

# CIVIL AVIATION NOTICES

## CAN 3-37

### Extended Diversion Time Operations (EDTO)

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## **Extended Diversion Time Operations (EDTO)**

### **37.1 Applicability**

This Civil Aviation Notice is issued by Oman Public Authority for Civil Aviation (PACA) and contain regulatory requirements about standards, practices and procedures acceptable to the Authority.

This CAN is applicable to operators engaged in Commercial Air Transport Operations beyond the threshold time established by PACA for EDTO/ETOPS and lays down the minimum requirements for turbine aeroplanes transiting oceanic areas or routes over land, registered in Oman, and engaged in EDTO/ETOPS. Operators shall not operate an aeroplane with two or more engines or an aeroplane more than 5700 kg beyond the threshold time unless approved by PACA for EDTO/ETOPS.

To be eligible for EDTO/ETOPS the specified airframe/engine combination should have been certificated to the Airworthiness Standards of Transport Category aeroplanes by FAA of USA or EASA or by any other regulatory authority acceptable to PACA.

### **37.2 Introduction**

The Civil Aviation Notices, hereinafter referred to as Notices, are issued by the Public Authority for Civil Aviation regulation (PACA). The Notices are a means of circulating essential information of an administrative or technical nature to holders of PACA Licenses and Certificates, foreign air operators in Oman, and foreign operators of Omani registered aircraft.

The purpose of initial ETOPS regulations were to provide very high level of safety while facilitating the use of twin engines on routes, which were previously restricted to three or four engine aeroplanes. ETOPS has now evolved to EDTO (Extended Diversion Time Operations) to encompass two or more engine aeroplanes and the intent of the current regulation is to avoid a diversion and if it occurs, to ensure that the diversion is safe. EDTO may be referred as ETOPS in some documents (AFM etc).

### **37.3 Purpose**

This notice provides guidance to demonstrate compliance with the requirements regarding, and information related to an application for, an approval for EDTO in accordance with CAR-OPS.

### **37.4 Cancellation**

This is the first notice issued on this subject.

### **37.5 Effective Date**

This notice is effective from 1 November 2019.

### **37.6 Other References**

- ICAO Annex 6 Part I Attachment C Guidance for operations by turbine-engined aeroplanes

- Beyond 60 minutes to an en-route alternate aerodrome including extended diversion time
- Operations (ETDO)
- FAA AC 120-42B Extended Operations (ETOPS and Polar Operations)
- EASA AMC 20-6 Extended range operation with two-engine Aeroplanes ETOPS
- Certification and operation

### 37.7 Definitions

Where the following terms are used in this notice, they have the meaning indicated:

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

**ETOPS** (or extended range twin-engine operations) – an alternative term to EDTO when used in the context of twin-engine aeroplanes in this CAN and some documents.

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

### 37.8 Type Design

The operator shall satisfy the PACA that the particular airframe engine combination is EDTO certified.

**Note:** The Type Design Approval for the aircraft does not reflect a continuing airworthiness or Operational Approval to conduct extended range operations. An Operational Approval for ETOPS operation has to be separately obtained from the PACA.

### 37.9 Airworthiness considerations for aeroplanes with more than two turbine engines

- 1- The most limiting EDTO significant system time limitation, if any, must be indicated in the aircraft flight manual (directly or by reference) and relevant to that particular operation.
- 2- There is no additional EDTO airworthiness certification, maintenance procedures or maintenance programme requirements for aeroplanes with more than two engines.

### 37.10 Airworthiness considerations for aeroplanes with two turbine engines

- 1-1-In considering an application from an operator to conduct EDTO, an assessment should be made of the operator's overall safety record, past performance, training and maintenance programmes. The data provided with the request should substantiate the operator's ability and competence to safely conduct and support these operations and should include the means used to satisfy the considerations outlined

in this paragraph. Any reliability assessment obtained, either through analysis or service experience, should be used as guidance in support of operational judgments regarding the suitability of the intended operation.

- 1-2- Operators without such experience should establish a programme that results in a high degree of confidence that the operator is able to safely conduct and support these operations and should include the means used to satisfy the considerations outlined in this paragraph.

### **37.11 Operational Approval**

- 1- An operator requesting a written permission for ETOPS or an increase of the maximum diversion time shall submit an application, with the required supporting data, to the PACA prior to the proposed start of ETOPS with the specific airframe engine combination. The operator shall submit the following:

- (a) Type Design Approval;
- (b) In-service experience;
- (c) Propulsion system reliability (operator and world fleet);
- (d) Reliability of significant airframe system;
- (e) Appropriate Auxiliary Power Unit (APU) in-flight start programme;
- (f) Operator's Reliability and Maintenance Programmes;
- (g) Conformance to latest Airworthiness Directives and Configurations, Maintenance and Procedures (CMP) standards;
- (h) Training of maintenance personnel; and
- (i) Any other data requested by the PACA.

