SOUTH AFRICAN CIVIL AVIATION AUTHORITY

TECHNICAL GUIDANCE MATERIAL

FOR EXTENDED DIVERSION TIME OPERATIONS (EDTO)

SUBJECT: TECHNICAL GUIDANCE MATERIAL FOR EXTENDED DIVERSION TIME OPERATIONS (EDTO)

EFFECTIVE DATE: 18 February 2022

APPLICABILITY: This guidance material concerns AOC approval holders applying for approval to conduct Extended Diversion Time Operations (EDTO). It also provides guidance in resolving operational issues to AOC approval holders currently conducting such operations.

PURPOSE: This Technical Guidance Material provides South African Civil Aviation Authority "SACAA" AOC approval holders with guidance for obtaining operational approval to conduct Extended Diversion Time Operations (EDTO) under South African Civil Aviation Regulations "SA-CAR" of 2011, as amended Part 91.07.35. The SACAA may authorize EDTO with two-engine aircraft over a route that contains a point further than 60 minutes flying time from an adequate airport at an approved one-engine inoperative cruise speed under standard conditions in still air. The SACAA may also authorize EDTO for aeroplanes with more than two engines over a route that contains a point further than 180 minutes flying time from an adequate airport at an approved one-engine inoperative cruise speed under standard conditions in still air. This Technical Guidance Material "TGM" provides an Acceptable means of complying with the regulations; however, it is not the only means of compliance. When this TGM uses mandatory language (e.g., "must" or "may not") it is quoting or paraphrasing a regulatory requirement or prohibition. When this TGM uses permissive language (e.g., "should" or "may"), it describes an acceptable means, but not the only means, of obtaining operational approval to conduct EDTO under Part 91.07.35 of the regulations.

REQUIREMENTS: SA-CAR Part 121 and 135 of the SACAR 2011, as amended.

1. REFERENCE:

i. CAR Part 91.07.35
ii. CAR Part 91.07.7(4)(d)
iii. CAR Part 91.07.12(3)
iv. CAR Part 43.02.19
v. CAR Part 121.07.1(7)
vi. CAR Part 135.07.1(7)

2. TERMS AND ABBREVIATIONS:

ABBREVIATION	DESCRIPTION
SACAA	South African Civil Aviation Authority
SACAR	South African Civil Aviation Regulations
CAR	Civil Aviation Regulations
TGM	Technical Guidance Material
APU	Auxiliary Power Unit
CATS	Civil Aviation Technical Standard
CMR	Certification Maintenance Requirements
AOC	Air Operator Certificate
MPD	Maintenance Planning Document
MRB	Maintenance Review Board
MSG	Maintenance Steering Group
SB	Service Bulletin
SSID	Supplemental Structural Inspection Programme
TC	Type Certificate
TCDS	Type Certificate Data Sheet
EDTO	Extended Diversion Time Operations
AMO	Aircraft Maintenance Organisation
PDSC	Pre-Departure Service Check
ICA	Instructions for Continued Airworthiness
OJT	On the Job Training
IFSD	In-Fight Shutdown

3. BACKGROUND ON EDTO

3.1 EDTO REGULATORY REQUIREMENTS

a. All aircraft with two or more engines operated under SA-CAR Part 121 and Part 135 are required to comply with SA-CAR Part 91.07.35. This regulation imposes special requirements for EDTO for these aircraft. These operations are defined as:

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

(2) More Than Two Engines Aircraft: These are flights whose planned routing contains a point further than 180 minutes flying time from an adequate airport at an approved one-engine inoperative cruise speed under standard conditions in still air.

Note: *a review of the time capabilities of the relevant EDTO Time-Limited Systems (TLSs) on aircraft with more than two engines should be performed by the aircraft manufacturer. The objective of this review is to confirm whether these time limitations have to be considered for the dispatch of EDTO flights and if the corresponding time limitation should be provided in relevant aircraft documentation.*

(3) EDTO Type Design Assessment. Aircraft with two engines (EDTO certification is required) and aircraft with more than two engines (EDTO certification is NOT required)

b. To conduct EDTO, the specified aircraft-engine combination must be certificated to the airworthiness standards of transport-category aircraft and be approved for EDTO. As with all other operations, an AOC approval 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. AOC approval holders must show that the facilities and services specified in the Air Transport Operations regulations (Part 135 & Part 121 as applicable) are available and adequate for the proposed operation. In addition, the AOC approval holder must be approved for EDTO.

3.2 EDTO REQUIRMENTS APLLICABLE TO AIRCRAFT FLOWN IN LONG-RANGE OPERATIONS.

a. All long-range aircraft, regardless of the number of engines, need a viable diversion airport in the case of onboard fire, medical emergency, or catastrophic decompression. Ensuring availability of en route alternate airports, adequate firefighting coverage at these airports, and fuel planning to account for depressurization are sound operational practices for all aircraft, including three- and four-engine aircraft. Likewise, planning for the maximum allowable diversion and worst-case scenarios should account for all aircraft time-critical systems.

3.3 PRECLUDE AND 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 aircraft systems are designed and tested to ensure their reliability. Two-engine aircraft maintenance practices are enhanced to better maintain and monitor the condition of the engines and systems significant to EDTO.

b. However, despite the best design, testing, and maintenance practices, situations occur that may require an aircraft to divert. Regardless of whether the diversion is for technical (aircraft system- or engine-related) or non-technical reasons, the AOC approval holder must have a flight operations plan to protect that diversion. For example, such a plan must include ensuring that pilots are knowledgeable about diversion airport alternates and weather conditions, have the ability to communicate with the AOC approval holder's dispatch office and Air Traffic Control (ATC), and have sufficient fuel to divert to the alternate. Under the "preclude and protect" concept, various failure scenarios need to be considered. For example, during the design of the aircraft, 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.

c. This philosophy has been critical to the success of two-engine EDTO in the past and has been applied to these aircraft in operations beyond 60 minutes from an adequate airport. This application is based on aircraft limitations and the engine inoperative diversion requirements. In-service data shows that all aircraft, regardless of the number of engines, divert from time to time for various causes. 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. If the AOC approval holder plan to operate aircraft with more than two engines in areas where en route airports are further 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.

3.4 EDTO AREAS OF OPERATION.

a. EDTO areas of operation are defined to be areas beyond a certain distance from adequate airports measured by an aircraft 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 aircraft, regulatory guidance has been established for the planning, operational, and equipage requirements for such operations. An AOC approval holder must apply to the SACAA for approval to operate in an EDTO area using the methodologies in this TGM or other means approved by the SACAA. When approval is granted, the EDTO authority for a specific EDTO area of operations will be noted in the AOC approval holder's operations specifications (OpSpecs).

(1) Most EDTO authorities for two-engine EDTO beyond 180 minutes are limited to a specific geographical region. Historically, EDTO authorities for two-engine aircraft up to 180 minutes were developed based on a specific need in a particular operating area. Limiting expanded EDTO authority beyond 180 minutes (for two-engine aircraft) serves several purposes.

(2) 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 approval holder must make every effort to plan EDTO with a maximum diversion distance of 180 minutes or less, if possible.

(3) It should be a goal of all two-engine aircraft 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.

(4) 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.

(5) In consideration of the successful history of three- and four-engine aircraft operations and the reliability and redundancy of current engines used in this operation, EDTO for these aircraft 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 maximum diversion time if possible.

c. In its application for EDTO authority, the AOC approval 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. 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 approval holder's application will necessarily have to be assessed differently for EDTO beyond 180 minutes.

(1) Two-Engine Aircraft up to 180-Minute EDTO and 207-Minute Authority in the North Pacific Area of Operations.

