). Is essential for prolonged operation of an airplane at engine inoperative altitudes.

(b) An EDTO Group 2 significant system is an EDTO significant system that is not an EDTO 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.

14) **Engine.** The basic engine assembly plus its essential accessories as supplied by the engine manufacturer.

15) **Engineering Judgment.** A subjective decision required due to the complexity of an issue based upon a qualitative analysis of relevant data.

16) **In-Flight Shutdown (IFSD).** When 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**.**

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.

♦ The CAAV considers IFSD for all causes, such as flameout, internal failure, flight crew initiated 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.

17) **Flight-by-Flight Exception.** The application of a greater EDTO maximum diversion authority under specific, limited circumstances, as defined in this AC, when a flight cannot be planned on the preferred route within an authorized lesser diversion time.

18) **Flight (Dispatch) Release.** The flight release of a flight occurs when the flight dispatcher approves the Operational Flight Plan, after which it is submitted to the pilot-in-command for acceptance.

> The flight release may be in the form of an Operational Flight Plan or a separate document, signed by the flight dispatcher and issued in accordance with the company operations manual.

19) **Fuel Consumption Monitoring Program.** A program established by the air operator to monitor the aeroplane's in-service deterioration in cruise fuel burn performance.

20) **Maximum Diversion Time.** For the purposes of EDTO and related EDTO regulations, maximum diversion time (for example 120 minutes, 180 minutes, 240 minutes, and, beyond 240 minutes) is the longest diversion time authorized for a flight under the operator's EDTO authority. It is calculated under standard conditions in still air at a one- engine inoperative cruise speed.

21) **One-Engine Inoperative Cruise Speed.** For the purposes of EDTO, the one-engine inoperative cruise speed is a speed within the certified operating limits of the airplane that is specified by the AOC holder and approved by the CAAV for calculating required fuel reserves needed to account for an inoperative engine, or determining whether an EDTO alternate is within the maximum diversion time authorized for an EDTO flight.

22) **North Pacific (NOPAC).** The North Pacific Air Traffic Service (ATS) routes and adjacent airspace between Anchorage and Tokyo Flight Information Regions (FIR).

23) **North Pacific Area of Operations.** Pacific Ocean areas north of 40º North latitudes including NOPAC ATS routes, and published Pacific Organized Track System (PACOTS) tracks between Japan and North America. (For the purposes of this definition, "North America" includes the countries of Canada, the United States, and Mexico.)

24) Polar Areas—

(a) **North Polar Area.** The entire area north of 78º North latitude.

(b) **South Polar Area.** The entire area south of 60º South latitude.

25) **Process.** A series of steps or activities that are accomplished in a consistent manner to ensure a desired result is attained on an ongoing basis.

26) **Proven Process.** A process is considered to be proven when the following elements are developed and implemented—

(a) Definition and documentation of process elements.

(b) Definition of process related roles and responsibilities.

(c) Procedures for validation of process or process elements to include—

(i). Indications of process stability/reliability;

(ii). Parameters to validate process and monitor (measure) success; and

(iii). Duration of necessary evaluation to validate process.

(iv). Procedure for follow-up in-service monitoring to assure the process remains reliable and stable.

27) **Power Plant.** A system consisting of an engine and all ancillary components installed on the engine prior to installation on the aeroplane to provide and control power/thrust and for the extraction of energy.

28) **Single Engine Cruise Speed (Or One-engine-inoperative Cruise Speed).** The approved one-engine-inoperative cruise speed for the intended area of operation must be a speed, within the certified limits of the aeroplane, selected by the air operator and approved by CAAV. This speed must be used for—

(a) Establishing the area of EDTO operations and any dispatch limitations;

(b) Calculation of one-engine-inoperative fuel requirements; and

(c) Establishing the level off altitude (net performance) data.

Refer to the fuel and oil supply section of this AC for more guidance on this calculation.

This level off altitude (net performance) must clear any obstacles en route by margins as specified in applicable operating rules.

1.7 ABBREVIATIONS

The following abbreviations are used in the text of this AC—

1) **AVARS** = Airborne Communication And Reporting System
2) **AFM** = Aircraft Flight Manual
3) **APU** = Auxiliary Power Unit
4) **ATC** = Air Traffic Control
5) **BECMG** = Becoming (Weather)
6) **CAAV** = Civil Aviation Authority of Vietnam
7) **CDL** = Configuration Deviation List
8) **CMP** = Configuration, Maintenance and Procedures Manual
9) **CP** = Critical Point
10) **EEP** = Extended Range Entry Point
11) **ER** = Extended Range
12) **EDTO** = Extended Diversion Time Operations
13) **ETP** = Equal Time Point
14) **EXP** = Extended Range Exit Point
15) **HAT** = Height Above Threshold
16) **HAA** = Height Above Aerodrome
17) **ICA** = Supplemental Instructions for Continuing Airworthiness
18) **IFSD** = In Flight Shut-Down
19) **IPC** = Illustrated Parts Catalogue
20) **MCTOW** = Maximum Certified Take-off Weight
21) **MEL** = Minimum Equipment List
22) **MMEL** = Master Minimum Equipment List
23) **PMI** = Principal Maintenance Inspector
24) **POI** = Principal Operations Inspector
25) **PROB** = Probability (Weather)
26) **PSRA** = Propulsion System Reliability Assessment
27) **RAT** = Ram Air Turbine
28) **RFFS** = Airport Rescue & Fire Fighting Service
29) **SOAP** = Spectrographic Oil Analysis Program

30) **STC** = Supplemental Type Certificate

31) **TC** = Type Certificate

32) **TEMPO** = Temporary (Weather)

SECTION 2 BACKGROUND ON EDTO

2.1 EDTO REGULATORY REQUIREMENTS

A. All two-engine airplanes and three- and four-engine passenger-carrying airplanes operated under VAR Part 12. These operations are defined as—

1) **Two-Engine Airplanes.** These are flights whose planned routing contains a point farther than 60 minutes flying time from an adequate airport at an approved one-engine inoperative cruise speed under standard conditions in still air.

2) **Passenger-Carrying Airplanes with More Than Two Engines.** These are flights whose planned routing contains a point farther than 180 minutes flying time from an adequate airport at an approved one-engine inoperative cruise speed under standard conditions in still air.

B. To conduct EDTO, the specified airplane-engine combination must be certificated to the airworthiness standards of transport-category airplanes and be approved for EDTO.

C. As with all other operations, an AOC holder requesting any route approval must first show that it is able to satisfactorily conduct operations between each required airport as defined for that route or route segment, and any required en route alternate airport.

D. AOC holders must show that the facilities and services specified in VAR Part 10 and 12 are available and adequate for the proposed operation.

E. In addition, the AOC holder must be approved for EDTO under VAR Part 12.

2.2 EVOLUTION OF EDTO

A. In June of 1985, responding to the industry's desire to take advantage of the increased reliability and capabilities of two-engine airplanes, the United States Federal Aviation Administration (FAA) issued an advisory circular (AC 120-42) implementing a new concept using the acronym EDTO. This AC provided guidance on one means of obtaining deviation authority to allow two-engine airplanes to operate on routes up to 120 minutes from an adequate airport after demonstration of specific levels of in-service experience and systems reliability.

B. The FAA amended this AC in 1988 (AC 120-42A) to permit two-engine airplanes to operate up to 180 minutes from an adequate airport.

These ACs introduced the term "EDTO" for those specific Extended Operations and addressed airplane and engine design aspects, maintenance programs, and operations.

C. Both of these ACs encompassed the following precepts—

1) Reliance on a two-step approval that included type design of the airplane-engine combination and approval of the AOC holder's operation.

2) Risk, as measured by diversion length, is mitigated by application of regulations and guidance reflecting current best practices that address the type certification of the EDTO airplane and its systems as well as the operational environment of such operations.

3) EDTO can be managed successfully, and the level of safety can be maintained, by up-to-date regulations and guidance that articulate quantifiable standards of reliability and experience.

D. The original guidance for extended-range operations with two-engine airplanes in AC 120-42 allowed an increase of up to 15 percent to the maximum diversion time of 120 minutes. This provision was eliminated with the release of the guidance in AC 120-42A, providing for operations up to 180 minutes.

Other mature civil aviation authorities issued their own advisory circulars and leaflets while closely paralleled the ACs issued by the FAA.

E. Recognizing a need for EDTO diversion authority between 120 and 180 minutes, the FAA reinstated the 138-minute provision in 1994. In March of 2000, at the request of the industry, the FAA issued EDTO Policy Letter (EPL) 20-1, 207 Minute EDTO Operation Approval Criteria. This document provided a similar 15 percent increase in the 180-minute maximum diversion time and gave limited relief to EDTO AOC holders in the specific case of North Pacific Operations.

F. Since the advent of the original advisory circular, international standards were amended to include the critical elements of extended two-engine airplane operations and many countries, including Vietnam, have amended their regulations to permit and govern EDTO operations.

G. Vietnam operators now have extensive experience with EDTO operations. These operations have been certificated, in part, by applying the FAA advisory circulars as the basic documents of certification.

H. This advisory circular parallels the current FAA advisory circular guidance regarding EDTO, but has been edited to delete references to FAA regulations, documents and organizations. It reflects the very latest international guidance for EDTO operations.

2.3 EDTO APPLICABILITY: PASSENGER-CARRYING: LONG-RANGE OPERATIONS

A. The latest FAA advisory circular (AC 120-42B) contains requirements that conform to the current United States regulations regarding “EDTO” by expanding the requirements to 3- and 4-engine passenger carrying aircraft over routes beyond 180 minutes from adequate airports.

B. This advisory reflects those requirements and standards for the purposes of operating 2-engine aircraft beyond 180 minutes diversion. The guidance regarding 3- and 4-engine aircraft does not yet appear in the VARs, so they are provided here as recommendations for best safety practices and in anticipation of future regulatory revision.

C. Because of the increasing commonality of all long-range operations, there is now evidence that EDTO requirements and processes are generally applicable to all long-range passenger-carrying operations, including those by 3- and 4-engine airplanes, and would improve the safety and viability of such operations. All long-range passenger-carrying airplanes, regardless of the number of engines, needed a viable diversion airport in the case of onboard fire, medical emergency, or catastrophic decompression.

D. Ensuring availability of en route alternate airports, adequate fire fighting coverage at these airports, and fuel planning to account for depressurization are sound operational practices for all airplanes, including 3- and 4-engine airplanes. Likewise, planning for the maximum allowable diversion and worst-case scenarios should account for all airplane time-critical systems.

E. Unlike the EDTO guidance provided for two-engine airplanes, there has been no regulatory framework governing the long-range operations of 3- and 4-engine airplanes. For example, in emergencies such as loss of cabin pressure, current regulations require adequate oxygen supplies but do not require the operator to consider the amount of extra fuel necessary to reach a diversion airport.

F. Operational data shows that the diversion rate for all airplane-related and non-airplane related causes are comparable between two-engine airplanes and airplanes with more than two engines. Consequently, international standards are in transition for all passenger carrying operations beyond 180 minutes from an adequate airport to adopt many of the EDTO

requirements that have been based on sound safety principles and successfully proven over many years of operations. The CAAV recommends that operators of 3- and 4-engine aircraft consider the recommendations of this AC for their operations.

2.4 EXTENDED OPERATIONS

A. Since 1985, the acronym, EDTO, has been defined as “extended twin-engine operations” and has been limited to airplanes with only two engines.

B. Since 1988, the EDTO limit for two-engine airplanes has been 180 minutes from an adequate airport at an approved one-engine inoperative cruise speed under standard conditions in still air (excluding the limited authority in the North Pacific. Service experience has shown that although limited, this authority has satisfactorily supported the vast majority of the world’s current aviation routes.

C. Those areas not supported within 180-minute diversion authority tend to be routes over remote areas of the world that are uniquely challenging to the operation. These areas include the South Polar Region, a small section in the South Pacific, the southern South Atlantic Ocean between South America and Africa, the southern Indian Ocean and the North Polar area under certain winter weather conditions.

D. The additional operational challenges of these routes are equally demanding of all airplanes, regardless of the number of engines, and include such issues as extremes in terrain and meteorology, as well as limited navigation and communications infrastructure. Support of a necessary diversion and subsequent recovery in such areas demands added training, expertise, and dedication from all AOC holders. The development of EDTO requirements is intended to address all these issues.

E. For continuity of concepts the existing acronym EDTO is retained, but it has been re-defined.

See definition of “EDTO” in paragraph 1.6(7).

F. The concept and the acronym “EDTO” has been expanded to include all passenger-carrying airplane operations where a proposed flight plan includes any point that is greater than 180 minutes from an adequate airport (at an approved one-engine inoperative cruise speed under standard conditions in still air).

2.5 PRECLUDE & PROTECT

A. The whole premise of EDTO has been to preclude a diversion and, if it were to occur, to have programs in place to protect the diversion. Under this concept, propulsion systems are designed and tested to ensure an acceptable level of in-flight shutdowns (IFSD), and other airplane systems are designed and tested to ensure their reliability.

B. Two-engine airplane maintenance practices are enhanced to better maintain and monitor the condition of the engines and systems significant to EDTO. The design of these enhanced practices has been a major factor in the joint development of the CAAV and industry aggressive steps to develop a foundation to resolve problems with airplane systems and engines in order to minimize the potential for procedural and human errors, thereby precluding a diversion.

C. However, despite the best design, testing, and maintenance practices, situations occur that may require an airplane to divert. Regardless of whether the diversion is for technical (airplane system- or engine-related) or non-technical reasons, the AOC holder must have a flight operations plan to protect that diversion. For example, such a plan must include ensuring that pilots—

1) Are knowledgeable about diversion airport alternates and weather conditions;

2) Have the ability to communicate with the AOC holder’s dispatch office and air traffic control; and

3) Have sufficient fuel to divert to the alternate.

D. Under the "preclude and protect" concept, various failure scenarios need to be considered. For example, during the design of the airplane, time-limited systems such as cargo compartment fire suppression/containment capability are considered. Fuel planning must account for the possibility of decompression or the failure of an engine with considerations for in-flight icing conditions. Best options under these scenarios should be provided to the pilot before and during the flight.

E. This philosophy has been critical to the success of two-engine EDTO in the past and has been applied to these airplanes in operations beyond 60 minutes from an adequate airport. In-service data shows that all airplanes, regardless of the number of engines, divert from time to time for various causes.

F. All passenger-carrying operations conducted where there are a limited number of en route airports, where the support infrastructure is marginal, or where there are challenging weather conditions should adopt many of the same elements of the same preclude and protect concept.

G. If AOC holders plan to operate passenger-carrying airplanes with more than two engines in areas where en route airports are farther away than 180 minutes, these operations are also required to meet certain standards defined under EDTO to ensure that all efforts are made to preclude a diversion, and if a diversion does occur, that procedures are in place to protect that diversion.

2.6 EDTO AREAS OF OPERATION

A. EDTO areas of operation are defined to be areas beyond a certain distance from adequate airports measured by an airplanes one-engine inoperative cruise speed under standard conditions in still air.

- Because of the impact such distances might have on the diversion time of an airplane, regulatory guidance has been established for the planning, operational, and equipage requirements for such operations. an AOC holder must apply to the CAAV for approval to operate in an EDTO area using the methodologies in this AC or other means approved by the CAAV.
- When approval is granted, the EDTO authority for a specific EDTO area of operations will be noted in the AOC holder's operations specifications (OpSpecs).

B. Most EDTO authorities for two-engine EDTO beyond 180 minutes are limited to a specific geographical region. Historically, EDTO authorities for two-engine airplanes up to 180 minutes were developed based on a specific need in a particular operating area.

C. Limiting expanded EDTO authority beyond 180 minutes (for two-engine airplanes) serves several purposes.

1) The primary importance is the preclusion of an arbitrary use of diversion authority beyond that necessary to complete the operation safely and efficiently.

   ♦ Because it is accepted that increased diversion times potentially increase the risk of the operation an AOC holder must make every effort to plan EDTO with a maximum diversion distance of 180 minutes or less, if possible.

2) It should be a goal of all two-engine airplane flight planning to operate to the shortest diversion time that provides the widest range of options in the event of a diversion while recognizing the economic benefits of a more direct route and the safety benefits of diverting to an airport that is well equipped.

   ♦ Tying increased diversion authority to specific areas of operation accomplishes this goal while sufficiently addressing the operational needs of the industry.

3) Likewise, this focus on specific needs and areas of operation does not add impetus to any perceived rationale for further degradation in the availability or capabilities of en route alternates in remote areas of the world.

   - Although the industry has no direct authority to affect the actions of sovereign nations, it is reasonable to base operations on the value of en route alternate availability at reasonable diversion distances.

4) In consideration of the successful history of three- and four-engine airplane operations and the reliability and redundancy of current engines used in this operation, EDTO for these airplanes does not have similar restrictions and EDTO authorities are not limited to geographic areas.