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. The actual flight plan must comply with the fuel supply requirements and must therefore account for wind. However, the flight planning limitations for aircraft 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. 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 approval holder's route planning exercise will be the same value used to determine the type design criteria for the aircraft-engine combination used in the operation, and the EDTO approval necessary to fly the route under all flight planning conditions.

(2) EDTO Beyond 180 Minutes (Two-Engine and More Than 2 Engines Aircraft).

i) For EDTO beyond 180 minutes for all aircraft, 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. The AOC approval holder should first conduct a route planning exercise for each planned city pairing to determine the diversion authority needed in still air conditions. 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. 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. 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 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 aircraft to have sufficient margins. Finally, for the Actual flight, the operator's flight planning must be within the aircraft 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.

ii) As a minimum, the AOC approval 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.

iii) Aircraft with more than two engines must have the required fire suppression systems are installed. For aircraft with more than two engines manufactured on or after 17 February 2015, the CMP document for that model will list the aircraft's most limiting EDTO Significant System time.

iv) Credit for the Driftdown. For the purposes of computing distances for EDTO Area of Operation, credit for driftdown may be taken.

v) Actual Diversion Time. Actual diversion time may exceed the authorized diversion time as long as the flight is conducted within the authorized EDTO Area of Operation, and the operator ensures;

aa) on the flight planning stage, that at any given day in the forecast conditions (such as prevailing winds, temperature and applicable diversion speed), a diversion to an en-route alternate aerodrome will not exceed the capability of:

- ❖ the most limiting EDTO significant system other than fire suppression systems minus 15 minutes at the approved One-engine-inoperative cruise speed; and
- ❖ the cargo fire suppression system minus 15 minutes, at the All Engines Operative cruise speed.

3.5 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 aircraft can divert following a single failure or a combination of failures that require a diversion. Most aircraft operate in an environment where there usually is a choice of diversion airports available within a close proximity to the route of flight. However, an AOC approval 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. Therefore, it is

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

b. At dispatch, an en route alternate must meet EDTO alternate weather requirements in as specified in, paragraph 4.3c of this TGM and in the AOC approval holder's OpSpecs. 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. 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. The airport of departure (take-off) 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 regulations.

c. 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 decisions successfully throughout the flight. The suitability of an en route alternate airport for an aircraft that encounters an in-flight situation that necessitates a diversion during EDTO operations is based on a determination that the airport still is suitable for the circumstances, and the weather and field conditions at that airport permit an instrument approach to be initiated and a landing completed.

3.5 EDTO IN-SERVICE EXPERIENCE REQUIREMENTS.

a. Two-engine “In-service” EDTO**.** An “in-service” EDTO authorization by specific approval is either:

(1) When the operator has accumulated more than one year of direct in-service experience with the aircraft “airframe-engine combinations” without EDTO. In this case, the operator may apply for a diversion time of 120-minute maximum; or

(2) For 120-minute EDTO, the SACAA additionally required the AOC approval holder to have 12-consecutive months of operational in-service experience with the aircraft-engine combination. In this case, the operator may apply for a diversion time of 180-minute maximum.

b. The SACAA recognized that a reduction of two-engine in-service experience requirements or substitution of in-service experience on another aircraft would be possible. Any reduction of two-engine in-service experience requirements shall be based on an evaluation of the AOC approval holder's ability and competence to achieve the necessary reliability for the particular Airframe-Engine Combinations (AEC) in EDTO.

For example, a reduction in in-service experience would be considered for an AOC approval holder who could show extensive in-service experience with a related engine on another aircraft that had achieved acceptable reliability.

c. The SACAA also allows AOC approval holders who 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. This is further discussed under two-engine "Accelerated" EDTO specific approval of this TGM.

Note: *Authorization for EDTO operations beyond 180-minute diversion time requires prior authorization for 180-minute EDTO operations. Authorization for EDTO operations beyond 240-minute diversion time requires a minimum of two years of experience with 180-minute or higher EDTO operations*.

3.6 OPERATIONAL RELIABILITY AND SYSTEMS SUITABILITY REQUIREMENTS.

a. The safety of long-range operations such as EDTO depends on the reliability of all aircraft systems including the propulsion systems. Time-limited systems such as cargo compartment fire suppression/containment capability must be considered. The AOC approval holder must also have an established program that monitors the reliability of systems significant to EDTO.

b. In order to achieve and maintain the required engine reliability standards, the AOC approval holder operating a two-engine aircraft in EDTO should assess the proposed maintenance and reliability program's ability to maintain a satisfactory level of aircraft systems reliability for the particular aircraft-engine combination. AOC approval holders should design the flight operations and, 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.

c. The type design requirements for EDTO certification consider the probability of occurrence of conditions that would reduce the capability of the aircraft or the ability of the flight crewmember to cope with an adverse operating condition. System failures or malfunctions occurring during extended range operations could affect flight crewmember workload and procedures. Although the demands on the flight crewmember 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 aircraft'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 aircraft equipment or operating

procedures may have on the original evaluations conducted when the aircraft was approved for EDTO before implementing such changes.

d. 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.

4. REQUIREMENTS FOR EDTO AUTHORIZATION

4.1 EDTO REQUIREMENTS.

a. AOC approval holders operating aircraft 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 approval holder is required to comply with all the applicable EDTO flight operational regulations described in this TGM and must have their EDTO programs and processes approved by the Director.

b. The AOC approval holder's EDTO requirements must be specified in their maintenance and operations programs. Maintenance requirements necessary to support EDTO are explained in paragraphs 4.2. Flight operations requirements necessary to support EDTO are described in paragraphs 4.3.

4.2 MAINTENANCE REQUIREMENTS FOR TWO-ENGINE EDTO AUTHORIZATION.

The AOC approval holder conducting EDTO with two-engine aircraft must comply with the EDTO maintenance requirements as specified below and in compliance with SA-CAR Part 43.02.19.

a. **Aircraft Maintenance Program (AMP).** The basic maintenance program for the aircraft being considered for EDTO is an AMP that may currently be approved for a non-EDTO AOC approval holder for a particular make and model aircraft-engine combination. The basic AMP must be a maintenance and inspection program that contains the Instructions for Continued Airworthiness (ICA) based on the manufacturer's maintenance requirements. The AOC approval holder and its Principal Airworthiness Inspector must review the AMP to ensure it provides an adequate basis for development of an EDTO maintenance program. The AOC approval holder's EDTO AMP must include specific EDTO requirements, which will be incorporated as supplemental requirements to the basic AMP. These supplemental requirements include the enhanced maintenance and training processes that will ensure EDTO aircraft 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. Prospective EDTO AOC approval holders must supplement their basic AMP with those program elements defined in paragraphs b through o below.

b. EDTO Maintenance Document. The AOC approval 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. 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 approval holder's document system. All EDTO requirements, including supportive programs, procedures, duties, and responsibilities, must be identified. The EDTO document(s) must reflect the actual policies and procedures the AOC approval holder expects their EDTO maintenance personnel to adhere to. The document(s) should be user friendly and be accessible to all affected personnel. The initial document must be submitted to the Principal Airworthiness Inspector and be approved before being adopted.

c. EDTO PRE-DEPARTURE SERVICE CHECK (PDSC).

(1) The AOC approval holder must develop an EDTO PDSC to verify that the aircraft and certain significant items are airworthy and EDTO capable. Each AOC approval holder's PDSC may vary in form and content. The prerequisites for an acceptable PDSC are content and suitability for the specific AOC approval holder's needs.

(2) All AOC approval 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. 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.