   - However, like twin-engine operators, the three- and four-engine operator is required to designate the nearest available EDTO alternate along the planned route of flight and must remain within a 240 minute diversion time if possible.

D. In its application for EDTO authority, the AOC holder will typically request a specific EDTO area of operation based on an analysis of proposed routings and the availability of airports sufficient to support the operational requirements of the EDTO regulations.

E. Because the operating rules distinguish between EDTO up to 180 minutes, and EDTO beyond 180 minutes, the requested level of EDTO authority in an AOC holder's application will necessarily have to be assessed differently for EDTO beyond 180 minutes.

2.6.1 NORTH PACIFIC AREAS OF OPERATIONS: 180-MINUTE & 207-MINUTE

A. The EDTO area of operation is the area bounded by distance circles representing the approved one-engine inoperative cruise speed under standard conditions in still air chosen by the applicant.

B. The actual flight plan must comply with the fuel supply requirements and must therefore account for wind. However, the flight planning limitations for airplane systems do not require the operator to account for wind in such calculations for flight planning and for determining the EDTO area of operations in these cases.

C. This allows the applicant to choose an operating authority in his or her application that is based on the "EDTO area of operation" determination. In other words, the distance from alternates in an AOC holder's route planning exercise will be the same value used to determine the type design criteria for the airplane-engine combination used in the operation, and the EDTO approval necessary to fly the route under all flight planning conditions.

2.6.2 EDTO BEYOND 180 MINUTES

A. In order to comply with the requirements for EDTO beyond 180 minutes for all airplanes, the EDTO operation must account for the effects of wind and temperature on the calculated distances. Consequently the planning for an EDTO flight beyond 180 minutes is more complex.

B. The AOC holder should first conduct a route planning exercise for each planned city pairing to determine the diversion authority needed in still air conditions.

> For the purposes of computing distances for EDTO Area of Operation, credit for driftdown may be taken.

1) If the route or segments of the route exceed 180 minutes based on one engine inoperative speed and still air, then a secondary planning exercise (that may be required seasonally) should be conducted that factors in expected winds and temperatures on that route.

2) The distance between adequate alternate airports on the route is converted into time (minutes) computed for all engine cruise speed, as well as engine inoperative speed.

3) The number of minutes cannot exceed the time-limited system certified capability (cargo fire suppression and the other most limiting system) that is identified in the Configuration Maintenance Procedures (CMP) or Aircraft Flight Manual (AFM) (or any other CAAV-

approved manufacturer's document) less the 15-minute pad. The operator needs to determine how much system capability is required for the planned route and equip its airplane to have sufficient margins.

4) Finally, for the actual flight, the operator's flight planning must be within the airplane systems capability for the selected EDTO alternate airports on the planned route based on diversion times that are calculated using known or forecast winds and temperature conditions.

Actual diversion time may exceed the authorized diversion time as long as the flight is conducted within the authorized EDTO Area of Operation, and complies with the VAR requirements

C. As a minimum, the AOC holder must ensure that the time-limited systems requirements are met at the equal-time points between EDTO alternates determined by the most limiting en route fuel supply requirements, commonly referred to as the EDTO critical fuel scenario.

- AOC holders flying three- and four engine airplanes, prior to the established installation time and certification time requirements of the regulation for these systems and their airplanes, are exempt from these flight planning limitations.

D. Once the required fire suppression systems are installed, the AOC holder must follow the flight planning limitations.

- For airplanes with more than 2 engines manufactured on or after February 17, 2015, the CMP document for that model will list the airplane's most limiting EDTO Significant System time issued in accordance with the applicable airworthiness standards.
- The AOC holder operating an airplane-engine combination with more than two engines must comply with the most limiting EDTO Significant System time listed in the CMP.

2.7 EDTO ALTERNATE REQUIREMENTS

A. One of the distinguishing features of EDTO operations is the concept of an en route alternate airport being available where an airplane can divert following a single failure or a combination of failures that require a diversion.

B. Most airplanes operate in an environment where there usually is a choice of diversion airports available within a close proximity to the route of flight.

C. However, an AOC holder conducting EDTO may only have one alternate airport within a range dictated by the endurance of a particular airframe system (for example, the cargo fire suppressant system), and that system or system failure may dictate the approved maximum diversion time for that route.

D. Therefore, it is important that any airport designated as an EDTO alternate have the capabilities, services, and facilities to safely support the operation.

E. The weather conditions at the time of arrival should provide assurance that adequate visual references will be available upon arrival at decision height (DH) or minimum descent altitude (MDA), and that the surface wind conditions and corresponding runway surface conditions will be acceptable to permit the approach and landing to be safely completed with an engine and/or systems inoperative.

F. At dispatch, an en route alternate must meet VAR EDTO alternate weather requirements in this AC and in the AOC holder's OpSpecs.

G. Because of the natural variability of weather conditions with time, as well as the need to determine the suitability of a particular en route alternate before departure, such requirements are higher than the weather minimums required to initiate an instrument approach.

- While en route, the forecast weather for designated EDTO alternates should remain at or above operating minima.
- This provides EDTO flights with the ability to resolve all diversion.

- This is necessary prior to the time that the instrument approach would be conducted, to provide for some deterioration in weather conditions after planning.
- This increases the probability that the flight will land safely after a diversion to an alternate airport.

H. The airport of departure (takeoff) and the destination airport (unless used concurrently as an EDTO alternate) are not required to meet the weather minima for EDTO alternates, as these airports are subject to other VAR). decisions successfully throughout the flight.

I. The suitability of an en route alternate airport for an airplane that encounters an in-flight situation that necessitates a diversion during EDTO operations is based on a determination that—

1) The airport still is suitable for the circumstances, and the weather; and

2) Field conditions at that airport permit an instrument approach to be initiated and a landing completed.

2.8 EDTO IN-SERVICE EXPERIENCE REQUIREMENTS

A. When AC 120-42 was first released in 1985, two-engine EDTO was a new concept and EDTO approvals were sought on airframe-engine combinations that were already in service. Hence, it was logical to establish criteria for approvals based on in-service experience. At that same time, the ICAO recognized the possibility that other approval methods could be developed without in-service experience, and accordingly, provided statements that recognized those options.

B. The original two-engine EDTO requirements for engine reliability were based on a world fleet in-service experience of 250,000 hours. For 120-minute EDTO, AOC holders were required to have 12-consecutive months of operational in-service experience with the airplane-engine combination (AEC). For 180-minute EDTO, AOC holder were expected to have previously gained 12 consecutive months of operational in-service experience with the specified AEC conducting 120-minute EDTO. These basic, two-engine in-service requirements have been retained and are discussed in Appendix A. Achieving these levels of experience, combined with the required levels of engine reliability, is an acceptable means of attaining EDTO approval for operators of two-engine airplanes.

C. As additional operational experience was gained, it was determined that a reduction of two-engine in-service experience requirements or substitution of in-service experience on another airplane would be possible. Any reduction was to be based on an evaluation of the AOC holder's ability and competence to achieve the necessary reliability for the particular AEC in EDTO.

- For example, a reduction in in-service experience would be considered for an AOC holder who could show extensive in-service experience with a related engine on another airplane that had achieved acceptable reliability.
- It became an international practices for AOC holders unable to initially fly EDTO routes at the lesser thresholds to make use of EDTO simulation or demonstration programs in their application for 180-minute EDTO.

D. Accelerated EDTO Operational Approval) was developed to permit EDTO without accumulating in-service experience in the airplane-engine combination. Most subsequent EDTO approvals have been granted under these guidelines and this method is retained in Appendix A.

2.9 OPERATIONAL RELIABILITY & SYSTEMS SUITABILITY REQUIREMENTS.

A. The safety of long-range operations such as EDTO depends on the reliability of all airplane systems including the propulsion systems.

B. Time-limited systems such as cargo compartment fire suppression/containment capability must be considered.

C. The AOC holder must also have an established program that monitors the reliability of systems significant to EDTO.

- In order to achieve and maintain the required engine reliability standards, the AOC holder operating a two-engine airplane in EDTO should assess the proposed maintenance and reliability program's ability to maintain a satisfactory level of airplane systems reliability for the particular airplane-engine combination.
- All AOC holders should design the flight operations and, if applicable, the maintenance programs for EDTO with an objective to preclude diversions and, if a diversion does occur, to protect that diversion.
- Required EDTO maintenance practices also must minimize the potential for procedural and human errors that could be detrimental to the safety of the operation.
- Fuel planning must account for the possibility of a depressurization and/or failure of an engine with considerations for in-flight icing conditions.

D. The type design requirements for EDTO certification consider the probability of occurrence of conditions that would reduce the capability of the airplane or the ability of the flight crew member to cope with an adverse operating condition.

- System failures or malfunctions occurring during extended range operations could affect flight crew member workload and procedures.
- Although the demands on the flight crew member may increase, a manufacturer applying for EDTO type design approval must consider crew workload, operational implications, and the crew's and passengers' physiological needs during continued operation with failure effects for the longest diversion time for which it seeks approval.
- The manufacturer must also conduct flight tests to validate the adequacy of the airplane's flying qualities and performance, and the flight crew's ability to safely conduct an EDTO diversion with expected system failures and malfunctions.
- An EDTO operator should carefully consider the possible adverse effects that changes in airplane equipment or operating procedures may have on the original evaluations conducted when the airplane was approved for EDTO before implementing such changes.

E. Following a determination that the airframe systems and propulsion systems are EDTO type design approved, an in-depth review of the applicant's required EDTO programs will be accomplished to show the ability to achieve and maintain an acceptable level of systems reliability, and to safely conduct these operations.

SECTION 3 REQUIREMENTS FOR EDTO AUTHORIZATION

3.1 EDTO REQUIREMENTS

A. The CAAV may approve EDTO for various areas of operation in accordance with the requirements and limitations this advisory circular

EDTO must be authorized in the AOC holder's OpSpecs and conducted in compliance with those sections of the VARs applicable to EDTO.

B. As of February 15, 2008, AOC holders operating passenger-carrying airplanes with more than two engines, having the authority to operate on specific EDTO routes should not need to re-apply for their specific route authority.

- However, the AOC holder is required to comply with all the applicable EDTO flight operational regulations described in this AC, and must have their EDTO programs and processes approved by the CAAV.

C. The AOC holder's EDTO requirements must be specified in their maintenance and operations programs.

- Maintenance requirements necessary to support EDTO are explained in paragraphs 3.2.
- Flight operations requirements necessary to support EDTO are described in paragraphs 3.4.
- The requirements for the various levels of EDTO authorities are listed in Appendix B.

3.2 MAINTENANCE REQUIREMENTS: 2-ENGINE EDTO

The AOC holder conducting EDTO with two-engine airplanes must comply with the following EDTO maintenance requirements—

3.2.1 CONTINUOUS AIRWORTHINESS MAINTENANCE PROGRAM (CAMP)

A. The basic maintenance program for the airplane being considered for EDTO is a CAMP that may currently be approved for a non-EDTO AOC holder for a particular make and model airplane-engine combination.

B. The basic CAMP must be a maintenance and inspection program that contains the instructions for continued airworthiness (ICA) based on the manufacturer's maintenance program, or those contained in an AOC holder's maintenance manual approved in its OpSpecs.

C. The AOC holder and the CAAV must review the CAMP to ensure it provides an adequate basis for development of a EDTO maintenance program.

- The AOC holder's EDTO CAMP must include specific EDTO requirements, which will be incorporated as supplemental requirements to the basic CAMP.
- These supplemental requirements include the enhanced maintenance and training processes that will ensure EDTO airplanes achieve and maintain the level of performance and reliability necessary for EDTO operations.
- These supplemental requirements, referred to in the industry as EDTO processes or EDTO process elements, currently should be in place for existing EDTO operations.

D. Prospective EDTO AOC holders must supplement their basic CAMP with those program elements defined in paragraphs 3.2.2 through 3.2.14.

3.2.2 EDTO MAINTENANCE DOCUMENT

A. The AOC holder must develop a document for use by personnel involved in EDTO. This may be a separate document or a part of other maintenance documents.

The initial document must be submitted to the CAAV and be approved before being adopted.

- It need not be inclusive but should, at least, reference the maintenance program and other pertinent requirements clearly indicating where all facets of the EDTO maintenance program are located in the AOC holder's document system.

B. All EDTO requirements, including supportive programs, procedures, duties, and responsibilities, must be identified.

C. The EDTO document(s) must reflect the actual policies and procedures the AOC holder expects their EDTO maintenance personnel to adhere to. The document(s) should be user friendly, and be accessible to all affected personnel.

3.2.3 EDTO PRE-DEPARTURE SERVICE CHECK (PDSC)

A. The AOC holder must develop an EDTO PDSC to verify that the airplane and certain significant items are airworthy and EDTO capable.

- Each AOC holder's PDSC may vary in form and content.
- The prerequisites for an acceptable PDSC are content and suitability for the specific AOC holder's needs.

B. All AOC holders must address EDTO significant system airworthiness in their EDTO maintenance program, including the PDSC.

- Specifically, the PDSC is a maintenance task that should include an applicable maintenance records review and an interior and exterior inspection.
- The PDSC is sometimes referred to as an expanded transit check inspection.

C. The PDSC should include visual inspections and procedures applicable to determining EDTO Significant Systems airworthiness status.

- The airworthiness status determination should include a process for determining engine and auxiliary power unit (APU) oil quantities, and consumption rates prior to EDTO dispatch.

- Proper servicing of fluids, such as engine, APU, generator systems, and hydraulic systems is a vital ingredient to successful EDTO operations.
- Some current EDTO operators have had incidents resulting from improper fluid servicing, or not properly determining or addressing high consumption rates. This has resulted in IFSDs and diversions.
- AOC holders should consider this area very seriously when developing their maintenance checks, including the PDSC.

D. Some AOC holders may elect to include tasks in the PDSC that are driven by their reliability programs and are not related to EDTO significant systems. However, the AOC holder must clearly identify the EDTO related tasks on their PDSC if non-EDTO qualified maintenance personnel are to accomplish the non-EDTO tasks.

E. An appropriately trained maintenance person, who is EDTO qualified, and authorized by the AOC holder, must accomplish and certify by signature the completion of EDTO specific tasks.

- An appropriately trained person who is EDTO qualified and authorized by the AOC holder must certify by signature, that the EDTO pre-departure service check has been completed.

F. Appropriately trained persons are those that have satisfactorily completed the AOC holder's EDTO training program. The signatory person that certifies the completion of the PDSC must also meet the following criteria—

1) Inside Vietnam, the signatory person holds a Vietnam mechanic's license with airframe and powerplant ratings, and works for an operator authorized to engage in AOC operations, or works for a VAR Part 5 Approved Maintenance Organization.

2) Outside Vietnam the signatory person holds—

(a) A Vietnam mechanic license with airframe and powerplant ratings; or

(b) An aircraft maintenance engineer license, or equivalent, with appropriate ratings, experience and training for the tasks to be performed, or,

(c) Works for an EDTO maintenance entity and has the requisite experience or specific training needed to accomplish the task and

- The maintenance entity signatory person does not have to hold a Vietnam license.
- See definition of Maintenance Entity.

is authorized to complete the PDSC and return the aircraft to service on behalf of the EDTO maintenance entity.

G. The PDSC must be certified complete immediately before each scheduled EDTO flight.

- The term "immediately" has historically meant to be no more than 2 to 4 hours before the flight.
- However, the CAAV may grant some relief from this time period under certain conditions.
- The AOC holder should explain any rational for such deviations in its EDTO maintenance document, which is approved by CAAV.

H. A PDSC may not be required before all EDTO flights. The CAAV may grant relief following irregular operations because of non-mechanical issues, such as weather or medical emergency diversions, or when operating EDTO into specific areas of operation.

- For example, if an airplane scheduled for an EDTO flight receives a PDSC before departure and subsequently must divert or turn back for reasons other than mechanical, the AOC holder must identify in its EDTO maintenance document what procedures its flight operations and maintenance personnel would follow to preclude performing another PDSC.

I. If a mechanical discrepancy develops as a result of the diversion or turn back, the AOC holder may have to perform another PD SC.

- For example, when an overweight landing inspection reveals an EDTO Significant System discrepancy that requires maintenance intervention, another PDSC is required.

J. In areas where prevailing weather conditions are stable and generally do not approach extremes in temperature, wind, ceiling and visibility, the service check may not be required for the return leg of an EDTO flight.

This check is not precluded by any other maintenance check.

- For example , the Micronesia routes (90-minute EDTO) and Caribbean/Western Atlantic (75-minute EDTO).

3.2.4 DUAL MAINTENANCE

A. EDTO dual maintenance, otherwise referred to as identical maintenance, multiple maintenance, and simultaneous maintenance, requires special consideration by the AOC holder.

- This is to recognize and preclude common cause human failure modes.
- Proper verification processes or operational tests, prior to EDTO, are required when dual maintenance on significant systems occurs.

B. Dual maintenance on the "same" EDTO Significant System can be described as actions performed on the same element of identical, but separate EDTO Significant Systems during the same routine or non-routine visit. Examples of maintenance on the "same" EDTO Significant System are—

1) Maintenance on both air cycle machines (or equivalent) in the air conditioning systems during a turnaround flight;

2) Removal of either both engine oil filters or both chip detectors; and

3) Replacement of both chip detectors.

C. Dual maintenance on "substantially similar" EDTO Significant Systems specifically addresses maintenance actions on engine-driven components on both engines.

- An example of dual maintenance on "substantially similar" EDTO Significant Systems could include replacement of the No. 1 Integrated Drive Generator (IDG) and the No. 2 Engine Driven Pump (EDP).

D. The AOC holder must establish procedures that minimize identical maintenance actions from being scheduled or applied to multiple similar elements in any EDTO Significant System during the same routine or non-routine maintenance visit.

- In order to manage this requirement the AOC holder must develop a list of fleet-specific EDTO Significant Systems and include them in their EDTO maintenance document(s).

E. The CAAV recognizes that sometimes EDTO dual maintenance actions cannot be avoided or precluded because of unforeseen circumstances that occur during EDTO operations.

- In the line maintenance arena, one example would be when an EDTO airplane has inbound discrepancies on both engines' oil systems, or there is a generator replacement on one engine, and an oil system discrepancy on the other engine.

F. Additionally, staggering maintenance on EDTO Significant Systems in the heavy maintenance arena is not always possible or feasible.

To minimize human factor common cause risk, the AOC holder should attempt to minimize dual maintenance on EDTO Significant Systems wherever/whenever possible.

G. In any event, when dual maintenance is performed on a EDTO Significant System, the AOC holder must have written procedures in its EDTO maintenance document that addresses this situation.

H. At a minimum, the AOC holder must ensure—

1) Separate EDTO-qualified maintenance persons perform the tasks;

2) The maintenance action on each of the elements in the EDTO Significant System is performed by the same technician under the direct supervision of a second EDTO qualified individual; and

3) It verifies the effectiveness of the corrective actions to those EDTO Significant Systems before the airplane enters the EDTO area of operation.

- ♦ This verification action must be performed using ground verification methods, and in some instances, in-flight verification methods described in the next section of this AC.
- ♦ On an exception basis, the same EDTO–qualified technician, under the supervision of an EDTO qualified Centralized Maintenance Control person, may perform the dual maintenance and the ground verification methods only if in-flight verification action is performed.

I. The CAAV acknowledges that the servicing of fluids and gases is not considered maintenance; however, these tasks, when done improperly have adversely affected EDTO operations.

The AOC holder should recognize the hazard associated with improper servicing and do all possible to mitigate the associated risk.

- Specifically, servicing tasks such as engine, APU, and generator system oil servicing are tasks that require high levels of attention.

J. The CAAV encourages the AOC holder to ensure that its programs have separate individuals perform such servicing. However, the CAAV recognizes that many AOC holder's route and organizational structures may not lend themselves to these procedures.

- The AOC holder's program should include detailed servicing instructions, or make readily available servicing instructions.
- Additionally, the AOC holders should consider including oil servicing in their EDTO OJT program, regardless of whether one individual or multiple individuals perform the tasks.

3.2.5 VERIFICATION PROGRAM

A. The AOC holder must develop a verification program for resolution of airplane discrepancies (corrective actions) on EDTO significant systems.

Each AOC holder must identify its EDTO significant systems, ground verification requirements, and in-flight verification requirements in its EDTO maintenance document.

- This program must include corrective action confirmation in specific areas such as engine shutdown, significant system failure, adverse trends, or any prescribed event that could effect an EDTO operation.

The program must ensure corrective action is taken and confirmed successful before the airplane enters an EDTO area of operation.

B. The AOC holder must establish a means to ensure any required verification action is accomplished.

- The AOC holder must include a clear description of who initiates verification actions and who is responsible for completing the actions in its EDTO maintenance document.

C. The AOC holder must verify the effectiveness of the corrective actions following the maintenance action and prior to an EDTO flight or prior to passing the EDTO entry point.

- The ground verification method is accomplished by following the ICA contained in the Airplane Maintenance Manuals (AMM) or the AOC holder's maintenance manuals.
- These ICAs include built-in test equipment (BITE) and functional/operational checks that often include leak checks after ground runs.

D. Normally ground verification is acceptable to ensure corrective action. Under certain conditions ground verification beyond that recommended in the ICA or in-flight verification may be required.

Ground maintenance personnel should coordinate with flight operations personnel whenever an in-flight verification is required.

- An example of a condition that would require an in-flight verification is the replacement of an APU component that could affect the APU ability to start at the EDTO cruise altitude after cold soak.

E. In-flight verification may be conducted on revenue flights, provided the action is completed before the EDTO entry point.

- In those cases where the verification flight will reach the EDTO entry point approximately 60 minutes into the flight, e.g., departing from an island, and the inflight verification is for APU inflight starting which requires a two-hour cold soak, (see "APU In-Flight Start Program"), the operator can initiate the flight with the APU running and shut it down two hours prior to top of descent and initiate the inflight APU start before top of descent.

3.2.6 TASK IDENTIFICATION

A. The AOC holder must identify all tasks that must be accomplished or certified as complete by EDTO-qualified maintenance personnel.

These tasks are referred to as "EDTO Specific Tasks."

- The intent is to have EDTO-trained maintenance personnel accomplish these tasks because they are related to EDTO.

B. The AOC holder must identify all tasks that must be accomplished or certified as complete by EDTO qualified personnel.

- The intent is to have EDTO trained maintenance personnel accomplish these identified tasks because they are related to EDTO.

C. EDTO specific tasks should be—

1) Identified on the AOC holder's work forms and related instructions; or

2) Parceled together and identified as an EDTO package.

If an AOC holder does not identify ETOP S-related task in their current maintenance program, then all tasks must be accomplished by EDTO-qualified personnel.

3.2.7 CENTRALIZED MAINTENANCE CONTROL PROCEDURES

A. An EDTO AOC holder, regardless of the size of its EDTO fleet, must have a centralized entity responsible for oversight of the EDTO maintenance operation.

B. The AOC holder must develop and clearly define in its EDTO maintenance document specific procedures, duties, and responsibilities for involvement of their centralized maintenance control personnel in the EDTO operation.

C. These established procedures and centralized control processes would preclude an airplane from being dispatched for EDTO flights after an engine IFSD, EDTO significant system failure, or discovery of significant adverse trends in system performance without appropriate corrective action having been taken.

3.2.8 EDTO PARTS CONTROL

A. The AOC holder must develop a parts control program to ensure the proper parts and configurations are maintained for EDTO.

B. The program must include procedures to verify that the parts installed on EDTO airplanes during parts borrowing or pooling arrangements, as well as those parts used after repair or overhaul, maintain the required EDTO configuration.

3.2.9 RELIABILITY PROGRAM

A. The AOC holder must develop an EDTO reliability program or enhance its existing reliability program to incorporate the EDTO supplemental requirements.

- This program must be designed with early identification and prevention of ETOP S-related problems as the primary goal.
- The program must be event-oriented, and incorporate reporting procedures for significant events detrimental to EDTO flights.

B. For those AOC holders that do not have an CAAV-approved reliability program, their Continuing Analysis and Surveillance System (CASS) must be enhanced to achieve EDTO reliability goals.

C. The AOC holder should submit regular EDTO reliability reports to CAAV.

- The frequency of such reporting should be agreed upon between the AOC holder and the CAAV.
- Customarily, monthly reports have been deemed an acceptable frequency.

D. In addition to the other maintenance reporting requirements, the AOC holder must report the following items on their EDTO airplanes (regardless of EDTO or Non-EDTO operation) within 96 hours to CAAV—

1) IFSDs, except planned IFSDs performed for flight training.

2) Diversions and turnbacks for failures, malfunctions, or defects associated with any EDTO Significant Systems.

3) Uncommanded power or thrust changes or surges.

4) Inability to control the engine or obtain desired power or thrust.

5) Inadvertent fuel loss or unavailability, or uncorrectable fuel imbalance in flight.

6) Failures, malfunctions or defects associated with EDTO Significant Systems.

7) Any event that would jeopardize the safe flight and landing of the airplane on an EDTO flight.

E. The reporting of any of the above items must include the information specified in the maintenance reporting requirements of VAR 5.

F. The AOC holder must conduct an investigation into the cause of the occurrence of any event requiring maintenance-related reporting and submit its findings to CAAV.

- The CAAV encourages operator investigations include manufacturers when feasible.
- If the CAAV determines additional corrective action is necessary, the AOC holder must further investigate and implement appropriate corrective action acceptable to the CAAV.

3.2.10 PROPULSION SYSTEM MONITORING

A. The AOC holder must monitor its fleet average IFSD rate for the specified airplane-engine combination.

- The AOC holder should establish firm criteria regarding the actions it will take when it detects adverse trends in propulsion system conditions.

B. If the IFSD rate, computed on a 12-month rolling average, exceeds the values in the following table, the AOC holder, in conjunction with CAAV, must investigate common cause effects or systemic errors and submit the findings to CAAV within 30 days.

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

In Flight Shut Down Rates		
Number of Engines	**Engine Hours EDTO**	**EDTO Authorization**
2	.05/1 000	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.

C. With respect to maintenance, the purpose of monitoring IFSD rates is to provide CAAV and operators with a tool for measuring the health of a fleet of ETOP S-approved airplanes in service.

It is very important that the AOC holder identify the root cause of events so that an indication of corrective action is available, such as a fundamental design problem that requires an effective hardware (or software) final fix.

- Causes of IFSDs or other engine and propulsion system problems may be associated with type design problems and/or maintenance and operational procedures applied to the airplane.

D. Repetitive inspections may be satisfactory as interim solutions, but longer-term design solutions, such as terminating actions, may be required if possible.

- Design problems can affect the whole fleet.

E. The CAAV will not revoke an existing EDTO operational approval solely because of a high IFSD rate.

- An AOC holder who experiences a type design related event need not be operationally penalized for a problem that is design-related and may not be of their own making.

F. However, maintenance or operational problems may be wholly, or partially, the responsibility of the AOC holder.

- If an AOC holder has an unacceptable IFSD rate risk attributed to common cause or a systemic problem in operational practices or the maintenance program, then action carefully tailored to that AOC holder may be required, and may include a reduction of the AOC holder's diversion limit.

G. The AOC holder must investigate an IFSD rate higher than the 12-month rolling average standard that occurs for a mature fleet after the commencement of EDTO (Refer to the IFSD Rates table above).

H. The AOC holder must investigate any indication of a high IFSD rate; however, it should consider that in the case of the smaller fleet, the high IFSD rate may be because of the limited number of engine operating hours used as the denominator for the rate calculation.

- This can cause an IFSD jump well above the standard rate because of a single IFSD event.
- The underlying causes for such a jump in the rate will have to be considered by the CAAV representative.
- On occasion, a particular event may also warrant implementation of corrective action even though the overall IFSD rate is not being exceeded.

I. The recommended 30-day reporting criteria is intended to ensure that the AOC holder provides the CAAV timely notification of the status of an event investigation.

- The AOC holder may or may not have root cause or terminating action at the end of the 30-day period, and further discussions with the CAAV may be required after this period.

J. The AOC holder may designate a sub-fleet engine/airframe combination for the purposes of the IFSD monitoring/rate program. The operator may include the IFSD statistics of all engines that are EDTO configured and are maintained in accordance with the operators EDTO program even if used on non-EDTO airplanes.

3.2.11 ENGINE CONDITION MONITORING

A. The AOC holder must develop a program for its EDTO engines that describes the parameters to be monitored, method of data collection, and corrective action processes. The program should reflect the manufacturer's instructions and industry practices, or the AOC holder should establish a program that demonstrates an equivalent level of monitoring and data analysis.

B. The goal of this monitoring program is to detect deterioration at an early stage, and to allow for corrective action before safe operation is affected. In order to achieve this goal, engine data analysis should be accomplished as often as practical.

- The recommended maximum interval is five days.

C. Engine limit margins must be maintained so that prolonged engine inoperative diversions may be conducted without exceeding approved engine limits (for example, rotor speeds and exhaust gas temperature) at all approved power levels and expected environmental conditions.

D. Engine margins preserved through this program should account for the effects of additional engine loading demands (for example anti-ice and electrical), which may be required during IFSD flight phase associated with the diversion.

If oil analysis monitoring, such as the Spectrographic Oil Analysis Program (SOAP), is meaningful and recommended by the manufacturer, the AOC holder should include it in their program.

3.2.12 OIL CONSUMPTION MONITORING

A. The AOC holder must develop an engine oil consumption monitoring program to ascertain that there is enough oil to complete the scheduled EDTO flight.

If the APU is required for EDTO, it must be included in the oil consumption monitoring program.

- The AOC holder's consumption limit must not exceed the manufacturer's recommendations, and it must trend oil consumption.
- The AOC holder's oil consumption trending program should be capable of recognizing a spike in the oil consumption rate.

B. An AOC holder who operates an EDTO aircraft in EDTO and non-EDTO operations may elect to develop a program that documents the indicated flight deck oil quantity at each Non-EDTO station to supplement their oil consumption trend monitoring programs capability to discover an oil spike.

- For example, if an EDTO airplane oil is serviced infrequently, and the quantities aren't regularly recorded, it would be difficult to determine whether the oil added during an EDTO pre-departure check was the result of normal oil consumption over several flight hours, or a sudden increase which would merit investigation and corrective action prior to the EDTO flight.

C. The AOC holders trending program may be done manually or by electronic means. The program must consider the amount of oil added at the departing EDTO station with reference to the running average consumption, as well as monitor for sudden increases in consumption.

D. The monitoring must be continuous including non-EDTO flights and the oil added at the EDTO departure station.

- For example, after servicing, the oil consumption may be determined by maintenance personnel as part of the pre-departure check.

Any corrective actions taken regarding oil consumption must be verified before EDTO departure.

- The amount of oil added also could be reported to a centralized maintenance control for calculation before the EDTO flight.

3.2.13 APU IN-FLIGHT START PROGRAM

A. If the airplane type certificate requires an APU but does not normally require the APU to operate during the EDTO portion of the flight, the AOC holder must develop an in-flight start and run reliability program to ensure that the APU will continue to provide the performance and reliability established by the manufacturer.

- This program is intended to verify the start and run capability. It is not required to actually load the APU in flight with the generator and/or pneumatics.
- This monitoring program must include periodic sampling of each airplane's APU in-flight starting capabilities.
- The AOC holder must ensure that each airplane's APU periodically is sampled rather than repeatedly sampling the same APUs.
- The AOC holder may adjust sampling intervals according to system performance and fleet maturity.

B. The AOC holder and CAAV should periodically review the AOC holder's 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 AOC holder should initiate an investigation into any common cause effects or systemic errors in procedures.

C. The AOC holder should include the criteria below in their APU in-flight start program. The AOC holder should make APU in-flight starts subject to the following conditions—

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

2) If in-flight APU start is performed on an EDTO flight, the start may be attempted on the return leg.

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.

4) Within route or track constraints, the objective would be met by attempting a start near the highest altitude assigned the route or track, and the final attempt near the lower altitude limits of the route or track, as defined by ATC. These altitudes should be representative of the EDTO routes flown.

5) 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.

D. The AOC holder must report any operationally required APU in-flight start failures occurring during actual EDTO operations to CAAV within 96 hours.

The final report should include corrective actions taken as well as the status of corrective action programs and fleet upgrades.

- The AOC holder also must report any occurrences of an EDTO configured APU in-flight unsuccessful start attempt occurring during routine sampling (which exceed the airframe and APU manufacturer design specifications) to CAAV.

3.2.14 CONFIGURATION MAINTENANCE& PROCEDURES (CMP)

A. The CMP Standard specifies any additional configuration, maintenance or operational requirement that is uniquely applicable to EDTO.

The requirements in the CMP are established by the State of Design at the time of initial EDTO type design approval of the airplane-engine combination.

B. The CMP document typically is published and maintained by the airplane manufacturer and includes identified CMP requirements. Airplane manufacturers may continue to release CMP revisions beyond the basic revision level required for EDTO.

- The CMP revision levels required for specific airplane-engine combinations are typically listed in the front of the CMP or may be controlled through issuance of customized CMP documents.

C. The AOC holder must implement the basic configuration, maintenance, and operating procedures standard, identified in the CMP, before beginning EDTO operations unless the CMP includes an incorporation schedule with a later date than the beginning of the AOC holder's EDTO operations.