Note: *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 (In-flight Shut-Downs) and diversions. AOC approval holders should consider this area very seriously when developing their maintenance checks, including the PDSC.*

(3) Some AOC approval 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 approval holder must clearly identify the EDTO related tasks on their PDSC if non-EDTO qualified maintenance personnel are to accomplish the non-EDTO tasks. An appropriately trained maintenance person, who is EDTO qualified, and authorized by the AOC approval 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 approval holder must certify by signature, that the EDTO pre-departure service check has been completed. Appropriately trained persons are those that have

satisfactorily completed the AOC approval holder's EDTO training program. The signatory person that certifies the completion of the PDSC must also meet the following criteria:

(i) The signatory person is an individual authorised to sign EDTO maintenance is a qualified person in terms of SA-CAR Part 66 or holder of an AME licence with an appropriate rating issued in terms of Part 66 and is authorised by a holder of an AMO approval with an appropriate rating issued in terms of SA-CAR Part 145, to carry out maintenance within the scope of such approval.

(ii) Works for an EDTO maintenance organisation (issued in terms of Part 145) and has the requisite experience or specific training needed to accomplish the task and is authorized to complete the PDSC and return the aircraft to service on behalf of the EDTO maintenance organisation.

Note: *An EDTO maintenance organisation (issued in terms of Part 145) is an entity that has been authorized to perform EDTO maintenance and authorized by the AOC approval holder to complete EDTO pre-departure service checks.*

(iii) 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 SACAA may grant some relief from this time period under certain conditions. The AOC approval holder should explain any rational for such deviations in its EDTO maintenance document, which is approved by its Principal Airworthiness Inspector.

(iv) A PDSC may not be required before all EDTO flights. The SACAA 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 aircraft scheduled for an EDTO flight receives a PDSC before departure and subsequently must divert or turn back for reasons other than mechanical, the AOC approval holder must identify in its EDTO maintenance document what procedures its flight operations and maintenance personnel would follow to preclude performing another PDSC. If a mechanical discrepancy develops as a result of the diversion or turn back, the AOC approval holder may have to perform another PDSC. For example, when an overweight landing inspection reveals an EDTO Significant System discrepancy that requires maintenance intervention, another PDSC is required.

(v) 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.

d. Dual Maintenance.

(1) EDTO dual maintenance, otherwise referred to as identical maintenance, multiple maintenance, and simultaneous maintenance, requires special consideration by the AOC approval 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.

(2) 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: maintenance on both air cycle machines (or equivalent) in the air conditioning systems during a turnaround flight; removal of either both engine oil filters, or both chip detectors; and replacement of both chip detectors.

(3) 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).

(4) AOC approval 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 approval holder must develop a list of fleet-specific EDTO Significant Systems and include them in their EDTO maintenance document(s).

(5) The SACAA 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 aircraft 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. Additionally, staggering maintenance on EDTO Significant Systems in the heavy maintenance arena is not always possible or feasible. However, to minimize human factor common cause risk, the AOC approval holder should attempt to minimize dual maintenance on EDTO Significant Systems wherever/whenever possible.

(6) In any event, when dual maintenance is performed on an EDTO Significant System, the AOC approval holder must have written procedures in its EDTO maintenance document that addresses this situation. At a minimum, the AOC approval holder must ensure:

(i) Separate EDTO-qualified maintenance persons perform the tasks,

(ii) 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

(iii) It verifies the effectiveness of the corrective actions to those EDTO Significant Systems before the aircraft 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 TGM. 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.

(7) The SACAA 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 approval 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. The SACAA encourages the AOC approval holder to ensure that its programs have separate individuals perform such servicing. However, the SACAA recognizes that many AOC approval holder's route and organizational structures may not lend themselves to these procedures. The AOC approval holder's program should include detailed servicing instructions or make readily available servicing instructions. Additionally, the AOC approval holders should consider including oil servicing in their EDTO OJT program, regardless of whether one individual or multiple individuals perform the tasks.

e. Verification Program.

(1) The AOC approval holder must develop a verification program for resolution of aircraft discrepancies (corrective actions) on EDTO significant systems. 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 affect an EDTO operation. The program must ensure corrective action is taken and confirmed successful before the aircraft enters an EDTO area of operation. The AOC approval 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 Aircraft Maintenance Manuals (AMM) or the AOC approval holder's maintenance manuals. These ICAs include built-in test equipment (BITE) and functional/operational checks that often include leak checks after ground runs.

(2) 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. An example of a condition that would require an in-flight verification is the replacement of an APU component that could affect the APU's ability to start at the EDTO cruise altitude after cold soak. 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 in-flight starting which requires a two-hour cold soak, (see paragraph 4.2m, "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. Ground maintenance personnel should coordinate with flight operations personnel whenever an in-flight verification is required. Each AOC approval holder must identify its EDTO significant systems, ground verification requirements, and in-flight verification requirements in its EDTO maintenance document.

(3) The AOC approval holder must establish a means to ensure any required verification action is accomplished. The AOC approval holder must include a clear description of who initiates verification actions and who is responsible for completing the actions in its EDTO maintenance document.

f. Task Identification.

The AOC approval holder must identify all tasks that must be accomplished or certified as complete by EDTO-qualified maintenance personnel. The intent is to have EDTO-trained maintenance personnel accomplish these tasks because they are related to EDTO. EDTO specific tasks must be:

(1) The AOC approval 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. EDTO specific tasks should be:

- ❖ Identified on the AOC approval holder's work forms and related instructions, or
- ❖ Packaged together and identified as an EDTO maintenance task.

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

g. Centralized Maintenance Control Procedures.

An EDTO AOC approval holder, regardless of the size of its EDTO fleet, must have a centralized entity responsible for oversight of the EDTO maintenance operation. The AOC approval 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. These established procedures and centralized control processes would preclude an aircraft 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.

h. EDTO Parts Control.

The AOC approval holder must develop a parts control program to ensure the proper parts and configurations are maintained for EDTO. The program must include procedures to verify that the parts installed on EDTO aircraft during parts borrowing or pooling arrangements, as well as those parts used after repair or overhaul, maintain the required EDTO configuration.

i. Reliability Program.

(1) The AOC approval 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 EDTO-related problems as the primary goal. The program must be event-oriented and incorporate reporting procedures for significant events detrimental to EDTO flights. For those AOC approval holders that do not have an SACAA approved reliability program, they should create an event-based EDTO reliability programme based on its EDTO significant systems list. This programme would enhance any existing reliability programme be it a statistical-based or a continuing analysis and surveillance (CASS) programme. The programme should be designed with the objective to allow early identification and prevention of EDTO-related significant events and ensure that EDTO reliability is maintained. The AOC approval holder should submit regular EDTO reliability reports to its Principal Airworthiness Inspector. The frequency of such reporting should be documented on the AOC approval holder's maintenance procedure manuals. Customarily, monthly reports have been deemed an acceptable frequency.

(2) In addition to the reporting service difficulty (SDRs "Service Difficulty Reports"), the AOC approval holder must report the following items on their EDTO aircraft (regardless of EDTO or Non-EDTO operation) to the SACAA within allowable timelines as stipulated in the regulations:

(i) IFSDs, except planned IFSDs performed for flight training.
(ii) Diversions and turn backs for failures, malfunctions, or defects associated with any EDTO Significant Systems.
(iii) Uncommanded power or thrust changes or surges.
(iv) Inability to control the engine or obtain desired power or thrust.
(v) Inadvertent fuel loss or unavailability, or uncorrectable fuel imbalance in flight.
(vi) Failures, malfunctions or defects associated with EDTO Significant Systems.
(vii) Any event that would jeopardize the safe flight and landing of the aircraft on an EDTO flight.