D. If a CMP document exists for an EDTO AOC holder's airplane, the AOC holder must ensure that all of the following apply—

1) Configuration features are installed in the airplanes and engines;

2) Maintenance procedures are incorporated into the maintenance program;

3) Demonstrated capabilities are incorporated into the flight operations manual and the minimum equipment list, as required; and

4) Operators must coordinate any deviation from the manufacturer's CMP requirements with the manufacturer, as required by the CMP document.

E. Each AOC holder must develop a system to ensure all CMP requirements remain incorporated in its airplanes, programs, and manuals throughout the operational life of each airplane, for as long as they operate in EDTO.

F. The CAAV will mandate any subsequent configuration, maintenance, or procedural changes necessary for continued safe EDTO operations through the Airworthiness Directive (AD) process.

Refer to Section 5 of this AC for EDTO maintenance and training program changes.

- The AOC holder should review and consider voluntarily incorporating any revised CMP standard that enhances airplane reliability and/or performance.

G. The AOC holder should provide CAAV a matrix detailing the CMP standard for its proposed EDTO fleet. The matrix should specifically include—

1) Each CMP item number;

2) Revision level;

3) Item description; and

4) Reference documentation describing the incorporation method and date.

3.3 EDTO MAINTENANCE TRAINING REQUIREMENTS

A. The AOC holder is responsible for ensuring that all maintenance personnel who perform maintenance on its EDTO airplanes, including repair stations, vendors, and contract maintenance, have received adequate technical training for the specific airplane-engine combination it intends to operate in EDTO.

The AOC holder should review the existing airplane-engine combination maintenance training program with CAAV to ensure that it adequately provides the necessary training.

B. Additionally, the AOC holder must develop EDTO specific training that focuses on the special nature of EDTO and take measures to insure that this training is given to all personnel involved in EDTO.

C. EDTO specific training is in addition to the AOC holder's accepted maintenance training program used to qualify individuals for specific airplanes and engines and may be included in the accepted maintenance training curricula. It thus, becomes the AOC holder's EDTO training program.

D. The goal of this training is to ensure that all personnel involved in EDTO properly accomplish EDTO maintenance requirements.

E. The AOC holder is responsible with acceptance from the CAAV to determine which personnel are involved in EDTO, and ensure that each person's level of EDTO training is commensurate with their level of involvement with EDTO airplanes.

F. Customarily, EDTO training is intended for Line and Hanger Maintenance personnel, Centralized Maintenance Control personnel and Engineering personnel, where applicable, but it does not necessarily include the various shop level employees.

- For example, a mechanic who is performing pre-departure service checks may be required to have a higher level of EDTO training and qualification than a mechanic performing routine tasks on non EDTO significant systems during a heavy maintenance check.

G. A technician working EDTO significant systems in an HMV (Heavy Maintenance Visit) environment must be appropriately trained for EDTO, but need not be EDTO qualified.

H. Recurrent training in all maintenance areas should be established and used to inform personnel involved in EDTO about new equipment, requirements, operator programs, etc.

Experience has shown recurrent training is a valuable instrument in "lessons learned" for EDTO operations.

I. In the line maintenance environment, ETOP S-qualified maintenance personnel are those who have—

1) Successfully completed the AOC holder's EDTO qualification program; and

2) Satisfactorily performed extended range tasks under the direct supervision of an CAAV-licensed maintenance person.

J. The person giving the direct supervision must have had previous experience with maintaining the particular make and model airplane being used by the AOC holder.

- For new airplanes, it is understood the AOC holder may not have an CAAV licensed maintenance person available who has previous experience with the newly introduced make and model airplane.
- In this instance, the training received from the manufacturer's maintenance training program, or a comparable program would be acceptable.

3.4 EDTO FLIGHT OPERATIONS REQUIREMENTS

3.4.1 AIRPLANE PERFORMANCE DATA

A. The AOC holder may not dispatch an airplane on an EDTO flight unless it makes performance data available to its flight crew members and dispatchers that support all phases of EDTO operations, including divert scenarios.

B. This performance data will contain the following information—

1) Detailed one-engine inoperative performance data including fuel flow for standard and nonstandard atmospheric conditions, which should be demonstrated as a function of airspeed and power setting, where appropriate. This data will cover—

(a) Driftdown (includes net performance);

(b) Cruise altitude coverage including 10,000 feet;

(c) Holding; and

(d) Altitude capability (includes net performance).

2) Detailed all-engine-operating performance data, including nominal fuel flow data, for standard and nonstandard atmospheric conditions, which should be demonstrated as a function of airspeed and power setting, where appropriate. This data will cover—

(a) Cruise altitude coverage including 10,000 feet; and

(b) Holding.

3) Details of any other conditions relevant to EDTO that can cause significant deterioration of performance, such as—

(a) Ice accumulation on the unprotected surfaces of the airplane;

(b) RAM Air Turbine (RAT) deployment; and

(c) Thrust reverser deployment if such data is available.

3.4.2 EN ROUTE AIRPORT INFORMATION

A. The AOC holder must maintain current status information on the operational capabilities of the airports designated for use as EDTO alternates.

"Public protection" has been a historic requirement for all commercial air transport operations.

B. For EDTO greater than 180 minutes and for operations traversing the North and South Polar Areas, this requirement has been expanded to include the listing of facilities—

1) At each airport, or

2) In the immediate area, sufficient to protect the passengers and crew from the elements and to see to their welfare.

Such a requirement can be interpreted to encompass the time from landing until satisfactory recovery of passengers and crew based on the AOC holder's passenger recovery plan discussed in paragraph 4.4 of this AC.

C. The AOC holder's program should provide flight crew members with current weather and information on a set of adequate airports in the EDTO portion of the flight that are within the maximum diversion capability of the airplane on the planned route of flight as an aid to the flight crew in contingency planning.

- Any appropriate facility information and other data concerning these airports should be provided to flight crew members in a clear, concise, user- friendly format for use when planning a diversion.

D. Any AOC holder conducting passenger flag operations must include in their flight operations manuals or equivalent documentation available to the flight crews—

1) For EDTO greater than 180 minutes, a specific passenger recovery plan for each EDTO Alternate Airport used in those operations; and

2) For operations in the North Polar Area and South Polar Area, a specific passenger recovery plan for designated diversion airports.

3.4.3 DISPATCH

3.4.3.1 Alternates

A. An AOC holder may not dispatch an airplane in EDTO unless the required takeoff, destination and alternate airports, including EDTO alternate airports are listed in the cockpit documentation (e.g., computerized flight plan) and are identified and listed in the dispatch release.

B. Because EDTO alternates serve a purpose different from that of a destination alternate, and may be used in the event of a diversion with an engine failure or loss of a primary airplane system, an AOC holder should not list an airport on the dispatch/flight release as an EDTO alternate unless that airport's services and facilities are adequate for such a diversion.

3.4.3.2 Flight Planning Limitation

A. The AOC holder's EDTO flight planning program must ensure that the planned route of flight remains within the authorized EDTO area of operation as follows—

1) For EDTO up to and including 180 minutes and 207 minutes in the North Pacific Area of Operation, the time required to fly the distance to the planned EDTO alternate, at the approved one-engine inoperative cruise speed in still air and standard conditions, may not exceed the time specified for the airplane's most time limited EDTO significant system (including cargo fire suppression) minus 15 minutes.

2) For EDTO beyond 180 minutes, the time required to fly the distance to the planned EDTO alternate, at the all-engines-operating cruise speed at the normal all-engine cruise altitude, correcting for wind and temperature, may not exceed the certified capability for the airplane's most limiting fire suppression system minus 15 minutes.

B. Further, for EDTO beyond 180 minutes, the time required to fly the distance to the planned EDTO alternate, at the approved one-engine inoperative cruise speed at the normal one engine inoperative level off altitude, correcting for wind and temperature, may not exceed the certified capability for the airplane's most time limited EDTO significant system (except for the most limiting fire suppression system) minus 15 minutes.

3.4.3.3 Landing Distance

For the runway expected to be used, the landing distance available, as specified by the airport authority, must be sufficient based on airplane flight manual landing performance data to meet the landing distance limitations specified in the VARs.

- The altitude of the airport, wind conditions, runway surface conditions, and airplane handling characteristics should be taken into account.

3.4.3.4 Airport Rescue & Fire Fighting Service (RFFS)

A. The following minimum International Civil Aviation Organization (ICAO) RFFS categories must be available at each airport listed as an EDTO Alternate Airport in a dispatch or flight release—

1) EDTO Up to 180 Minutes. EDTO alternates with ICAO Category 4.

2) EDTO Greater than 180 Minutes. EDTO alternates with Category 4, plus the—

- Airplane must remain within the EDTO authorized diversion time from an Adequate Airport that has RFFS equivalent to that specified by ICAO Category 7, or higher.
- Availability of Adequate Category 7 RFFS airports should be considered for the entire EDTO segment of the planned route.

B. If the necessary equipment and personnel are not immediately available at the airport, additional fire fighting support may be brought in from a nearby town or other location.

C. The AOC holder must ensure that the nearby facility is capable of responding to a request for fire fighting assistance within a reasonable time. A 30-minute response time is deemed adequate if the initial notification to respond can be initiated while the diverting airplane is en route.

- A 30-minute response time does not imply that the fire fighting equipment has to be at the airport within 30 minutes of the initial notification under all conditions.
- It does mean that such equipment must be available on arrival of the diverting airplane and remain on station as long as the services are needed.

3.4.3.5 EDTO Alternate Minima

A. A particular airport may be considered to be an EDTO alternate for flight planning and dispatch purposes, if the latest available forecast weather conditions from the earliest time of landing to the latest time of landing at that airport, equals or exceeds the criteria detailed in the following table.

EDTO Alternate Minimums

Approach Facility Configuration[1]	Alternate Airport IFR Weather Minimum Ceiling[2]	Alternate Airport IFR Weather Minimum Visibility[3]
For airports with at least one operational navigational facility providing a straight-in non-precision approach procedure, or Category I precision approach, or, when applicable, a circling maneuver from an instrument approach procedure.	Add 400 ft to the MDA(H) or DA(H), as applicable.	Add 1 sm or 1 600m to the landing minimum.
For airports with at least two operational navigational facilities, each providing a straight-in approach procedure to different suitable runways.	Add 200 ft to the higher DA(H) or MDA(H) of the two approaches used.	Add 1/2 sm or 800m[4] to the higher authorized landing minimum of the two approaches used.

EDTO Alternate Minimums

Approach Facility Configuration[1]	Alternate Airport IFR Weather Minimum Ceiling[2]	Alternate Airport IFR Weather Minimum Visibility[3]
One usable authorized Category II ILS IAP.	300 feet	3/4 sm (1200 m) or RVR 4000 (1200 m)
One usable authorized category III ILS Instrument Approach Procedure (IAP).	200 feet	1/2 sm (800 m)[4] or RVR 1800 feet (550 m)

[1] When determining the usability of an IAP, wind plus gust must be forecast to be within operating limits, including reduced visibility limits, and should be within the manufacturer's maximum demonstrated crosswind value.
[2] Conditional forecast elements need not be considered, except that a PROB40 or TEMPO condition below the lowest applicable operating minima must be taken into account.
[3] When dispatching under the provisions of the MEL, those MEL limitations affecting instrument approach minima must be considered in determining EDTO alternate minima.
[4] Because of variations in the international metric weather forecasting standards, 700m may be used in lieu of 800m.

B. Because OpSpecs alternate weather minima standards apply to all alternates, the following criteria is recommended for a typical AOC holder's OpSpecs.

1) An individual AOC holder's OpSpecs must reflect current requirements.

2) Although no consideration for the use of GPS/RNAV approaches is presented here, operators may request to receive this authorization through the CAAV.

- This authorization would be reflected in the operator's OpSpecs.

3) Appropriate EDTO alternate minima for such operations will be determined by the CAAV.

- The airport of departure (takeoff) and the destination airport (unless used concurrently as an EDTO alternate) are not required to meet the weather minima for EDTO alternates as these airports are subject to other VAR alternate requirements.

3.4.4 FUEL SUPPLY

No person may dispatch or release for flight or takeoff a turbine engine- powered airplane in EDTO unless, considering wind and other weather conditions expected, it has the fuel required by international requirements and enough fuel to satisfy the guidance of this section.

If the APU is a required power source, then its fuel consumption must be accounted for during the appropriate phases of flight.

3.4.4.1 Enroute Fuel Supply Scenarios

The greater amount of fuel sufficient to fly to an EDTO alternate under the following three scenarios—

In computing the EDTO alternate fuel supply, advantage may be taken of driftdown computed at the approved one-engine inoperative cruise speed.

1) Assuming a rapid decompression at the most critical point followed by descent to a safe altitude in compliance with the oxygen supply requirements; or

2) 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 safe altitude in compliance with the oxygen supply requirements; or

3) 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.

3.4.4.2 Hold & Land at Alternate

Upon reaching the alternate, hold at 1,500 ft above field elevation for 15 minutes and then conduct an instrument approach and land.

3.4.4.3 Additional Fuel for Wind Forecasting Errors

Add a 5 percent wind speed factor (that is, an increment to headwind or a decrement to tailwind) on to the actual forecast wind used in the fuel calculations above to account for any potential errors in wind forecasting.

- If an AOC holder is not using the actual forecast wind based on a wind model acceptable to the CAAV, the airplane must carry an additional 5 percent of the en-route fuel supply, as reserve fuel to allow for errors in wind data.

> A wind aloft forecast distributed worldwide by the World Area Forecast System (WAFS) is an example of a wind model acceptable to the CAAV.

3.4.5 ADDITIONAL COMPENSATION

After completing the above fuel supply calculations, compensate with additional fuel for the greater of the following scenarios—

3.4.5.1 Compensate for the Possibility of Icing

A. The effect of airframe icing during 10 percent of the time during which icing is forecast (including ice accumulation on unprotected surfaces, and the fuel used by engine and wing anti-ice during this period).

> Accounting of wing anti-ice may apply to some models of airplane based on their characteristics and the manufacturer's recommended procedures.

B. Unless a reliable icing forecast is available, icing may be presumed to occur when—

1) The total air temperature at the approved one-engine cruise speed is less than +10 degrees Celsius; or

2) If the outside air temperature is between 0 degrees Celsius and -20 degrees Celsius with a relative humidity of 55 percent or greater.

C. Fuel burn calculations, for engine anti-ice, and if appropriate wing anti-ice, must include the entire time during which icing is forecast

3.4.5.2 Program for In-Service Deterioration

Unless the AOC holder has a program established to monitor airplane in-service deterioration in cruise fuel burn performance, and includes in fuel supply calculations fuel sufficient to compensate for any such deterioration, increase the final calculated fuel supply by 5 percent to account for deterioration in cruise fuel burn performance.

3.4.6 COMMUNICATIONS

A. The CAAV has determined that the best way to assure clear and timely communication in general, is via voice communication. Likewise the CAAV has determined that there is a significant safety benefit associated with an EDTO flight having the ability to communicate via a satellite based voice system, especially for those situations that occur while on long, remote EDTO routes.

B. The need for safety is best served through information and technical assistance that is clearly and rapidly transmitted to the flight crew in a way that requires the least amount of distraction to piloting duties. Other than the area north of 82 degrees latitude, satellite communications provides the best means to provide that capability because it is not limited by distance.

C. The CAAV recognizes the limitations of satellite communications (SATCOM) in the North Polar Area above this latitude, and in such an area an alternate communication system such as HF voice or data link is to be used. The relatively short period of time that the flight is above latitude 82 degrees North in relation to the total planned flight time is a small fraction of the total flight.

D. The ability to use SATCOM for all other portions of the flight, which for some routes could be longer than 15 hours duration, is advantageous to the flight.

- For flights above 82 degrees North latitude, the operator must also ensure that communications requirements can be met by the most reliable means available, taking into account the potential communication disruption due to solar flare activity.
- The same philosophy and commensurate requirements apply for EDTO in the South Polar Area.

E. The VAR requires for communications facilities that enable rapid and reliable communications on routes and altitudes that may be used.

Where voice communication facilities are not available, and voice communication is not possible or is of poor quality, communications using alternative systems must be substituted.

- For all EDTO, each AOC holder conducting these operations must provide voice communications over routes where voice communications facilities are available.

F. In addition to the communication requirement above, AOC holders operating EDTO beyond 180 minutes from an alternate must have a second communications system that is capable of providing immediate satellite-based voice communications of landline telephone fidelity such as SATCOM.

In determining whether these communications requirements are available, the AOC holder must consider potential routes and altitudes needed for possible diversions to EDTO alternates as well as the original planned routing.

- This system must be capable of providing clear voice communications between the flight crew member and ATC, and the flight crew member and operations (dispatch).
- Where clear satellite-based voice communications are not available, alternative communications systems must be substituted.

If an operator has provided a satellite communication system for the crew, it is not necessary that the second communication system required for EDTO beyond 180 minutes be satellite based.

3.4.7 DISPATCH/FLIGHT RELEASE

A. The following items must be listed in the dispatch or flight release for all EDTO operations —

1) EDTO alternates; and

2) The authorized EDTO diversion time under which the flight is dispatched or released.

B. The pilot in command (PIC) should have access to the weather and status of services and facilities at all adequate airports with weather greater than approach minimums other than the designated EDTO alternates along the planned route that could be used for diversion before accepting the flight release.

C. If a flight is dispatched on a route that is greater than 180 minutes from an EDTO alternate, the AOC holder must inform the flight crew and give them the reason for the routes selection.

3.4.7.1 Dispatch on a "Flight-by-Flight Exception" Basis

A. The operator's use of dispatch authority in these areas may be limited to an "exception" basis for—

This exception may only be used when an EDTO alternate is not available within 180 minutes and is based on certain criteria.

1) Two-engine airplane EDTO approvals under the provisions of 207-minute EDTO in the North Pacific Area of Operation; and

2) 240-minute EDTO in the North Polar Area, in the area north of the NOPAC area, and the Pacific Ocean area north of the equator.

- AOC holders are required to maintain a record of their use of that authority for tracking purposes.
- When an operator is granted such authority, they may exercise this authority based on the conditions above without limit.
- There is currently no requirement for any specific format for reporting 207- and 240-minute track usage.

B. For 207-Minute EDTO, exception criteria includes political or military concerns, volcanic activity, temporary airport conditions, and airport weather below dispatch requirements, or other weather related events.

The AOC holder must establish the criteria to be used to decide what extreme weather precludes using an airport.

C. For 240-Minute EDTO in the North Polar Area and in the Area North of NOPAC, exception criteria includes extreme conditions particular to these areas such as volcanic activity, extreme cold weather at en route airports airport, weather below dispatch requirements, temporary airport conditions and other weather related events.

D. For 240-Minute EDTO in the Pacific Ocean Area north of the Equator, exception criteria includes political or military concern, volcanic activity, airport weather below dispatch requirements, temporary airport conditions and other weather related events.

3.4.8 EN ROUTE

3.4.8.1 PIC Authority

No part of this AC is to be interpreted as reducing the PIC's joint responsibility for determining that the flight can be safely conducted as planned before release. None of the guidance in this AC may be interpreted in any way to prejudice or limit the final authority and responsibility of the PIC for the safe operation of the airplane.

3.4.8.2 Potential Diversion Airports after Departure

A. After departure, designated EDTO alternates must continue to meet the requirements of original dispatch, except that the weather must remain at, or above, operating minima.

- The pilot and dispatcher should monitor the airports within the EDTO area of operation that could be used for diversion for deterioration in the weather and limitations in the availability of facilities and services that would render an airport unsuitable for landing in the event of a diversion.
- During the course of the flight, the flight crew members should be informed of significant changes in conditions at the designated EDTO alternates, particularly those conditions that would render an airport unsuitable for landing and improvement in airport weather to conditions above operating minima.

B. In most EDTO operations, the EDTO entry point is a significant distance from the point of dispatch. To ensure the capability and availability of an en route alternate to support any en route contingencies, before an EDTO flight proceeds beyond the EDTO entry point, the AOC holder must evaluate the weather from the earliest to latest time of arrival at the designated EDTO alternates, as well as the landing distances, airport services, and facilities.

C. If any conditions, such as weather below landing minima, are identified that would preclude a safe approach and landing, the PIC should be notified and an additional EDTO alternate selected where a safe approach and landing can be made.

D. A revised flight plan should include information on the newly designated EDTO alternates within the authorized area of operation.

1) Information on the weather and capabilities (that is, emergency response, approach aids, navigation facilities, and airport infrastructure) of potential EDTO alternates in the authorized area of operations should be available to the PIC.

2) The maximum diversion time, determined by the newly selected EDTO alternate, must not exceed the authorized EDTO maximum diversion time listed in the AOC holder's OpSpecs for that airplane and operating area that could have been applied at original dispatch.

E. An operator is not required to turn back once the flight has gone beyond the EDTO entry point if an unexpected worsening of the weather at the designated EDTO alternate airport drops the airport below operating landing minima (or any other event occurs that makes the runway at that airport unusable).

- The CAAV requires that the PIC, in coordination with the dispatcher if appropriate, will exercise judgment in evaluating the situation and make a decision as to the safest course of action.
- This may be a turn back, re-routing to another EDTO alternate airport, or continuing on the planned route.

F. Should the operator become aware of a potential weather problem prior to the airplane entering the EDTO stage of the flight, the operator should designate a different alternate airport at the EDTO entry point in order to continue the flight.

3.4.8.3 Engine Failure

A. **T**he PIC of a two-engine airplane with one engine inoperative is required to land at the nearest suitable airport where, in the PIC's judgment after considering all relevant factors, a safe landing can be made.

B. This determination is especially critical for EDTO where the availability of suitable airports may be limited and the diversion decision is therefore more critical.

C. 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 principle of protecting the diversion once it occurs—

1) Airplane configuration, weight, systems status, and fuel remaining;

2) Wind and weather conditions en route at the diversion altitude;

3) Minimum altitudes en route to the diversion airport;

4) Fuel burn to the diversion airport;

5) Airport's nearby terrain, weather, and wind;

6) Availability and surface condition of runway;

7) Approach navigation aids and lighting available;

8) Rescue and fire fighting services (RFFS) at the diversion airport;

9) Facilities for passenger and crew member disembarkation, and accommodations;

10) PIC's familiarity with the airport; and

11) Information about the airport provided to the PIC by the AOC holder.

D. 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—

1) The fuel supply is sufficient to fly beyond the nearest suitable airport;

2) Passenger accommodation other than passenger safety; and

3) Availability of maintenance and/or repair resources.

E. If no more than one engine is shut down on an airplane that has three or more engines, the PIC may choose to fly beyond the nearest suitable airport in point of time if the PIC determines that doing so is as safe as landing at the nearest suitable airport.

- In making a decision to fly beyond the nearest suitable airport, the PIC should consider all relevant factors and, in addition, consider the possible difficulties that may occur if the flight is continued beyond the nearest suitable airport.
- When an airplane with more than two engines bypasses a suitable alternate, the PIC should carefully weigh the risk associated with the next possible failure, which could complicate or compound the current engine inoperative condition.
- 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.

3.4.8.4 System Failure/Partial Failure

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

In no case may the maximum approved diversion authority of the operation be exceeded.

- This should include a careful assessment of remaining systems and overall operational capability.

B. Time permitting, full use should be made of the information available through the AOC 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.

C. 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 alternates.

Dispatch should advise the flight crew members of additional airports on the planned route of flight that could be used for diversion.

3.4.8.5 Other Diversion Scenarios

A. During EDTO an airplane may divert for reasons other than engine or systems failure such as medical emergencies, onboard fire, or decompression.

B. The nature of the emergency, and its possible consequences to the airplane , 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.

C. The required EDTO Alternate Airports designated for a particular flight provide one option to the PIC. However, these EDTO 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.

3.4.9 EDTO PROCEDURES DOCUMENTATION

A. The AOC holder should develop unique EDTO flight crew procedures for each of the flight operations requirements discussed in this section. These procedures should be contained in the applicable manual or information provided to the flight crew.

The initial pilot flight manual EDTO section and each revision must be submitted to the CAAV and approved before being adopted.

B. The manual or information provided to the flight crew should also contain procedural information necessary to interface with EDTO maintenance requirements such as—

1) Fuel crossfeed valve operational check (if applicable);

2) Special EDTO MEL requirements ;

3) APU in-flight start procedures (if applicable);

4) Engine Condition Monitoring (ECM) data recording procedures; and

5) In-flight verification of EDTO significant systems.

3.5 FLIGHT OPERATIONS TRAINING REQUIREMENTS

3.5.1 EDTO UNIQUE REQUIREMENTS

The AOC holder's approved training program for EDTO should include training that describes the unique aspects of EDTO. That training should include, but not be limited to—

3.5.1.1 Diversion Decision Making

A. The AOC holder's training program should prepare flight crew members to evaluate probable propulsion and airframe systems malfunctions and failures.

B. The goal of this training should be to establish flight crew member competency in dealing with the most probable operating contingencies.

3.5.1.2 Specific EDTO Requirements

A. The AOC holder's EDTO training program should provide and integrate training for flight crew members and dispatchers (if applicable), as listed below.

The CAAV will periodically evaluate a cross-section of these items.

1) Flight planning, including contingency data, that is engine failure, decompression, and diversion equal time point.

2) Flight progress monitoring and fuel tracking.

3) Operational restrictions associated with dispatch under the minimum equipment list (MEL).

4) Non-normal procedures including—

(a) Abnormal and emergency procedures.

(b) Systems failures and remaining airplane capability as it relates to the decision to divert or to continue.

(c) Diversion.

(d) Crew member incapacitation.

(e) A simulated approach and missed approach with only an alternate power source available, if the loss of two main alternating current electrical power sources with no APU electrical source available results in significant degradation of instrumentation to either pilot.

5) Use of equipment specifically required for EDTO operations such as cold weather gear and SATCOM.

6) Procedures to be followed in the event that there is a change in conditions at an EDTO alternate listed on the dispatch/flight release that would preclude a safe approach and landing.

7) Procedures to be followed in the event that there is a change in conditions at other potential en route diversion airports that would preclude a safe approach and landing.

8) Understanding and effective use of approved additional or modified equipment required for EDTO.

9) Fuel quantity comparison: the AOC holder's training program should identify fuel management procedures to be followed during the en route portion of the flight.

These procedures should provide for an independent crosscheck of fuel quantity indicators, for example, fuel used, subtracted from the total fuel load, compared to the indicated fuel remaining.

10) Fuel management: accounting for discrepancies between planned fuel remaining and actual fuel remaining for example estimated time of arrival ahead of or behind plan, gross weight, and/or altitude differences.

11) Flight crew procedures unique to EDTO as listed above in the paragraph 3.4, EDTO Procedures Documentation.

See "EDTO Procedures Documentation (paragraph 3.4.9 of this AC).

3.5.2 PASSENGER RECOVERY PLAN

The AOC holder must provide training to the flight crew members and dispatchers relative to their perspective roles in the AOC holder's passenger recovery plan.

3.5.3 CHECK AIRMAN USED IN EDTO

A. The AOC holder must designate check airmen specifically for EDTO. The objective of the EDTO check airman program should be to ensure standardized flight crew member practices and procedures and also to emphasize the special nature of EDTO.

B. Only airmen with a demonstrated understanding of the unique requirements of EDTO should be designated as a check airman.

3.5.4 REVIEW OF TRAINING PROGRAMS & OPERATING MANUALS.

A. The purpose of the review is to verify the adequacy of information provided to training programs and operating manuals. The CAAV will use the information resulting from these reviews as the basis for modification or updating flight crew member training programs, operating manuals, and checklists, as necessary.

B. The CAAV will also continually review in-service experience of systems significant to EDTO. The review includes system reliability levels and individual event circumstances, including crew member actions taken in response to equipment failures or loss of capabilities.

SECTION 4 APPLICATIONS TO CONDUCT EDTO

4.1 EDTO QUALIFICATIONS

The unique nature of EDTO necessitates an evaluation of these operations to ensure that the AOC holder's proposed programs are effective. The CAAV will review the AOC holder's documentation and training programs to validate that they are appropriate for EDTO. To receive approval to conduct EDTO the AOC holder must satisfy the following conditions—

4.1.1 AIRPLANE

The specified airplane-engine combination listed in the AOC holder's application must have been certificated to the airworthiness standards of transport category airplanes and must be approved for EDTO. Guidance for airplane EDTO type design.

4.1.1.1 Two-Engine

A. Airplane-engine combinations already approved for EDTO under previous CAAV guidance can continue to be used in EDTO operations. No re-certification is required.

B. Two-engine airplanes with existing type certificates on February 15, 2007, may be approved for up to 180-minutes EDTO without meeting requirements for fuel system pressure and flow, low fuel alerting, and engine oil tank design of the appropriate airworthiness standards.

4.1.1.2 More than Two Engines

A. Airplanes with more than two engines that are to be used in EDTO and are manufactured prior to February 17, 2015, may operate in EDTO without type design approval of the appropriate airworthiness standards.

B. Airplanes with more than two engines manufactured on or after February 17, 2015, must meet the requirements of EDTO type design.

4.1.2 FLIGHT OPERATIONS & MAINTENANCE REQUIREMENTS

The AOC holder must show compliance with the flight operations requirements discussed in paragraph 3.4 and the maintenance requirements discussed in paragraph 3.2 of this AC.

4.1.3 TRAINING REQUIREMENTS

The AOC holder should show that it has trained its personnel to achieve competency in EDTO and must show compliance with the flight operations and maintenance training requirements discussed in paragraphs 3.3 and 3.5 of this AC.

4.1.4 REQUIREMENTS FOR EDTO APPROVAL

A. Before the CAAV grants EDTO operational approval to an applicant for two-engine EDTO, the AOC holder must be able to demonstrate the ability to achieve and maintain the level of propulsion system reliability that is required for the EDTO-approved airplane-engine combination to be used.

B. The AOC holder must also demonstrate that it can operate the particular airframe and other airplane systems at levels of reliability appropriate for the intended operation.

C. This can be achieved directly by a successful in-service operational history or by successfully validating all the required EDTO processes according to the Accelerated EDTO Application Method in Appendix A of this AC.

4.1.5 ACCELERATED EDTO APPLICATION

A. An applicant for an initial operating certificate who is applying for EDTO authority at entry into service under the Accelerated EDTO Application method must comply with the same requirements for AOC holders outlined in this AC.

B. It should be understood that validation of an applicant with no previous operational experience should be more robust than would be necessary for an AOC holder with operational experience.

C. As is the case for all Accelerated EDTO approvals, the Director, Flight Standards Inspectorate Service must be satisfied that the applicant can operate to the standards expected of an experienced EDTO operator from the first day of service.

4.2 APPLICATION FOR EDTO AUTHORIZATION

A. Any AOC holder wishing to obtain an EDTO authorization must submit an application with all supporting data to the CAAV-FSSD.

The AOC holder may follow the guidance found in this AC to complete the application.

B. This application will be for a specific airplane-engine combination and should address all the regulatory requirements for EDTO.

C. The application should be submitted at least 60 days prior (6 months for the Accelerated EDTO method of application) to the proposed start of extended range operation with the specific airplane-engine combination.

4.2.1 TWO-ENGINE AIRPLANES

4.2.1.1 Up to 180-Minute EDTO

An applicant requesting EDTO up to 180 minutes for two-engine operations may select one of the following two application methods best suited to their proposed operation (See Appendix A)—

1) In-service experience method, or

2) Accelerated EDTO method.

4.2.1.2 EDTO Beyond 180 Minutes, up to & Including 240 Minutes

A. The CAAV grants approval for EDTO beyond 180 minutes only to AOC holders with existing 180-minute EDTO operating authority for the airplane-engine combination to be operated in the application.

The determination by the CAAV-FSSD to grant EDTO approval is the same as for all EDTO authorities.

B. There is no minimum in-service time requirement for the 180-minute EDTO operator requesting EDTO approval beyond 180 minutes.

4.2.1.3 EDTO Beyond 240 Minutes

A. This authority is only granted to operators of two-engine airplanes between specific city pairs.

B. The AOC holder must have been operating at 180 minute or greater EDTO authority for at least 24-consecutive months, of which at least 12-consecutive months must be at 240-minute EDTO authority with the airplane-engine combination in the application.

4.2.2 PASSENGER-CARRYING AIRPLANES WITH MORE THAN TWO ENGINES

There are no minimum in-service experience criteria for AOC holders requesting EDTO beyond 180 minutes for operations with more than two engines. Those applicants will request approval under the accelerated EDTO method.

4.3 EDTO AUTHORITIES

4.3.1 EDTO WITH TWO–ENGINE AIRPLANES

An applicant for two-engine EDTO may seek approval for extended operations by seeking one of the following EDTO approvals best suited to their proposed operations (see Appendix B)—

1) 75-minute EDTO in the Caribbean/Western Atlantic Area or in other areas.

2) 90-minute EDTO in Micronesia.

3) 120-minute EDTO.

4) 138-minute EDTO. Such approvals are granted to current 180-minute EDTO operators, or as an extension of authority to operators with only 120-minute EDTO approval.

5) 180-minute EDTO.

6) 207-minute EDTO in the North Pacific Area of Operation.

7) 240-minute EDTO. Approvals are granted at this level based on the particular geographic area applied for with criteria delineated for particular applications.

8) Beyond 240-minute EDTO. Approvals are granted at this level based on particular city pairs.

4.3.2 EDTO: PASSENGER-CARRYING AIRPLANES: MORE THAN 2 ENGINES

AOC holders applying for EDTO with passenger-carrying airplanes that have more than two engines will receive EDTO authority based on the CAAV-approved maximum time limited airplane system restriction of the airplane-engine combination listed in their application and the maximum authority requested.