(3) The AOC approval holder shall submit the above occurrence/incident reports in a SACAA prescribed form.

(4) The AOC approval holder must conduct an investigation into the cause of the occurrence of any reportable event as outlined in the regulations and submit its findings to its SACAA.

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

j. Propulsion System Monitoring.

(1) The AOC approval holder must monitor its fleet average IFSD rate for the specified aircraft-engine combination. It should establish firm criteria regarding the actions it will take when it detects adverse trends in propulsion system conditions. If the IFSD rate, computed on a 12-month rolling average, exceeds the values in the following table, the AOC approval holder, in conjunction with its SACAA, must investigate common cause effects or systemic errors and submit the findings to its SACAA within 30 days.

Note: *It may be applicable to combine some similar aircraft-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	.05/1000	Up to and including 120 minutes.
2	.03/1000	Beyond 120 minutes up to and including 180 minutes and 207 minutes in North Pacific.
2	.02/1000	Greater than 180 minutes (Except for 207 minutes in North Pacific.

(2) With respect to maintenance, the purpose of monitoring IFSD rates is to provide SACAA and operators with a tool for measuring the health of a fleet of EDTO-approved aircraft in service. 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 aircraft. It is very important that the AOC approval 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. 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. The SACAA will not revoke an existing EDTO operational approval solely because of a high IFSD rate. The AOC approval 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. However, maintenance or operational problems may be wholly, or

partially, the responsibility of the AOC approval holder. If an AOC approval 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 approval holder may be required and may include a reduction of the AOC approval holder's diversion limit.

(3) The AOC approval 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). The AOC approval 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 SACAA. On occasion, a particular event may also warrant implementation of corrective action even though the overall IFSD rate is not being exceeded.

(4) The 30-day reporting criteria of paragraph 4.2j of this TGM is intended to ensure that the AOC approval holder provides the SACAA timely notification of the status of an event investigation. The AOC approval holder may or may not have root cause or terminating action at the end of the 30-day period, and further discussions with the SACAA may be required after this period.

(5) The AOC approval 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 aircraft.

k. Engine Condition Monitoring.

The AOC approval 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 best practices, or the AOC approval holder should establish a program that demonstrates an equivalent level of monitoring and data analysis. 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. 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. 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 approval holder should include it in their program.

l. Oil Consumption Monitoring.

The AOC approval holder must develop an engine oil consumption monitoring program to ascertain that there is enough oil to complete the scheduled EDTO flight. The AOC approval holder's consumption limit must not exceed the manufacturer's recommendations, and it must trend oil consumption. The AOC approval holder's oil consumption trending program should be capable of recognizing a spike in the oil consumption rate. The AOC approval 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 aircraft 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. The AOC approval 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. 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. The amount of oil added also could be reported to a centralized maintenance control for calculation before the EDTO flight. If the APU is required for EDTO, it must be included in the oil consumption monitoring program. Any corrective actions taken regarding oil consumption must be verified before EDTO departure.

m. APU In-Flight Start Program.

(1) If the aircraft type certificate requires an APU but does not normally require the APU to operate during the EDTO portion of the flight, the AOC approval 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. Specifically, the 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 aircraft's APU in-flight starting capabilities. Specifically, the AOC approval holder must ensure that each aircraft's APU periodically is sampled rather than repeatedly sampling the same APUs. The AOC approval holder may adjust sampling intervals according to system performance and fleet maturity. The AOC approval holder and SACAA should periodically review the AOC approval 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 approval holder should initiate an investigation into any common cause effects or systemic errors in procedures.

(2) The AOC approval holder should include the criteria below in their APU in-flight start program. The AOC approval holder should make APU in-flight starts subject to the following conditions:

(i) 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.

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

(iii) 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.

(iv) 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.

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

(3) The AOC approval holder must report any operationally required APU in-flight start failures occurring during actual EDTO operations to the SACAA within the timeframes required by the regulations. The AOC approval 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 the SACAA. The final report should include corrective actions taken as well as the status of corrective action programs and fleet upgrades.

n. Configuration Maintenance and Procedures (CMP).

(1) 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 SACAA at the time of initial EDTO type design approval of the aircraft-engine combination. The CMP document typically is published and maintained by the aircraft manufacturer and includes identified CMP requirements. Aircraft manufacturers may continue to release CMP revisions beyond the basic revision level required for EDTO. The CMP revision levels required for specific aircraft-engine combinations are typically listed in the front of the CMP or may be controlled through issuance of customized CMP documents. The AOC approval 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 approval holder's EDTO operations. If a CMP

document exists for an EDTO AOC approval holder's aircraft, the AOC approval holder must ensure that all of the following apply:

(i) Configuration features are installed in the aircraft and engines;
(ii) Maintenance procedures are incorporated into the maintenance program;
(iii) Demonstrated capabilities are incorporated into the flight operations manual and the minimum equipment list, as required; and
(iv) Operators must coordinate any deviation from the manufacturer's CMP requirements with the SACAA, as required by the CMP document.

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

(3) The SACAA will mandate any subsequent configuration, maintenance, or procedural changes necessary for continued safe EDTO operations through the Airworthiness Directive (AD) process. The AOC approval holder should review and consider voluntarily incorporating any revised CMP standard that enhances aircraft reliability and/or performance.

(4) The AOC approval holder should provide SACAA it's a matrix detailing the CMP standard for its proposed EDTO fleet. The matrix should specifically include each CMP item number, revision level, item description, and reference documentation describing the incorporation method and date.

o. Procedural Changes.

Refer paragraph 7.3 for EDTO maintenance and training program changes

4.3 EDTO FLIGHT OPERATIONS REQUIREMENTS.

a. Aircraft Performance Data.

The AOC approval holder may not dispatch an aircraft on an EDTO flight unless it makes performance data available to its flight crewmembers and dispatchers that support all phases of EDTO operations, including divert scenarios. 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:

(i) Driftdown (includes net performance);
(ii) Cruise altitude coverage including 10,000 feet;
(iii) Holding; and
(iv) 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:

(i) Cruise altitude coverage including 10,000 feet; and
(ii) Holding

(3) Details of any other conditions relevant to EDTO that can cause significant deterioration of performance, such as ice accumulation on the unprotected surfaces of the aircraft, RAM Air Turbine (RAT) deployment, and thrust reverser deployment if such data is available.

b. En Route Airport Information.

(1) The AOC approval holder must maintain current status information on the operational capabilities of the airports designated for use as EDTO alternates. For EDTO greater than 180 minutes, this requirement has been expanded to include the listing of 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. Such a requirement can be interpreted to encompass the time from landing until satisfactory recovery of passengers and crew based on the AOC approval holder's passenger recovery plan as approved in the operations manual.

(2) The AOC approval holder's program should provide flight crewmembers 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 aircraft 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 crewmembers in a clear, concise, user friendly format for use when planning a diversion.

(3) AOC approval holder must include in their operations manuals or equivalent documentation available to the flight crews:

(i) For EDTO greater than 180 minutes, a specific passenger recovery plan for each EDTO Alternate Airport used in those operations.

c. Dispatch.

(1) **Alternates.** The AOC approval holder may not dispatch an aircraft in EDTO unless the required take-off, 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. 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

aircraft system, the AOC approval 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. The AOC approval holder of a two-engine aircraft should exercise EDTO beyond 180 minutes authority only if there are no EDTO alternates that are within a 180-minute diversion distance from the planned route of flight. In addition, those adequate airports closest to the planned route of flight should be those first considered as EDTO alternates.