4.4 EDTO AUTHORIZATION REQUIREMENTS

A. All AOC holders of airplanes with two engines, and all AOC holders of passenger-carrying airplanes with more than two engines, operating on EDTO routes must comply with all the operational and process requirements specified in the VARs and as discussed in this AC.

B. Those AOC holders operating airplanes with more than two engines who choose to follow the recommendations in this AC as a means of compliance with the operating rules, and who, on February 15, 2008, have the authority to operate on specific non-EDTO routes that under the new definition are classified as EDTO routes, are not required to re-apply for their specific route authority.

C. However, from February 15, 2008, the AOC holder is required to comply with all the EDTO flight operational requirements that are described in this AC and must have their EDTO program and all EDTO processes approved by the CAAV.

D. All EDTO AOC holders applying for approvals under this section must provide sufficient information with their application to the CAAV on the following areas of concern in EDTO—

4.4.1 EDTO AREA OF OPERATIONS/AIRPLANE PERFORMANCE

A. The altitudes and airspeeds used in establishing the EDTO area of operations for each airplane-engine combination must be shown to permit compliance with the terrain and obstruction clearance requirements of the VARS.

B. A speed other than the approved single engine speed may be used as the basis for compliance to VARs relating to EDTO, provided fuel consumption is shown not to exceed the critical fuel scenario associated with the applicable EDTO equal-time point, and the time limited system requirements are not exceeded.

4.4.2 WEATHER INFORMATION SYSTEM

A. An AOC holder should substantiate that the weather information system that it uses can be relied on to forecast terminal and en route weather with a reasonable degree of accuracy and reliability in the proposed areas of operation. Such factors as staffing, dispatcher, training, sources of weather reports and forecasts, and when possible, a record of forecast reliability, should be evaluated.

4.4.3 MINIMUM EQUIPMENT LIST

A. The AOC holder is required to submit its MEL, designed in accordance with the Master Minimum Equipment List (MMEL), appropriate to the requested level of EDTO. AN AOC holder's MEL may be more restrictive than the MMEL, considering the kind of EDTO proposed and the equipment and service problems unique to the AOC holder.

B. System redundancy levels appropriate to EDTO should be reflected in the MMEL. Systems considered to have a fundamental influence on flight safety may include, but are not limited to the following—

1) Electrical, including battery,

2) Hydraulic,

3) Pneumatic,

4) Flight instrumentation,
5) Fuel,
6) Flight control,
7) Ice protection,
8) Engine start and ignition,
9) Propulsion system instruments,
10) Navigation and communications,
11) Auxiliary power units,
12) Air conditioning and pressurization,
13) Cargo fire suppression,
14) Emergency equipment, and
15) Any other equipment necessary for EDTO.

4.4.4 PUBLIC PROTECTION

A. The provisions for public protection have historically been embedded in the VARs. The definition of "public protection" has been expanded for AOC holders operating EDTO beyond 180 minutes, and for operations in the North Polar Area and South Polar Area to include facilities at each airport, or in the immediate area, sufficient to protect the passengers and crew from the elements and to see to their welfare.

B. Due to the nature of these operations and the climatic issues involved during the majority of the year, AOC holders undertaking these operations must ascertain that facilities at an airport, or in the immediate area, are sufficiently robust to protect the passengers and crew from the elements, and to see to their welfare during the time required to transport them towards their destination under the passenger recovery plan.

4.4.5 PASSENGER RECOVERY PLAN

A. A specific passenger recovery plan is required for each EDTO Alternate Airport used by an AOC holder in EDTO greater than 180 minutes.

B. For operations in the North Polar Area and the South Polar Area a specific passenger recovery plan is required for each designated diversion airport taken from those listed in an operator's OpSpecs for this operation.

Further guidance on passenger recovery plans will be discussed in a polar operations AC (TBD).

C. The AOC holder's formal passenger recovery plan should provide a means to validate acceptable levels of infrastructure to provide for an orderly process for the care and well being of the passengers and crew members.

- This infrastructure should include facilities that provide for the physiological needs of the passengers and crew members such as continuing safety, food, and shelter.
- Any list of considerations for the passengers and crew members need not be exhaustive. However, in certain cases involving operations in demanding environments, plans may need to be detailed enough to provide for medical care, communications, methods for securing alternative expedited travel, extraction, and other continued travel provisions for the crew members and passengers.
- If the AOC holder proposes to use the airplane capabilities and services as a means to satisfy all or part of the requirements for such a plan , the time-limited capability of appropriate systems should be evaluated and taken into account.

D. It is generally accepted that any plan that is designed to fully recover the passengers within 48 hours may be viewed as meeting the overall requirement to provide for the care and safety of the passengers and crew members.

E. The greatest concern relative to passenger recovery plans is when diversions occur to an airport that is geographically located within an area not normally served by the AOC holder and, more specifically, when the diversion occurs to an en route alternate airport located in a harsh operating environment.

F. An AOC holder with a route system extending over remote areas of the world has a responsibility, to develop a passenger recovery plan in anticipation of the possibility of a diversion to an approved en route alternate airport lying within those remote regions.

G. In these instances, the AOC holder operating on those routes should devise a plan of substance that will outline how it will recover the passengers, crew members, and airplane in the event of such a diversion.

H. This plan should be of sufficient detail to demonstrate that the recovery operation can be readily effected, and that the basic needs of the diverted passengers and crew members can be provided for in the interim.

I. The plan should address all of the concerns previously listed with specific emphasis on any issues unique to that particular environment. In some environments provisions for shade from the direct sunlight and cooling may be a concern; while in other environments such as polar and sub-polar areas, plans should provide for immediate provisions for shelter from the elements, heating, and clothing.

J. After these immediate concerns are addressed, the plan should address provisions for initiating extraction procedures immediately. In all cases a particular alternate airport environment should drive the requirements of the passenger recovery plan and the prioritization of concerns needing to be addressed.

4.4.6 NAVIGATION

A. The applicant must show the availability of navigation facilities adequate for the operation, taking into account the navigation equipment installed on the airplane, the navigation accuracy required for the planned route and altitude of flight, and the routes and altitudes to the airports designated as EDTO alternates.

B. Navigation facilities required to ensure a safe approach and landing must be available.

Non-terrestrial approaches, e.g., GPS/RNAV, may be utilized if approved in an AOC holder's operating specifications.

4.4.7 COMMUNICATIONS

A. The AOC holder must show the availability of communications services and facilities for communication with ATC and the dispatch office.

B. AOC holders operating EDTO routes must use the most reliable voice-based communications technology available for communications between the flight crew and air traffic services, and the flight crew and the AOC holder.

C. For EDTO routes further than 180 minutes from adequate airports, a second communication system is required and must be able to provide immediate satellite-based voice communications of landline-telephone fidelity.

- For EDTO routes further than 180 minutes from adequate airports, only one of the two required communication systems must be SAT COM.
- The intent is for the crew to have available immediate satellite-based voice communication of landline-telephone fidelity.
- If an aircraft is already equipped with a SATCOM system, the second communication system does not need to be SATCOM.

- Rapid and reliable ATC communications are determined by the facilities operated by ATC units in the areas of operations.

4.5 VALIDATION FLIGHT(S)

A. Prior to granting EDTO approval to an AOC holder for operation of a specific airplane-engine combination in an authorized area of operation, the CAAV will require actual validation flights on proposed routes that the AOC holder intends to operate within the EDTO area of operations, designated in the operator's approval request.

B. This is to ensure that the EDTO flight operations and maintenance programs described in Section 3 are capable of supporting those operations.

C. Depending on the AOC holder's level of experience in conducting EDTO and the routes intended to be used in operations, the CAAV will determine the number of validation flights required, the manner in which validation flights may be conducted (revenue with passengers, non-revenue, or cargo only), and any other items requiring validation.

D. If approval is granted to fly the validation flight in revenue service, the operator should be granted appropriate, though temporary or restricted, OpSpecs covering the necessary flight(s). At the successful conclusion of the validation, the CAAV will amend and issuance of unrestricted OpSpecs.

E. AOC holders operating passenger-carrying airplanes with more than two engines who, on the effe ctive date of this AC, have the authority to operate on specific non-EDTO routes that under the new definition are classified as EDTO routes, may not be required to conduct an actual validation flight.

F. If the AOC holder can adequately validate that the necessary additional EDTO processes and procedures are in place, and that they can function appropriately, may be validated by another means satisfactory to the CAAV.

4.6 REQUIRED DEMONSTRATION ON A VALIDATION FLIGHT

A. The AOC holder should demonstrate, by means of an CAAV-witnessed validation flight or flights using the specified airplane-engine combination in its application, that it has the competence and capability to safely conduct and adequately support the intended operation.

B. The CAAV will determine the conditions for each AOC holder's validation flights. This determination will be made on a case-by-case basis following a review of the AOC holder's experience and the proposed operation.

C. This process may require the AOC holder to conduct an actual diversion during the validation flights.

D. The following emergency conditions should be demonstrated during the EDTO validation flights, unless successful demonstration of these conditions has been approved and subsequently witnessed by the CAAV in an acceptable simulation prior to the validation flight—

1) Total loss of thrust of one engine and total loss of engine-generated (or normal) electrical power (as a minimum, the EDTO critical electrical condition identified during EDTO certification), or

2) Any other condition considered more critical in terms of airworthiness, crew member workload, or performance risk.

E. This simulator demonstration does not alter the AOC holder's requirement to demonstrate the competence and the capability to adequately support the intended operation during the EDTO validation flight.

SECTION 5 CAAV EDTO APPROVAL

5.1 FINAL EDTO OPERATING AUTHORITY

A. Following completion of the EDTO application requirements and before the issuance of OpSpecs, the AOC holder's application with supporting data, together with the Principal Inspectors recommendations will be reviewed by the FSSD management.

B. The CAAV final approvals should include any specific recommendations made by the principal maintenance inspector (PMI), principal avionics inspector (PAI), and principal operations inspector (POI), as appropriate.

C. Following this review and concurrence by FSSD management, the validation flights should be conducted in accordance with any additional guidance or recommendations specified in the review and concurrence process.

D. Following the successful completion of the validation flights, the CAAV to issue the AOC holder OpSpecs for EDTO operations.

5.2 EDTO OPSPECS

Those OpSpecs for EDTO provide authorizations and limitations covering at least the following—

1) Approved airplane-engine combinations,

2) Current approved CMP standard required for EDTO, if appropriate,

3) Authorized geographic area(s) of operation,

4) EDTO area of operation,

5) Airports authorized for use, including alternates and associated instrument approaches and operating minima,

6) Approved maintenance and reliability program for EDTO including those items specified in the type design approved CMP standard, if appropriate, and

7) Identification of the airplanes authorized for EDTO by make, model, serial, and registration number.

5.3 CHANGES TO APPROVED EDTO PROCEDURES

A. Following final EDTO approval, if an AOC holder determines a need to make substantial changes to its EDTO operations, maintenance and training procedures, it should submit such changes in a timely manner to the CAAV for review and acceptance before incorporation.

B. The AOC holder and CAAV should negotiate what constitutes a substantial change to allow flexibility and take into consideration an AOC holder's EDTO experience.

What is considered substantial for a new entrant EDTO AOC holder may be considerably different than for an AOC holder with many years of EDTO experience.

5.4 PROCESSES AFTER RECEIVING EDTO AUTHORITY

A. The CAAV continuously monitors the world fleet average IFSD rate for two-engine EDTO authorized airplane-engine combinations to ensure that the levels of reliability achieved in EDTO remain at the required levels.

B. If an acceptable level of reliability in fleet average IFSD is not maintained, or if significant deficiencies or adverse trends are detected in type design (i.e., basic design of the airplane-

engine) or in the operation, the CAAV may require the airframe and engine manufactures to develop a plan acceptable to the CAAV to address the deficiencies.

C. As with all other operations, the CAAV will monitor all aspects of the EDTO operations it has authorized to the AOC holder to ensure that the levels of reliability achieved in EDTO operations remain at acceptable levels, and that the operation continues to be conducted safely.

D. In the event that an acceptable level of reliability is not maintained, if significant adverse trends exist, or critical deficiencies are detected in the type design or in the conduct of EDTO operations, the CAAV will—

1) Alert the appropriate State of Design and the airplane evaluation group, when problems associated with airplane design or operations are identified; and

2) Initiate a special evaluation, impose operational restrictions (if necessary), and ensure that the AOC holder adopts corrective actions to resolve the problems in a timely manner.

SECTION 6 POLAR OPERATIONS

Polar operational areas are defined in paragraph 1.6 of this AC.

6.1 BACKGROUND

A. Specific guidance identifying the preparation for north polar flights and identified the necessary equipment and airplane configuration requirements for all airplanes, regardless of the number of engines, was initially consolidated by the United States FAA in 2001. A process was established to apply uniformly to all applicants for polar route authority. This process required EDTO-like planning, equipage and operational requirements in these areas.

B. It was determined that operating in the polar areas presents operational issues similar to typical EDTO flights, and as such, the risks associated with this operation can be mitigated by applying planning, operational, and equipage requirements similar to EDTO and specific procedures applicable to the risks associated with this type of flying.

C. The processes for approval of polar operations is incorporated into this advisory circular in anticipation of applications for these types of operations. The process for approval of EDTO operations will also apply to polar operations. The guidance in this Section details the additional requirements applicable to polar operations.

6.2 APPLICABILITY

A. Any AOC holder operating an airplane whose route contains any point within the North Polar area or South Polar area, must comply with the requirements of VAR Part 12. The AOC holder must first determine during the route planning stage if the operation will be EDTO as defined and discussed in Section 2 of this AC. If the operation is EDTO the polar requirements of VAR Part 12 and the guidance in this Section are in addition to any of the applicable EDTO requirements discussed in Section 3,

6.3 POLAR REQUIREMENTS

A. The AOC holder applying for authority to fly in the Polar Areas must develop plans in preparation for all polar flights in the North and/or South Polar Areas, as appropriate. This section documents the added requirements and identifies equipment and airplane configuration requirements in addition to the requirements discussed in Section 3, paragraphs 3.1 through 3.5.

B. The AOC holder's plan for conducting operations within these areas must include the following elements—

6.3.1 REQUIREMENTS FOR DESIGNATING ALTERNATES

A. AOC holders should designate a set of alternate airports regardless of their distance from the planned route, such that one or more can reasonably be expected to be available in a variety of weather conditions to support a necessary diversion.

B. The flight must have sufficient fuel as required by VARs, if applicable, and should be able to make a safe landing and the airplane maneuvered off of the runway at the selected diversion airport.

C. In the event of a disabled airplane following landing, the capability to move the disabled airplane should exist at that airport, so as not to block the operation of any recovery airplane. In addition, those airports designated for use should be capable of protecting the safety of all personnel by being able to—

1) Off-load the passengers and crew member in a safe manner during adverse weather conditions;

2) Provide for the physiological needs of the passengers and crew members for the duration of the stay at the diversion airport until safe evacuation; and

3) Safely extract passengers and crew members as soon as possible (execution and completion of the passenger recovery is expected as soon as possible within 48 hours following diversion).

6.3.2 PASSENGER RECOVERY PLAN

A. Except for supplemental all-cargo operations, each AOC holder conducting operations in the polar areas must have a passenger recovery plan at designated diversion airports as discussed in paragraph 6.3.1 above and in Section 4 of this AC,

B. The passenger recovery plan in these Polar Regions should also include special consideration for the possibility of extreme cold weather, limited passenger facilities, and the need to initiate passenger recovery without delay.

6.3.3 FUEL FREEZE STRATEGY & MONITORING

A. The AOC holder must have a fuel- freeze strategy and procedures for monitoring fuel freezing.

B. The AOC holder may wish to develop a fuel freeze strategy and monitoring program (e.g., alternate fuel freeze point temperature determination based on actual measurements of uploaded fuel), in lieu of using the standard minimum fuel freeze temperatures for specific types of fuel used.

In such cases, the AOC holder's fuel freeze analysis and monitoring program for the airplane fuel load is subject to CAAV approval.

C. The AOC holder should have procedures established that require coordination between maintenance, dispatch, and assigned flight crew members to convey the determined fuel freeze temperature of the fuel load on board the airplane.

6.3.4 COMMUNICATION CAPABILITY

A. The AOC holder must have effective voice communications and/or data link capability for all portions of the flight route.

B. The communication requirements of apply to all EDTO operations in these areas. For all other operations, company communications may be accomplished using—

- HF voice;
- HF data link;
- Satellite communication (SATCOM) voice; or
- SATCOM data link.

C. Because of the limitations of VHF and satellite-based voice communications, ATC communications will probably require high frequency (HF) voice over portions of these routes.

- The CAAV recognizes that SATCOM may not be available for short periods during flight over the Poles.
- Communication capability with HF radios also may be affected during periods of solar flare activity

The AOC holder should consider predicted solar flare activity and its effect on communications for each flight that is dispatched for operations into these areas.