(2) Flight Planning Limitation. The AOC approval holder's EDTO flight planning program must ensure that the planned route of flight remains within the authorized EDTO area, as follows:

(i) 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 aircraft's most time limited EDTO significant system (including cargo fire suppression) minus 15 minutes.

(ii) 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 aircraft's most limiting fire suppression system minus 15 minutes. Three- and four-engine turbine engine-powered aircraft not meeting these requirements may not continue with EDTO operations.

(iii) 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 aircraft's most time limited EDTO significant system (except for the most limiting fire suppression system) minus 15 minutes.

(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 aircraft flight manual landing performance data to meet the landing distance limitations. The altitude of the airport, wind conditions, runway surface conditions, and aircraft handling characteristics should be taken into account.

(4) Airport Rescue and Fire Fighting Service (RFFS).

(i) 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**:**

- **EDTO Up to 180 Minutes. EDTO alternates with ICAO Category 4.**

- ❖ EDTO Greater than 180 Minutes. EDTO alternates with Category 4. In addition, the aircraft 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. The availability of Adequate Category 7 RFFS airports should be considered for the entire EDTO segment of the planned route.

(i) If the necessary equipment and personnel are not immediately available at the airport, additional firefighting support may be brought in from a nearby town or other location. The AOC approval holder must ensure that the nearby facility is capable of responding to a request for firefighting 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 aircraft is en route. A 30-minute response time does not imply that the firefighting 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 aircraft and remain on station as long as the services are needed.

(5) EDTO Alternate Minima.

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. Because OpSpecs alternate weather minima standards apply to all alternates, the following criteria is recommended for a typical AOC approval holder's OpSpecs. An individual AOC approval holder's OpSpecs must reflect alternate airports which indicates that the weather conditions will be at or above the alternate weather minima specified in its operations specifications for that airport when the flight arrives. Although no consideration for the use of GPS/RNAV approaches is presented here, operators may request to receive this authorization through the SACAA. This authorization would be reflected in the operator's OpSpecs. Appropriate EDTO alternate minima for such operations will be determined by the Director. The airport of departure (take-off) 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 the regulations.

EDTO Alternate Minimum

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 manoeuvre from an instrument approach procedure.	Add 400 ft to the MDA (H) or DA (H), as applicable.	Add 1 sm or l600m 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 Yi sm or 800m[4] to the higher authorized landing minimum of the two approaches used.
One useable authorized Category II ILS IAP.	300 feet	3/4 sm (1200 m) or RVR 4000 (1200 m)
One useable authorized category III ILS Instrument Approach Procedure (IAP).	200 feet	112 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

For operations outside United States, because of variations in the international metric weather forecasting standards, 700m may be used in lieu of 800m.

(6) Fuel Supply. The AOC approval holder must comply with the EDTO en route fuel supply, as follows:

(i) No person may dispatch or release for flight or take-off a turbine engine powered aircraft in EDTO unless, considering wind and other weather conditions expected, it has enough fuel to satisfy paragraphs 1 through 4 below:

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

- ❖ Assuming a rapid decompression at the most critical point followed by descent to a safe altitude in compliance with the oxygen supply requirements, or
- ❖ 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
- ❖ 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.

bb) Upon reaching the alternate, hold at 1,500 ft above field elevation for 15 minutes and then conduct an instrument approach and land. 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 to calculate fuel in paragraph I above to account for any potential errors in wind forecasting. If an AOC approval holder is not using the actual forecast wind based on a wind model acceptable to the SACAA, the aircraft must carry 5 percent of the fuel required for paragraph I above, 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 SACAA

cc) After completing the calculation in paragraph 3, compensate in paragraph I above with additional fuel for the greater of the following scenarios:

- ❖ 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). Unless a reliable icing forecast is available, icing may be presumed to occur when the total air temperature at the approved one-engine cruise speed is less than + 10 degrees Celsius, or if the outside air temperature is between 0 degrees Celsius and -20 degrees Celsius with a relative humidity of 55 percent or greater.
- ❖ Fuel for engine anti-ice, and if appropriate wing anti-ice, for the entire time during which icing is forecast

(ii) Unless the AOC approval holder has a program established to monitor aircraft 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.

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

(iv) In computing the EDTO alternate fuel supply, advantage may be taken of driftdown computed at the approved one-engine inoperative cruise speed. Accounting of wing anti-ice as in paragraph (6) (a) 4 above may apply to some models of aircraft based on their characteristics and the manufacturer's recommended procedures.

(7) Communications. The SACAA has determined that the best way to assure clear and timely communication in general, is via voice communication. Likewise, the SACAA 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. 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. The SACAA recognizes the limitations of satellite communications (SATCOM). 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. 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.

(i) The AOC approval holder shall meet the requirement for communications facilities that enable rapid and reliable communications on routes and altitudes that may be used. For all EDTO each AOC approval holder conducting operations in EDTO must provide voice communications over routes where voice communications facilities are available. 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.

(ii) In addition to the communication requirement above, AOC approval 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. This

system must be capable of providing clear voice communications between the flight crewmember and ATC, and the flight crewmember 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.

(iii) In determining whether such communications requirements discussed in paragraphs (i) and (ii) above are available, the AOC approval holder must consider potential routes and altitudes needed for possible diversions to EDTO alternates as well as the original planned routing.

(8) Dispatch/Flight Release.

(i) The following items must be listed in the dispatch or flight release for all EDTO.

- ❖ EDTO alternates; and
- ❖ The authorized EDTO diversion time under which the flight is dispatched or released.

(ii) 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.

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

(9) Dispatch on a "Flight-by-Flight Exception" Basis. For two-engine aircraft EDTO approvals under the provisions of 207-minute EDTO in the North Pacific Area of Operation, and 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, regulations limit the operator's use of this authority in these areas to an "exception" basis. This exception may only be used when an EDTO alternate is not available within 180 minutes and is based on certain criteria.

(i) 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.

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

(iii) 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.

Note: *AOC approval 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.*

d. En Route.

(1) PIC Authority. No part of this TGM 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 TGM may be interpreted in any way to prejudice or limit the final authority and responsibility of the PIC for the safe operation of the aircraft.

(2) Potential Diversion Airports after Departure.

(i) 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 crewmembers 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.

(ii) 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 approval 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. 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. A revised flight plan should include

information on the newly designated EDTO alternates within the authorized area of operation. 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. The maximum diversion time, determined by the newly selected EDTO alternate, must not exceed the authorized EDTO maximum diversion time listed in the AOC approval holder's OpSpecs for that aircraft and operating area that could have been applied at original dispatch.

(iii) 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 SACAA 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. Should the operator become aware of a potential weather problem prior to the aircraft entering the EDTO stage of the flight, the rule allows the operator to designate a different alternate airport at the EDTO entry point in order to continue the flight.

(3) Engine Failure.

(i) The PIC of a two-engine aircraft with one engine inoperative to land at the nearest suitable airport where, in the PIC's judgment after considering all relevant factors, a safe landing can be made. This determination is especially critical for EDTO where the availability of suitable airports may be limited, and the diversion decision is therefore more critical. The following is a list of some, but not all, factors that may be relevant in determining whether or not an airport is suitable, and are consistent with the EDTO principle of protecting the diversion once it occurs:

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

(ii) When operating a two-engine aircraft with one engine inoperative, none of the following factors should be considered sufficient justification to fly beyond the nearest suitable airport:

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

(iii) If no more than one engine is shut down on an aircraft that has three or more engines, the PIC can 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 aircraft 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.

(4) System Failure/Partial Failure.

(i) 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. This should include a careful assessment of remaining systems and overall operational capability. Time permitting, full use should be made of the information available through the AOC approval 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.

(ii) If, as a result of re-evaluating aircraft 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 crewmembers of additional airports on the planned route of flight that could be used for diversion. In no case may the maximum approved diversion authority of the operation be exceeded.

(5) Other Diversion Scenarios. During EDTO an aircraft may divert for reasons other than engine or systems failure such as medical emergencies, onboard fire, or decompression. The nature of the emergency, and its possible consequences to the aircraft, passengers and crew, will dictate the best course of action suitable to the

specific en route contingency. The flight crew must decide on the best course of action based on all available information. The EDTO Alternate Airports and 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.

e. EDTO Procedures Documentation.

(1) The AOC approval 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 manual or information provided to the flight crew should also contain procedural information necessary to interface with EDTO maintenance requirements such as;

- ❖ Fuel cross-feed valve operational check (if applicable);
- ❖ Special EDTO MEL requirements;
- ❖ APU in-flight start procedures (if applicable);
- ❖ Engine Condition Monitoring (ECM) data recording procedures; and
- ❖ In-flight verification of EDTO significant systems.

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

5. EDTO TRAINING REQUIREMENTS

5.1 EDTO MAINTENANCE TRAINING REQUIREMENTS.

a. The AOC approval holder is responsible for ensuring that all maintenance personnel who perform maintenance on its EDTO aircraft, including repair stations, vendors, and contract maintenance, have received adequate technical training for the specific aircraft-engine combination it intends to operate in EDTO. The AOC approval holder should review the existing aircraft-engine combination maintenance training program with the SACAA to ensure that it adequately provides the necessary training.

b. Additionally, the AOC approval 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. EDTO specific training is in addition to the AOC approval holder's accepted maintenance training program used to qualify individuals for specific aircraft and engines and may be included in the accepted maintenance training curricula. It thus, becomes the AOC approval holder's EDTO training program. The goal of this training is to ensure that all personnel involved in EDTO properly accomplish EDTO maintenance requirements. The AOC approval holder is responsible with acceptance from the

SACAA 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 aircraft. 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. 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. 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.

c. In the line maintenance environment, EDTO-qualified maintenance personnel are those who have successfully completed the AOC approval holder's EDTO qualification program, and who have satisfactorily performed extended range tasks under the direct supervision of a certificated maintenance person. The person giving the direct supervision must have had previous experience with maintaining the particular make and model aircraft being used by the AOC approval holder. For new aircraft, it is understood the AOC approval holder may not have SACAA certified maintenance person available who has previous experience with the newly introduced make and model aircraft. In this instance, the training received from the manufacturer’s maintenance training program, or a comparable program would be acceptable.

5.2 FLIGHT OPERATIONS TRAINING REQUIREMENTS.

a. EDTO Unique Requirements.

The AOC approval 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:

(1) Diversion Decision Making. The AOC approval holder's training program should prepare flight crewmembers to evaluate probable propulsion and airframe systems malfunctions and failures. The goal of this training should be to establish flight crewmember competency in dealing with the most probable operating contingencies.

(2) Specific EDTO Requirements. The AOC approval holder's EDTO training program should provide and integrate training for flight crewmembers and dispatchers (if applicable), as listed below. The SACAA will periodically evaluate a cross-section of these items.

aa) Flight planning, including contingency data that is engine failure, decompression, and diversion equal time point.
bb) Flight progress monitoring and fuel tracking.
cc) Operational restrictions associated with dispatch under the minimum equipment list (MEL).
dd) Non-normal procedures including

1) Abnormal and emergency procedures.
2) Systems failures and remaining aircraft capability as it relates to the decision to divert or to continue.
3) Diversion.
4) Crewmember incapacitation.
5) 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.

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

1) 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.
2) 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.
3) Understanding and effective use of approved additional or modified equipment required for EDTO.
4) Fuel quantity comparison: the AOC approval 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.
5) 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.
6) Flight crew procedures unique to EDTO as listed above in the paragraph 4.3 e of this TGM, EDTO Procedures Documentation.

(3) Passenger Recovery Plan.

(i) The AOC approval holder must provide training to the flight crewmembers and dispatchers relative to their perspective roles in the AOC approval holder's passenger recovery plan.

(ii) Check Airman Used in EDTO. The AOC approval holder must designate check airmen specifically for EDTO. The objective of the EDTO check airman program should be to ensure standardized flight crewmember practices and procedures and also to emphasize the special nature of EDTO. Only airmen with a demonstrated understanding of the unique requirements of EDTO should be designated as a check airman.

(iii) Review of Training Programs and Operating Manuals.

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

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

6. APPLICATIONS TO CONDUCT EDTO

6.1 EDTO Qualifications.

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

a. Aircraft. The specified aircraft-engine combination listed in the AOC approval holder's application must have been certificated to the airworthiness standards of transport category aircraft and must be approved for EDTO.

(i) Two-Engine. Aircraft-engine combinations already approved for EDTO under previous SACAA guidance can continue to be used in EDTO operations. The SACAA may use its discretion when a re-certification under this new TGM is deemed necessary. Two-engine aircraft with existing type certificates on 15 February 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.

(ii) More than Two Engines. Aircraft with more than two engines that are to be used in EDTO and are manufactured prior to 17 February 2015, may operate in EDTO without type design approval. Aircraft with more than two engines manufactured on or after 17 February 2015, must meet the requirements of EDTO type design.

b. Flight Operations and Maintenance Requirements. The AOC approval holder must show compliance with the flight operations requirements discussed in paragraph 4.3 and the maintenance requirements discussed in paragraph 4.2.

c. Training Requirements. The AOC approval 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 5.1 and 5.2.

d. Requirements for EDTO Approval. Before the SACAA grants EDTO operational approval to an applicant for two-engine EDTO, the AOC approval 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 aircraft-engine combination to be used. The AOC approval holder must also demonstrate that it can operate the particular airframe and other aircraft systems at levels of reliability appropriate for the intended operation. 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 3 of this TGM.

e. Accelerated EDTO Application. 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 approval holders outlined in this TGM. 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 approval holder with operational experience. As is the case for all Accelerated EDTO approvals, the Director must be satisfied that the applicant can operate to the standards expected of an experienced.

6.2 Application for EDTO Authorization.

a. Any AOC approval holder wishing to obtain an EDTO authorization must submit an application with all supporting data to the SACAA. This application will be for a specific aircraft-engine combination and should address all the regulatory requirements for EDTO. The AOC approval holder may follow the guidance found in this AC to complete the application. 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 aircraft-engine combination.

b. Two-Engine Aircraft.

(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:

- ❖ In-service experience method, or
- ❖ Accelerated EDTO method.

(2) EDTO Beyond 180 Minutes, up to and including 240 Minutes. The SACAA grants approval for EDTO beyond 180 minutes only to AOC approval holders with existing 180-minute EDTO operating authority for the aircraft-engine combination to be operated in the application. There is no minimum in-service time requirement for the 180-minute EDTO operator requesting EDTO approval beyond 180 minutes. The determination by the Director, to grant EDTO approval is the same as for all EDTO authorities.

(3) EDTO Beyond 240 Minutes. This authority is only granted to operators of two-engine aircraft between specific city pairs. The AOC approval 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 aircraft-engine combination in the application.

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

6.3 EDTO AUTHORITIES.

a. EDTO with Two-Engine Aircraft. 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:

aa) 75-minute EDTO in the Caribbean/Western Atlantic Area or in other areas.
bb) 90-minute EDTO in Micronesia.
cc) 120-minute EDTO.
dd) 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.
ee) 180-minute EDTO.
ff) 207-minute EDTO in the North Pacific Area of Operation.
gg) 240-minute EDTO. Approvals are granted at this level based on the particular geographic area applied for with criteria delineated for particular applications.
hh) Beyond 240-minute EDTO. Approvals are granted at this level based on particular city pairs.

b. EDTO with Aircraft having More than Two Engines.