6.3.5 MEL CONSIDERATIONS

A. The AOC holder must amend its MEL to reflect the items that must be operational for these operations.

For EDTO flights, all MEL restrictions for the applicable EDTO operations apply.

B. Before receiving CAAV authority to conduct these operations, all AOC holders should review its MEL for consideration of the dispatch availability of the following systems/equipment—

1) Fuel quantity indicating system (FQIS), including the fuel tank temperature indicating system;
2) APU (when the APU is necessary for an airplane to comply with EDTO requirements), including electrical and pneumatic supply to its designed capability,
3) Auto-throttle system;
4) Communication systems relied on by the flight crew member to satisfy the requirement for communication capability; and
5) Except for all-cargo operations, an expanded medical kit to include automated external defibrillators (AED).

6.3.6 TRAINING

A. The AOC holder should address the following training requirements in its approved training programs—

1) QFE/QNH and meter/feet conversions (required for flight crew member and dispatcher training);
2) Training requirements for fuel freeze, to include maintenance, dispatch, and flight crew member training (special curriculum segments);
3) General route-specific training on weather patterns;
4) Relevant airplane system limitations (for example fuel temperature limits);
5) Role of the maintenance department in providing airplane systems capability information to dispatch and flight crew member to aid the PIC in diversion decision making;
6) Crew member training in the use of the cold weather anti-exposure suit,
7) Role of dispatchers and crew members in the AOC holder's passenger recovery plan.

B. For dispatch and crew member considerations during solar flare activity, the AOC holder must be guidance in the operations manual regarding radiation exposure during polar flights and crew members must have completed training regarding in-flight radiation exposure.

6.3.7 CREW EXPOSURE TO RADIATION DURING SOLAR FLARE ACTIVITY

The AOC holder must provide a plan for mitigating crew exposure to the effects of solar flare activity at the altitudes and latitudes expected in such operations.

6.3.8 SPECIAL EQUIPMENT FOR POLAR OPERATIONS

A minimum of two cold weather anti-exposure suits must be on board each airplane, so that outside coordination at a diversion airport with extreme climatic conditions can be accomplished safely.

- A short term MEL relief for this item may be granted provided the AOC holder has arranged ground support provisions for providing such protective clothing at alternate airports.
- The CAAV may also relieve the AOC holder from this requirement during those periods of the year when the seasonal temperature makes the equipment unnecessary.

6.4 VALIDATION BEFORE APPROVAL

A. Prior to receiving an authorization to conduct polar operations a AOC holder must conduct an CAAV observed validation flight.

B. As part of polar area validation, the AOC holder must exercise its passenger recovery plan.

C. Adequate and timely notification must be made to the CAAV before the validation flight so that any necessary coordination between the CAAV inspector and personnel at the selected diversion airport can be completed.

D. The inspector will witness the effectiveness and adequacy of the following areas of operation—

1) Communications,

2) Coordination,

3) Facilities,

4) Accuracy of Notices to Airman and weather information, and

5) Operability of ground equipment during the simulated diversion.

E. The exercise of the AOC holder's passenger recovery plan may be completed before the validation flight.

- The CAAV will not consider a request by a AOC holder to conduct the validation flight in a passenger revenue status if the AOC holder's passenger recovery plan has not been previously and satisfactorily demonstrated to the CAAV.
- If the AOC holder elects to demonstrate its passenger recovery plan as part of and during its validation flight, the flight may not be conducted in a passenger revenue status.
- However, the carriage of cargo revenue is permissible in this case and is encouraged for airplane weight and balance purposes.

6.5 CAAV POLAR AREA APPROVAL

A. AOC holders must obtain CAAV approval to conduct these operations and to operate in any area of magnetic unreliability. The CAAV will grant such authority based on a specific airplane-engine combination.

B. Any AOC holder wishing to obtain Polar authorization must submit an application with all supporting data to CAAV. This application must address all the regulatory requirements for Polar operations and may follow the guidance as found in this AC.

C. The application should be submitted at least 60 days prior to the proposed start of polar operations with the specific airplane-engine combination.

CAAV approval is granted by an amendment to the AOC holder's OpSpecs.

APPENDIX A
EDTO Approval Methods

The two different approval methods available for an AOC holder's use are described in this appendix.

1. In-Service Experience Method (Two-Engine EDTO for up to 180-Minute EDTO)

A. General.

1) An in-service experience program is one way of gaining EDTO operational approval. As a prerequisite to obtaining any operational approval, the AOC holder should show that an acceptable level of propulsion system reliability has been achieved in service by the world fleet for that particular airplane-engine combination. The candidate AOC holder also should obtain sufficient maintenance and operation familiarity with the particular airplane-engine combination. Each AOC holder requesting approval to conduct EDTO by the in-service method should have operational experience appropriate to the operation proposed.

2) This appendix contains guidelines for requisite in-service experience. These guidelines may be reduced or increased following review and concurrence on a case-by-case basis by the CAAV-FSSD. Any reduction or increase in in-service experience guidelines will be based on an evaluation of the AOC holder's ability and competence to achieve the necessary reliability for the particular airplane-engine combination in EDTO.

- For example, a reduction in in-service experience may be considered for an AOC holder who can show extensive in-service experience with a related engine on another airplane that has achieved acceptable reliability.
- In contrast, an increase in in-service experience may be considered for those cases where heavy maintenance has yet to occur and/or abnormally low number of takeoffs has occurred.

B. Specific Approvals.

1) **75- and 90-Minute Operation.** Consideration may be given to the approval of 75-minute and 90-minute EDTO for AOC holders with minimal or no in-service experience with the airplane-engine combination. This determination considers such factors as the proposed area of operations, the AOC holder's demonstrated ability to successfully introduce airplanes into operations, and the quality of the proposed maintenance and operations programs.

2) **120-Minute Operation.** Each AOC holder requesting approval to conduct EDTO with a maximum diversion time (in still air) of 120 minutes should have 12 consecutive months of operational in-service experience with the specified airplane-engine combination. In- service experience guidelines may be increased or decreased by the CAAV.

3) 180-Minute Operation.

(a) Each AOC holder requesting approval to conduct EDTO with a maximum diversion time (in still air) of 180 minutes should have previously gained 12-consecutive months of operational in-service experience with the specified airplane-engine combination in conducting 120-minute EDTO. In-service experience guidelines may be reduced or increased by the CAAV. Likewise, the substitution of in-service experience, which is equivalent to the actual conduct of 120-minute EDTO operations, also will be established by the CAAV, on a case-by-case basis.

(a) Before approval, the AOC holder's capability to conduct operations and implement effective EDTO programs in accordance with the criteria detailed in this AC will be examined. Only AOC holders who have demonstrated capability to successfully conduct a 120-minute program will be considered for approval beyond 120-minutes.

Approval will be given on a case-by-case basis for an increase to their area of operation beyond 120-minutes. The dispatch limitation will be a maximum diversion time of 180 minutes to an EDTO alternate at an approved one-engine inoperative speed (under standard conditions in still air).

C. Requesting Approval

1) An AOC holder requesting approval for EDTO under this method should submit the request with the required supporting data to CAAV at least 60 days before the proposed start of EDTO operation with the specific airplane-engine combination.

2) In considering an application from an AOC holder to conduct EDTO, the CAAV should assess the AOC holder's overall safety record, past performance, flight crew member training, and maintenance programs.

3) The data provided with the request should substantiate the AOC holder's ability and competence to safely conduct and support these operations and should include the means used to satisfy the considerations outlined in this paragraph.

2. Accelerated EDTO Method (Up to 180-Minute EDTO for Two-Engine Airplanes and for all EDTO for Passenger-Carrying Airplanes With More Than Two Engines)

This section describes the means by which an AOC holder may initiate EDTO operations when the AOC holder establishes the processes necessary for successful and reliable EDTO operations and proves to the CAAV that such processes can be successfully applied throughout the applicant's EDTO operations.

This may be achieved by thorough documentation and analysis of processes and process validation, or demonstration on another airplane/validation (as described under process validation in this appendix, below) or a combination of these processes.

A. EDTO Processes

1) The airplane-engine combination for which the AOC holder is seeking accelerated EDTO operational approval must be EDTO type design-approved (except for two-engine EDTO at 75-minute authorization and for passenger-carrying airplanes with more than two engines manufactured prior to March 17, 2015) and be capable of operating at a satisfactory level of reliability before commencing EDTO. The AOC holder seeking accelerated EDTO operational approval must demonstrate to the CAAV that it has an EDTO program in place that consists of all the following applicable EDTO process elements.

2) The applicable process elements defined as the EDTO maintenance and operations requirements of paragraphs 3.2 through 3.5 of this AC.

- Passenger carrying airplanes with more than two engines are exempt from the EDTO maintenance requirements.
- Therefore the operator may ignore the maintenance processes described in this Appendix.

B. Documentation of the following elements as appropriate—

1) Technology new to the AOC holder and significant difference in primary and secondary power (engines, electrical, hydraulic, and pneumatic) systems between the airplanes currently operated and the two-engine airplane for which the AOC holder is seeking EDTO operational approval.

2) The plan to train flight and maintenance personnel to the differences identified in the maintenance subparagraph above.

3) The plan to use proven manufacturer-validated training and maintenance and operations manual procedures relevant to EDTO for the two-engine airplane for which the AOC holder is seeking accelerated EDTO operational approval.

4) Changes to any previously proven validated training, maintenance or operations manual procedures used in previous non-EDTO operations or in previous EDTO with a different airplane-engine combination and/or geographic area of operations. Depending on the nature and extent of any changes, the AOC holder may be required to provide a plan for validating such changes.

5) The validation plan for any additional AOC holder unique training and procedures relevant to EDTO.

1) Details of any EDTO program support from the airframe manufacturer, engine manufacturer, other AOC holders or any other outside person.

2) The control procedures when maintenance or flight dispatch support is provided by an outside person as described above.

C. Process Validation Methodology

1) Paragraph A above identifies those process elements that should be proven before EDTO authority is granted by the CAAV under the accelerated EDTO approval program. For a process to be considered proven the process should first be defined.

- Typically, this will include a flow chart showing the various elements of the process.
- Roles and responsibilities of the personnel who will be managing this process should be defined including any training requirement.
- The AOC holder should demonstrate that the process is in place and functions as intended.
- The AOC holder may accomplish this by thorough documentation and analysis, or by demonstrating on an airplane, that the process works and consistently provides the intended results. The AOC holder should define the necessary evaluation duration to validate the process and also show that a feedback loop exists to illustrate need for revision of the process, if required, based on in-service experience.

3) Normally the choice to use or not to use demonstration on an airplane as a means of validating individual processes should be determined by the AOC holder. Process validation may be done with the airframe-engine combination that will be used in EDTO. It can also be done with a different airplane type from that for which EDTO approval is being sought, including an airplane with more than two engines, if it can be shown that the particular airplane- engine combination in the AOC holder's EDTO program is not necessary to validate a process.

4) With sufficient preparation and dedication of resources, such validation may not be necessary to assure processes that produce acceptable results. However, if the plan proposed by the AOC holder to prove processes is determined by the CAAV to be inadequate or the plan does not produce acceptable results, validation of the processes with an airplane will be required.

5) If an AOC holder currently is conducting EDTO with a different airplane- engine combination, it may be able to document that it has proven EDTO processes in place with only minimal further validation required. If the AOC holder has similar non-EDTO operations and can simulate or demonstrate proven EDTO processes in such operations, credit can be given for such successful evaluations. In either case, the AOC holder should demonstrate that the means are in place to assure equivalent results with the airplane-engine combination being proposed for EDTO operational approval.

6) The following elements may aid in justifying a reduction in the validation requirement of EDTO processes—

(a) Experience with other airframes and/or engines,

(b) Previous EDTO experience,

(c) Experience with long range, overwater operations with two-, three-, or four- engine airplanes, and

(d) Experience gained by flight crew members and maintenance and flight dispatch personnel while working with other ETOP S-approved AOC holders.

D. Application for Accelerated EDTO Program

1) The AOC holder seeking accelerated EDTO operational approval should submit an Accelerated EDTO operational approval plan to the CAAV six months before the proposed start of EDTO. This will provide sufficient time for the AOC holder and the CAAV to validate the effectiveness of all EDTO process elements ("proven process"). The AOC holder's application for EDTO should—

(a) State the EDTO authority requested. Define proposed routes and the EDTO diversion time necessary to support these routes and the airplane-engine combination to be flown.

(b) Define processes and related resources being allocated to initiate and sustain EDTO operations in a manner that demonstrates commitment by management and all personnel involved in EDTO maintenance and operational support.

(c) Provide a documented plan for compliance with requirements listed in this section for Accelerated EDTO.

(d) Define Review Gates.

2) A review gate is a milestone- tracking plan to allow for the orderly tracking and documentation of specific provisions of this Appendix. Each review gate should be defined in terms of the process elements to be validated.

3) Normally, the review gate process will start six months before the proposed start of EDTO and should continue until at least six months after the start of EDTO. The review gate process will help ensure that the proven processes comply with the provisions of this AC and are capable of continued EDTO operations.

D. Validation of Process Elements

1) When the AOC holders accelerated EDTO plan receives approval by the CAAV and final concurrence by CAAV-FSSD, a validation of the process elements of the accelerated EDTO plan should begin. Close coordination between the AOC holder and the CAAV is necessary for a successful validation of the EDTO plan. All process elements required in paragraph (a) should be validated.

2) Before the start of the validation of the process elements, the following information should be part of the Accelerated EDTO plan submitted to the CAAV—

(a) Validation periods, including start dates and proposed completion dates.

(b) Definition of airplane(s) to be used in the validation. List should include registration numbers, manufacturer and serial number and model of the airframes and engines.

(c) Description of the areas of operation (if relevant to validation objectives) proposed for validation and actual EDTO.

(d) Definition of designated EDTO validation routes. The routes should be of duration necessary to ensure process validation occurs.

3) Process validation reporting. The AOC holder should compile results of EDTO process validation. The AOC holder should—

(a) Document how each element of the EDTO process was utilized during the validation.

(b) Document any shortcomings with the process elements and measures in place to correct such shortcomings.

(c) Document any changes to EDTO processes that were required after an IFSD, unscheduled engine removals, or any other significant operational events.

(d) When there is concurrence between the AOC holder and the CAAV that a process element has been successfully proven, the review gate should be closed and confirmation documented.

(e) Provide periodic process validation reports to the CAAV. This should be addressed during the review gates.

4) The AOC holder should include a final review gate prior to final EDTO approval that is the validation flights described in paragraphs 4.5 and 4.6 of this AC. This review gate should ensure that all EDTO processes have been proven.

5) Any validation program should address the following—

(a) The AOC holder should show that it has considered the impact of the EDTO validation program with regard to safety of flight operations. The AOC holder should state in its application any policy guidance to personnel involved in the EDTO process validation program. Such guidance should clearly state that EDTO process validation exercises should not be allowed to adversely impact the safety of operations especially during periods of abnormal, emergency, or high cockpit workload operations. It should emphasize that during periods of abnormal or emergency operation or high cockpit workload EDTO process validation exercises may be terminated.

(b) The validation scenario(s) should be of sufficient frequency and operational exposure to validate maintenance and operational support systems not validated by other means.

(c) A means must be established to monitor and report performance with respect to accomplishment of tasks associated with EDTO process elements. Any recommended changes to EDTO maintenance and operational process elements should be defined.

E. Final Approval for Accelerated EDTO Authority

1) At the successful completion of the AOC holder's accelerated EDTO validation program all process elements should have been validated and appropriate review gates closed.

2) Report of a successful completion of review gates will be forwarded by the CPC to the FSSD Director.

3) Upon final concurrence and approval, the applicant should forward to the CAAV a plan for final validation flights to be conducted over proposed routes in the EDTO area of operation and in the airframe-engine combination listed in the AOC holder's application.

4) This CAAV witnessed EDTO validation flight or flights will be conducted in accordance with paragraphs 4.5 and 4.6 of this AC. The purpose of these flights is for the AOC holder to demonstrate to the CAAV that it has the competence and capability to safely conduct and adequately support the intended EDTO operation.