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

6.4 EDTO AUTHORIZATION REQUIREMENTS.

a. All AOC approval holders of aircraft with two engines, and all AOC approval holders of aircraft with more than two engines, operating on EDTO routes must comply with all the operational and process requirements specified in the EDTO regulations and as discussed in this TGM.

b. Those AOC approval holders operating aircraft with more than two engines who choose to follow the recommendations in this TGM as a means of compliance with the operating rules, and who, on 15 February 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. However, from 15 February 2008, the AOC approval holder is required to comply with all the EDTO flight operational requirements that are described in this TGM and must have their EDTO program and all EDTO processes approved by the SACAA. The SACAA will amend the AOC approval holder's OpSpecs when the Director grants an AOC approval holder the approval to conduct operations.

c. All EDTO AOC approval holders applying for approvals under this section must provide sufficient information with their application to the SACAA on the following areas of concern in EDTO:

(i) EDTO Area of Operations/Aircraft Performance. The altitudes and airspeeds used in establishing the EDTO area of operations for each aircraft-engine combination must be shown to permit compliance with the terrain and obstruction clearance requirements. A speed other than the approved single engine speed may be used as the basis for compliance, 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.

(ii) Weather Information System. The AOC approval 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.

(iii) Minimum Equipment List. The AOC approval holder is required to submit its MEL, designed in accordance with the Master Minimum Equipment List (MMEL), appropriate to the requested level of EDTO. The AOC approval

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 approval holder. 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:

- Electrical, including battery,
- Hydraulic,
- Pneumatic,
- Flight instrumentation,
- Fuel,
- Flight control,
- Ice protection,
- Engine start and ignition,
- Propulsion system instruments,
- Navigation and communications,
- Auxiliary power units,
- Air conditioning and pressurization,
- Cargo fire suppression,
- Emergency equipment, and
- Any other equipment necessary for EDTO.

(iv) Public Protection. The definition of "public protection" has been expanded for AOC approval 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. Due to the nature of these operations and the climatic issues involved during the majority of the year, AOC approval 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 discussed in paragraph (v) below

(v) Passenger Recovery Plan.

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

bb) The AOC approval 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 wellbeing of the passengers and crewmembers. This infrastructure should include facilities that provide for the physiological needs of the passengers and crewmembers such as continuing safety, food, and shelter. Any list of considerations for the passengers and crewmembers 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 crewmembers and passengers. If the AOC approval holder proposes to use the aircraft 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.

cc) 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 crewmembers. 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 approval holder and, more specifically, when the diversion occurs to an en route alternate airport located in a harsh operating environment. The AOC approval holder with a route system extending over remote areas of the world has a responsibility under the regulations 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. In these instances, the AOC approval holder operating on those routes should devise a plan of substance that will outline how it will recover the passengers, crewmembers, and aircraft in the event of such a diversion. 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 crewmembers can be provided for in the interim. 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. 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.

(vi) Navigation. The applicant must show the availability of navigation facilities adequate for the operation, taking into account the navigation equipment installed on the aircraft, the navigation accuracy required for the planned route and altitude of flight, and the planned routes and altitudes to the airports designated as EDTO alternates. Navigation facilities required to ensure a safe approach and landing must be available.

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

(vii) Communications. The AOC approval holder must show the availability of communications services and facilities for communication with ATC and the dispatch office. AOC approval 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 approval holder. 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. Rapid and reliable ATC communications are determined by the facilities operated by ATC units in the areas of operations.

Note: *For EDTO routes further than 180 minutes from adequate airports, only one of the two required communication systems must be SATCOM.*

6.5 VALIDATION FLIGHT(S).

Prior to granting EDTO approval to an AOC approval holder for operation of a specific aircraft-engine combination in an authorized area of operation, the SACAA will require actual validation flights on proposed routes that the AOC approval holder intends to operate within the EDTO area of operations, designated in the operator's approval request. This is to ensure that the EDTO flight operations and maintenance programs described in 4.2 of this TGM are capable of supporting those operations. Depending on the AOC approval holder's level of experience in conducting EDTO and the routes intended to be used in operations, the SACAA 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. 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 SACAA should amendment and issuance of unrestricted OpSpecs. AOC approval holders operating aircraft with more than two engines who, on the effective date of this TGM, 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. If the AOC approval 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 Director.

6.6 REQUIRED DEMONSTRATION ON A VALIDATION FLIGHT.

(a) The AOC approval holder should demonstrate, by means of an SACAA-witnessed validation flight or flights using the specified aircraft-engine combination in its application, that it has the competence and capability to safely conduct and adequately support the intended operation. The SACAA, will determine the conditions for each AOC approval holder's validation flights. This determination will

be made on a case-by-case basis following a review of the AOC approval holder's experience and the proposed operation. This process may require the AOC approval holder to conduct an actual diversion during the validation flights.

(b) 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 SACAA in an acceptable simulation prior to the validation flight:

(i) 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

(ii) Any other condition considered more critical in terms of Airworthiness, crewmember workload, or performance risk.

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

7. SACAA EDTO APPROVAL

7.1 FINAL EDTO OPERATING AUTHORITY.

Following completion of the EDTO application requirements and before the issuance of OpSpecs, the AOC approval holder's application with supporting data, together with the Inspectors (POI and PMI) recommendations, should be forwarded to management for review and concurrence. The recommendations should include any specific recommendations made by the principal airworthiness inspector (PMI), and Principal Operations Inspector (POI), as appropriate. Following review and concurrence by management, the validation flights should be conducted in accordance with any additional guidance or recommendations specified in the review and concurrence process. Following the successful completion of the validation flights, the SACAA will issue the AOC approval holder OpSpecs for EDTO operations.

7.2 EDTO OPSPECS. Those OpSpecs for EDTO provide authorizations and limitations covering at least the following:

1) Approved aircraft-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 aircraft authorized for EDTO by make, model, serial, and registration number.

7.3 CHANGES TO APPROVED EDTO OPERATIONS, MAINTENANCE AND TRAINING PROCEDURES.

Following final EDTO approval, if the AOC approval 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 SACAA for review and approval before incorporation. The AOC approval holder and the SACAA should negotiate what constitutes a substantial change to allow flexibility and take into consideration the AOC approval holder's EDTO experience. What is considered substantial for a new entrant EDTO AOC approval holder may be considerably different than for the AOC approval holder with many years of EDTO experience.

7.4 PROCESSES AFTER RECEIVING EDTO AUTHORITY.

The State of Design responsible for the type certificate, continuously monitors the world fleet average IFSD rate for two-engine EDTO authorized aircraft-engine combinations to ensure that the levels of reliability achieved in EDTO remain at the required levels. 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 aircraft-engine) or in the operation, the State of Design or SACAA may require the airframe and engine manufactures to develop an acceptable plan to address the deficiencies.

(i) As with all other operations, the SACAA will monitor all aspects of the EDTO operations it has authorized to the AOC approval 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.

(ii) 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 SACAA will:

1) Alert the type certificate holder, when problems associated with aircraft design or operations are identified; and

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

1. APPENDIX 1.

DEFINITIONS

The following definitions are applicable to EDTO.