End of Appendix A

APPENDIX B
EDTO Approvals

1. Airplanes with 2-Engines: 75 Minutes

Table 1: Area of Applicability: Caribbean, Western Atlantic Area

Requirements	How to Apply	Comments
● The airplane-engine combination need not be type design approved for EDTO. ● The CAAV reviews the airframe-engine combination to ensure the absence of factors that could prevent safe operations. ● The airframe-engine combination must have sufficient favorable experience to demonstrate to the CAAV a level of reliability ● Appropriate for 75-minute EDTO. ● Even though there is no requirement for the type design approval of the airplane, the AOC holder must ensure the airplane has systems that are capable of complying with the requirements for time- limited system planning. ● The AOC holder must comply with the maintenance program requirements, except that a pre-departure service check before departure of the return flight is not required. Guidance is provided in Section 3, paragraphs 3.2 and 3.3 of this AC. ● The AOC holder must comply with the flight operational requirement in VAR Part 12, as described in Section 3, paragraphs 3.4 and 3.5 of this AC. ● The AOC holder need not comply with 120-minute EDTO provisions of the MMEL. ● The AOC holder must operate in accordance with the EDTO authority as contained in its operations specifications (OpSpecs)	● Request made to the CAAV for route authority. The application will show the need for such an authority. ● Minimal or no in-service experience with the airplane-engine combination is required (see Appendix A).	● This area is considered a "benign" area of operations due to— ● (1) numerous airports, ● (2) a high level of reliability and availability are required of communications, navigation, and ATC services and facilities, and ● (3) prevailing weather conditions that are stable and generally do not approach extremes in temperature, wind, ceiling, and visibility.

Table 2: Area of Applicability: Areas Other than Caribbean, Western Atlantic Area

Requirements	How to Apply	Comments
● The airplane-engine combination need not be type design approved for EDTO. ● The CAAV reviews the airframe-engine combination to ensure the absence of factors that could prevent safe operations. ● The airframe-engine combination must have sufficient favorable experience to demonstrate to the CAAV a level of reliability appropriate for 75-minute EDTO. ● Even though there is no specific requirement for type design approval of the airplane, the AOC holder must ensure the airplane has systems that are capable of complying with the requirements for time-limited system planning. ● The AOC holder must comply with the maintenance program requirements. Guidance is provided in Section 3, paragraphs 3.2 and 3.3 of this AC. ● The AOC holder must comply with the flight operational requirements in VAR Part 12, as described in Section 3, paragraphs 3.4 and 3.5 of this AC. ● The AOC holder must comply with 120-minutes EDTO provisions in the MMEL. ● The AOC holder must operate in accordance with the EDTO authority as contained in its OpSpecs.	● Request made to the CAAV for route authority. ● The application will show the need for such an authority	● Areas not considered benign such as North Atlantic (NAT/NMPS) area. ● Minimal or no in-service experience with the airplane-engine combination is required (see Appendix A).

2. Airplanes with 2-Engines: 90 Minutes

Table 3: Area of Applicability: Micronesia

Requirements	How to Apply	Comments
● The airplane-engine combination must be type design approved for 120- minutes EDTO or greater. ● The AOC holder must comply with the maintenance program requirements, except that a pre-departure service check before departure of the return flight is not required. Guidance is provided in Section 3, paragraph 3.2 and 3.3 of this AC. ● The AOC holder must comply with the flight operational requirement in VAR Part 12, as described in Section 3, paragraphs 3.4 and 3.5 of this AC. ● The AOC holder must comply with 120-minutes EDTO provisions in the MMEL. ● The AOC holder must operate in accordance with the EDTO authority as contained in its OpSpecs.	● Request made to the CAAV for route authority. ● The application will show the need for such an authority.	● Minimal or no in- service experience with the airplane-engine combination is required (see Appendix A).

3. Airplanes with 2-Engines: 120 Minutes

Table 4: Area of Applicability: Unlimited (No Area Restriction)

Requirement	How to Apply	Comments
• The airplane-engine combination must be EDTO type design approved for 120 minutes or greater. • The AOC holder must comply with all VAR Part 12 flight operations and maintenance requirements pertaining to EDTO as discussed in Section 3 of this AC. • The AOC holder must comply with 120-minute EDTO provisions in the MMEL. • The AOC holder must operate in accordance with the EDTO authority as contained in its OpSpecs.	• Section 4, paragraph 4.2 of this AC provides the two methods for gaining approval.	

4. Airplanes with 2-Engines: 138 Minutes: Unlimited

Table 5: Upgrade for AOC Holders currently approved for 120-Minute EDTO

Requirement	How to Apply	Comments
• The airplane-engine combination must be EDTO type design approved for 120-minute or greater. If approved only up to 120 minute, the CAAV must ensure the airplane time-limited systems support operations up to 138 minute. • Comply with all VAR Part 12 flight operations and maintenance requirements pertaining to EDTO as discussed in Section 3 of this AC. The AOC holder must conduct training for maintenance, dispatch and flight crew. Training should include any unique aspects of 138 minute operations e.g., any additional requirement imposed by the CAAV including MEL requirements. • Must comply with the "beyond 120-minute EDTO provisions in the MMEL. If a 180-minute EDTO MMEL does not exist for the airplane, the AOC holder must apply to the CAAV for any additional items that may be applicable for 138-minute operations. • 138-minute EDTO authority is used when the route cannot be efficiently operated under 120-minute EDTO. • The AOC holder must operate in accordance with the EDTO authority as contained in its OpSpecs.	• AOC holder with 120-minute EDTO authority may apply to the CAAV. • The application will show the need for such an authority. • A modified MEL to support operations should be submitted with the application to CAAV-FSSD.	• This is an extension of previous 120- minute authority. • Approval is granted for operations up to 138 minutes on a flight-by-flight exception basis.

Table 6: AOC Holders Already Approved for 180-Minute EDTO

Requirement	How to Apply	Comments
• Airplane-engine combination must be EDTO type design approved for 180 minutes or greater. • Comply with all VAR Part 12 flight operations and maintenance requirements pertaining to EDTO as discussed in Section 3 of this AC. • Must comply with the 180-minute EDTO provisions in the MMEL. • The AOC holder must operate in accordance with the EDTO authority as contained in its operations specifications. • The AOC holder must conduct training for maintenance, dispatch and flight crew regarding the differences between 138-minute and 180- minute diversion authority.	• AOC holder with 180-minute EDTO authority may apply to the CAAV. • The application will show the need for such an authority.	• Since this authority is less than the AOC holder's maximum EDTO authority, it may be exercised on an unlimited basis.

5. Airplanes with 2-Engines: 207 Minutes

Table 7: Area of Applicability: In North Pacific Area of Operations (Pacific Ocean areas north of 40N latitudes including NOPAC ATS routes and published PACOT tracks between Japan and North America)

Requirement	How to Apply	Comments
• Airplane-engine combination must be EDTO type design approved for 180 minutes or more. • The approved time for the airplane's most limiting EDTO significant system and most limiting cargo-fire suppression time must be at least 222 minutes. • AOC holder must have existing 180-minute EDTO operating authority for the airplane-engine combination to be operated. • The AOC holder must have previous EDTO experience satisfactory to the CAAV. • The AOC holder must make every effort to plan EDTO within 180 minutes or less, if possible. • The AOC holder must inform the flight crew each time an airplane is proposed for dispatch for greater than 180 minutes and tell them why the route was selected. • In addition to the equipment specified in the AOC holder's minimum equipment list for 180-minute EDTO, the following systems must be operational for dispatch— (A)The fuel quantity indicating system, (B)The APU (including electrical and pneumatic supply and operating to the APU's designed capability) when the APU is necessary for an airplane to comply with EDTO requirements, (C)The auto throttle system, (D)The communication system required VAR Part 6 and (E)One-engine inoperative auto-land capability, if flight planning is predicated on its use.	• Those AOC holders that have 180-minute EDTO authority in this area can apply to the CAAV for approval as an extension to their 180-minute authority.	• This is an extension of 180-minute EDTO authority for the specific case of operations in the North Pacific Area of Operations.

Table 7: Area of Applicability: In North Pacific Area of Operations (Pacific Ocean areas north of 40N latitudes including NOPAC ATS routes and published PACOT tracks between Japan and North America)

Requirement	How to Apply	Comments
• Comply with all VAR Part 12 flight operations and maintenance requirements pertaining to EDTO as discussed in Section 3 of this AC. • The nearest available EDTO alternate within 207-minutes diversion time must be specified in the dispatch or flight release. • In conducting such a flight the AOC holder must consider Air Traffic Service's preferred track. • This exception may be used only on a flight-by-flight basis when an EDTO alternate is not available within 180 minutes for reasons such as political or military concerns; volcanic activity; temporary airport conditions; and airport weather below dispatch requirements or other weather related events. • The AOC holder must operate in accordance with the EDTO authority as contained in its operations specifications. • The AOC holder must track how many times 207-minute authority is used.		

6. Airplanes with 2-Engines: 240 Minutes

Table 8: Area of Applicability: North Polar Area, in the area north of the NOPAC, and the Pacific Ocean north of the equator.

Requirement	How to Apply	Comments
• Airplane-engine combination must be EDTO type design approved for greater than 180 minutes. The AOC holder must ensure the airplane has systems that are capable of complying with the requirements for time-limited system planning. • AOC holder must have existing 180-minute EDTO operating authority for the airplane-engine combination to be operated. • The AOC holder must have previous EDTO experience satisfactory to the CAAV. • The AOC holder must make every effort to plan EDTO with 180 minutes or less, if possible. • The AOC holder must inform the flight crew each time an airplane is proposed for dispatch for greater than 180 minutes and tell them why the route was selected.	• Those AOC holders that have 180-minute EDTO authority in this area can apply to the CAAV for approval as an extension to their 180-minute authority.	• This is an extension of 180-minute EDTO in this area and is to be used on a flight by flight exception basis when an EDTO alternate is not available within 180 minutes.

Table 8: Area of Applicability: North Polar Area, in the area north of the NOPAC, and the Pacific Ocean north of the equator.

Requirement	How to Apply	Comments
• In addition to the equipment specified in the AOC holder's minimum equipment list for 180-minute EDTO, the following systems must be operational for dispatch— • (A)The fuel quantity indicating system, (• B)The APU (including electrical and pneumatic supply and operating to the APU's designed capability) when the APU is necessary for an airplane to comply with EDTO requirements, • (C)The auto throttle system, • (D)The communication system required VAR Part 6 and • (E)One-engine inoperative auto-land capability, if flight planning is predicated on its use. • Comply with all VAR Part 12 flight operations and maintenance requirements pertaining to EDTO as provided in Section 3 of this AC. • The nearest available EDTO alternate within 240-minutes diversion time must be specified in the dispatch or flight release. • In conducting such a flight the AOC holder must consider Air Traffic Service's preferred track. • The criteria used by the AOC holder to decide that extreme weather precludes using an airport must be established by the AOC holder, accepted by the CAAV, and published in the AOC holder's manual for the use of dispatchers and pilots. • The AOC holder must operate in accordance with the EDTO authority as contained in its OpSpecs. • This exception may be used in the North Polar Area and in the area north of NOPAC only in extreme conditions particular to these areas such as volcanic activity, extreme cold weather at en route airports, airport weather below dispatch requirements, temporary airport conditions, and other weather related events. This exception may be used in the Pacific • Ocean area north of the equator only for reasons, such as political or military concern, volcanic activity, airport weather below dispatch requirements, temporary airport conditions and other weather related events.		

Table 9: Areas South of the Equator

- Pacific Ocean areas between US West Coast and Australia, New Zealand and Polynesia.
- South Atlantic Oceanic Areas,
- Indian Ocean Areas
- Oceanic areas between Australia and South America

Requirement	How to Apply	Comments
• Airplane-engine combination must be EDTO type design approved for greater than 180 minutes. The AOC holder must ensure the airplane has systems that are capable of complying with the requirements for time-limited system planning. • AOC holder must have existing 180-minute EDTO operating authority for the airplane-engine combination to be operated. • The AOC holder must have previous EDTO experience satisfactory to the CAAV. • In addition to the equipment specified in the AOC holder's minimum equipment list for 180-minute EDTO, the following systems must be operational for dispatch— • (A)The fuel quantity indicating system, • (B)The APU (including electrical and pneumatic supply and operating to the APU's designed capability) when the APU is necessary for an airplane to comply with EDTO requirements, • (C)The auto throttle system, • (D)The communication system required VAR Part 6 and • (E)One-engine inoperative auto-land capability, if flight planning is predicated on its use. • Comply with all VAR Part 12 flight operations and maintenance requirements pertaining to EDTO as provided in Section 3 of this AC. • The nearest available EDTO alternate within 240-minutes diversion time must be specified in the dispatch or flight release. • The AOC holder must operate in accordance with the EDTO authority as contained in its OpSpecs.	• Request made to the CAAV for route authority. • The application will show the need for such an authority.	• This is an unlimited authority

7. Airplanes with 2-Engines: Beyond 240 Minutes

Table 10: +240 Minutes: Specific City Pairs

- Pacific Ocean areas between US West Coast and Australia, New Zealand and Polynesia.
- South Atlantic Oceanic Areas,
- Indian Ocean Areas
- Oceanic areas between Australia and South America
- South Polar Area

Requirement	How to Apply	Comments
• Airplane-engine combination must be EDTO type design approved for greater than 180-minute. The AOC holder must ensure the airplane has systems that are capable of complying with the requirements for time-limited system planning. • The AOC holder must have existing 180-minute EDTO operating authority for the airplane-engine combination to be operated. • The AOC holder must have previous EDTO experience satisfactory to the CAAV. • The operator must have been operating at 180-minute or greater EDTO • authority for at least 24-consecutive months, of which at least 12-consecutive months must have been under 240-minute EDTO authority with the airplane-engine combination to be used. • In addition to the equipment specified in the AOC holder's minimum equipment list for 180-minute EDTO, the following systems must be operational for dispatch— • (A)The fuel quantity indicating system, • (B)The APU (including electrical and pneumatic supply and operating to the APU's designed capability) when the APU is necessary for an airplane to comply with EDTO requirements, • (C)The auto throttle system, • (D)The communication system required VAR Part 6 and • (E) One-engine inoperative auto-land capability, if flight planning is predicated on its use. • The AOC holder must comply with all VAR Part 12 flight operations and maintenance pertaining to EDTO as provided in Section 3 of this AC. • The AOC holder must operate in accordance with the EDTO authority as contained in its OpSpecs.	• Request made to the CAAV for route authority. • The application will show the need for such an authority	• There is no time limit to this authority

8. Passenger Carrying Airplanes with More Than 2-Engines

Table 11: Operations Beyond 180-Minutes from Diversion Airport

Requirement	How to Apply	Comments
● The airplane-engine combination must be type-design-approved for EDTO, with exceptions (see comments). ● The AOC holder must ensure the airplane has systems that are capable of complying with the requirements for time-limited system planning. ● The operator must designate the nearest available EDTO alternate or alternates within 240-minutes diversion time (at one engine inoperative cruise speed under standard conditions in still air). If an EDTO alternate is not available within 240 minutes, the operator must designate the nearest available EDTO alternate or alternates along the planned route of flight. ● The minimum equipment list (MEL) limitations for the authorized EDTO diversion time apply. ● (i)The Fuel Quantity Indicating System must be operational. ● (ii)The communications systems required by VAR Part 6 must be operational, except for three and four-engine airplanes operating 180 minutes or less from an alternate in the North Polar and South Polar areas. ● The AOC holder must operate in accordance with the EDTO authority as contained in its OpSpecs.	● Request made to the CAAV for route authority. ● The application will show the need for such an authority. ● AOC holders who have authority to operate on specific routes that under this AC are newly defined as EDTO routes do not have to re-apply for specific route authority. ● The AOC holder will be required to comply with all the EDTO operational requirements in this AC.	● There is an eight-year 'production cut-in for EDTO type design requirements for these airplanes. ● The AOC holder should review their aircraft for applicability. ● Those airplanes not required to have an EDTO type design do not have any CMP or Parts control compliance requirements.

9. All Airplanes Enter the North or South Polar Areas

Table 12: For Any Portion of the North or South Polar Area

Requirement	How to Apply	Comments
In addition to any applicable requirements of Sections 1. and 2. of this Appendix, the AOC holder's operations specifications must contain the following— ● The designation of alternate airports that may be used for en-route diversions and the requirements the airports must meet at the time of diversion. ● Except for supplemental, all-cargo operations, a recovery plan for passengers at diversion alternates. ● A fuel-freeze strategy and procedures for monitoring fuel freezing. ● A plan to ensure communication capability for these operations. ● An MEL for these operations. ● A training plan for operations in these areas. ● A plan for mitigating crew exposure to radiation during solar flare activity. ● A plan for providing at least two cold weather anti-exposure suits in the aircraft, to protect crew members during outside activity at a diversion airport with extreme climatic conditions. The CAAV may relieve the AOC holder from this requirement if the season of the year makes the equipment unnecessary.	● AOC holders must submit an application with all supporting data to their CAAV. ● This application must address all the regulatory requirements for Polar operations and the guidance in this AC. ● The application should be submitted at least 60 days prior to the proposed start of polar operations with the specific airplane- engine combination.	● These requirements are in addition to any applicable EDTO requirements listed in Sections 3 and 4 of this AC. ● The validation requirements of this approval include an exercise of the AOC holder's passenger recovery plan as per paragraph 6.6.

End of Advisory Circular