1. Adequate Airport. An airport that an airplane operator may list with approval from the SACAA shall meets the landing limitations and meets the requirements of SA-CAR Part 139, excluding those that apply to aircraft rescue and firefighting service, or a military airport that is active and operational. Airports without outside SACAA jurisdiction, may be considered adequate provided that they are determined to meet the equivalent standards and intent of Part 139.

2. Configuration, Maintenance, and Procedures (CMP) Document. A document approved by the State of Design 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.

3. 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.

4. 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.

5. ER. An abbreviation used in the MMEL and in the minimum equipment list (MEL) of some certificate holders to indicate EDTO. As used in this AC, any EDTO MMEL/MEL restrictions applicable to EDTO.

6. EDTO Alternate Airport. An adequate airport listed in the certificate 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.

7. EDTO Area of Operation. For turbine-engine-powered aircraft with two engines an area beyond 60 minutes from an adequate airport, or aircraft with more than two engines, an area beyond 180 minutes from an adequate airport, and within the authorized EDTO maximum diversion time approved for the operation being conducted. An EDTO area of operation is calculated at an approved one-engine inoperative cruise speed under standard conditions in still air.

8. 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 aircraft with more than two engines.

9. 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:

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

b. An 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.

10. EDTO-Qualified Personnel. A person performing maintenance for the certificate holder, who has satisfactorily completed the certificate holder's EDTO qualification program.

11. EDTO. An aircraft operation during which a portion of the flight is conducted beyond 60 minutes from an adequate airport for turbine-engine-powered aircraft with two engines, and beyond 180 minutes for turbine-engine-powered aircraft with more than two engines. This distance is determined using an approved one-engine inoperative cruise speed under standard atmospheric conditions in still air.

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

13. In-Flight Shutdown (IFSD). When an engine ceases to function (when the aircraft is airborne) and is shut down, whether self-induced, flight crew initiated or caused by an external influence. The SACAA 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. 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.

14. 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.

15. One-Engine Inoperative Cruise Speed. For the purposes of those sections of applicable to EDTO, the one-engine inoperative cruise speed is a speed within the certified operating limits of the aircraft that is specified by the certificate holder and approved by the SACAA 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.

APPENDIX 2.
EDTO APPROVAL METHODS

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

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

a. General.

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

(ii) 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 Director. Any reduction or increase in in-service experience guidelines will be based on an evaluation of the AOC approval holder's ability and competence to achieve the necessary reliability for the particular aircraft-engine combination in EDTO. For example, a reduction in in-service experience may be considered for an AOC approval holder who can show extensive in-service experience with a related engine on another aircraft 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 take-offs has occurred.

b. Specific Approvals.

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

(ii) 120-Minute Operation. Each AOC approval 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 aircraft-engine combination. In- service experience guidelines may be increased or decreased by the Director.

(iii) 180-Minute Operation.

a. Each AOC approval 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 aircraft-engine combination in conducting 120-minute EDTO. In-service experience guidelines may be reduced or increased by the Director. 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 Director, on a case-by-case basis.

b. Before approval, the AOC approval holder's capability to conduct operations and implement effective EDTO programs in accordance with the criteria detailed in this TGM will be examined. Only AOC approval 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. The AOC approval holder's requesting approval for EDTO under this method should submit the request with the required supporting data to its Principal Inspector at least 60 days before the proposed start of EDTO operation with the specific aircraft-engine combination. In considering an application from the AOC approval holder's to conduct EDTO, the Principal Inspector should assess the AOC approval holder's overall safety record, past performance, flight crewmember training, and maintenance programs. The data provided with the request should substantiate the AOC approval 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 Aircraft with Two-Engine and for all EDTO Aircraft with More Than Two Engines). This section describes the means by which the AOC approval holder's may initiate EDTO operations when the AOC approval

holder's establishes the processes necessary for successful and reliable EDTO operations and proves to the SACAA 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 aircraft/validation (as described under process validation in this appendix, below) or a combination of these processes.

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

(i) The applicable process elements defined as the EDTO maintenance and operations requirements of Section 4 , paragraphs 4.2 through 4.3.

Note: *Aircraft with more than two engines are exempt from the EDTO maintenance requirements. Therefore, the operator may ignore the maintenance processes described in this Appendix.*

(ii) Documentation of the following elements as appropriate:

1) Technology new to the AOC approval holder's and significant difference in primary and secondary power (engines, electrical, hydraulic, and pneumatic) systems between the aircraft currently operated and the two-engine airplane for which the AOC approval holder's 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 approval holder's 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 aircraft-engine combination and/or geographic area of operations. Depending on the nature and extent of any changes, the AOC approval holder's may be required to provide a plan for validating such changes.

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

6) Details of any EDTO program support from the airframe manufacturer, engine manufacturer, other AOC approval holder's or any other outside person.

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

b. Process Validation Methodology.

(i) Paragraph (a) identifies those process elements that should be proven before EDTO authority is granted by the SACAA 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 approval holder's should demonstrate that the process is in place and functions as intended. The AOC approval holder's may accomplish this by thorough documentation and analysis, and/or by demonstrating on an aircraft, that the process works and consistently provides the intended results. The AOC approval holder's 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.

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

(iii) If the AOC approval holder's currently is conducting EDTO with a different aircraft-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 approval holder's 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 approval holder's should demonstrate that the means are in place to assure equivalent results with the aircraft-engine combination being proposed for EDTO operational approval. The following elements may aid in justifying a reduction in the validation requirement of EDTO processes:

1) Experience with other airframes and/or engines,

2) Previous EDTO experience,

3) Experience with long range, overwater operations with two-, three-, or four- engine aircraft, and

4) Experience gained by flight crewmembers and maintenance and flight dispatch personnel while working with other EDTO-approved AOC approval holder's.

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

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

(ii) 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.

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

(iv) Define Review Gates. 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. 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. When the AOC approval holder's accelerated EDTO plan receives approval by from the SACAA, a validation of the process elements of the accelerated EDTO plan should begin. Close coordination between the AOC approval holder's and the SACAA is necessary for a successful validation of the EDTO plan. All process elements required in paragraph (a) should be validated.

(i) Before the start of the validation of the process elements, the following information should be part of the Accelerated EDTO plan submitted to the SACAA:

1) Validation periods, including start dates and proposed completion dates.

2) Definition of aircraft to be used in the validation. List should include registration numbers, manufacturer and serial number and model of the airframes and engines.

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

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

(ii) Process validation reporting. The AOC approval holder's should compile results of EDTO process validation. The AOC approval holder's should:

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

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

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

4) When there is concurrence between the AOC approval holders and the SACAA that a process element has been successfully proven, the review gate should be closed, and confirmation documented.

5) Provide periodic process validation reports to the SACAA. This should be addressed during the review gates.

(iii) The AOC approval holder's should include a final review gate prior to final EDTO approval that is the validation flights described in paragraphs 6.5 and 6.6 of this TGM. This review gate should ensure that all EDTO processes have been proven

(iv) Any validation program should address the following:

1) The AOC approval holder's should show that it has considered the impact of the EDTO validation program with regard to safety of flight operations. The AOC approval holder's 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.

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

means.

3) 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.

(v) Final Approval for Accelerated EDTO Authority. At the successful completion of the AOC approval holder's accelerated EDTO validation program all process elements should have been validated and appropriate review gates closed. Report of a successful completion of review gates will be forwarded by the SACAA. Upon final concurrence and approval, the applicant should forward to the SACAA 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 approval holder's application. This SACAA witnessed EDTO validation flight or flights will be conducted in accordance with paragraphs 404 and 405 of this TGM. The purpose of these flights is for the AOC approval holder's to demonstrate to the SACAA that it has the competence and capability to safely conduct and adequately support the intended EDTO operation.

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