- 2- The operator shall demonstrate its ability and competence to maintain and operate the aeroplane so as to achieve the necessary reliability in extended diversion time operations.

### **37.12 Configurations, Maintenance and Procedures**

- 1- The operator shall ensure that its ETOPS fleet is in compliance with the latest CMP standards provided by the aeroplane manufacturer and the Type Certificate Authority.
- 2- The operator shall implement the CMP standards before the next ETOPS flight or in accordance to a schedule accepted by the PACA.

### **37.13 Aeroplane Flight Manual Information**

Operators holding EDTO approval shall ensure that the applicable flight manual contain at least the following information:

- (a) The maximum flight time with one power-unit inoperative, for which the systems reliability has been approved in accordance with the airworthiness requirements established for EDTO;
- (b) A list of additional equipment installed to meet the airworthiness requirements for EDTO.
- (c) Additional performance data, including limitations, and flight procedures appropriate to EDTO; and

- (d) Statement to the effect that the aeroplane systems associated with EDTO meet the required airworthiness and performance criteria but that the meeting of such criteria does not by itself constitute approval to conduct EDTO.

### **37.14 Minimum Equipment List (MEL)**

- 1- The operator shall indicate clearly in the MEL of the ETOPS fleet, items that have different dispatch requirements for ETOPS flights. Systems considered to have a fundamental influence on flight safety shall include but are not limited to:

- (a) Electrical power.
- (b) Hydraulic system.
- (c) Pneumatic.
- (d) Flight instrumentation.
- (e) Fuel.
- (f) Flight control.
- (g) Ice protection.
- (h) Engine start and ignition.
- (i) Propulsion system instruments.
- (j) Navigation and communications.
- (k) Propulsion
- (l) Auxiliary power-units.
- (m) Air conditioning and pressurization.
- (n) Cargo fire suppression.
- (o) Emergency equipment.
- (p) Engine fire detection and extinguishing systems.
- (q) Any other equipment required for extended diversion time operations.

### **37.15 Aeroplane Dispatch**

- 1- The operator shall ensure that the aeroplane is precluded from being dispatch for EDTO when:

- (a) After an engine in-flight shut-down (IFSD) on a previous flight.
- (b) After primary airframe system failure on a previous flight.
- (c) After a replacement of an engine.
- (d) After failure of an engine power control system or significant adverse trends in engine performance or
- (e) After any major maintenance works on the aircraft.

- 2- The aeroplane shall operate at least one non-revenue (handling flight) or non EDTO revenue flight successfully before being released on extended diversion time operations. This shall be reflected in the aircraft technical log.

### **37.16 APU In-flight Start Programme**

1. The operator shall establish maintenance procedures to verify in-flight start reliability following maintenance of the APU and APU components, as defined by the manufacturer, where start reliability at altitude may have been affected.
2. To ensure that the APU maintains its in-flight start capabilities, the operator shall have an appropriate APU in-flight programme. When APU in-flight starts are necessary to demonstrate the APU start reliability, the operator shall perform an APU in-flight start once every three months for each aircraft of its EDTO fleet. The result of the in-flight start shall be annotated in the Technical Log of the aircraft.

### **37.17 Maintenance Training**

A- The operator shall have a maintenance training programme to ensure: -

- a. Personnel involved in ETOPS are provide with the necessary training;
- b. Personnel can accomplish the ETOPS maintenance related tasks properly; and
- c. That the special nature of ETOPS related maintenance requirements is emphasized.

B- For the purpose of this Chapter, ETOPS qualified maintenance personnel are those that have completed the operators' ETOPS training programme and have satisfactorily performed extended range tasks under supervision, within the framework of the operator's approved procedures for Personnel Authorisation.

### **37.18 ETOPS Parts Control**

The operator shall have an ETOPS Parts Control Programme to ensure that the proper parts and configurations are maintained for ETOPS fleets. The Programme shall include verification that parts placed on an ETOPS aircraft during parts borrowing or pooling arrangements, as well as those parts used after repair or overhaul, maintain the necessary ETOPS configuration for that aircraft. A list of EDTO significant parts should be established and the parts identified as EDTO significant when received and stored.

### **37.19 Maintenance Programme and Procedures**

1. The operator shall ensure that the airframe and propulsion systems continue to be maintained in accordance with the maintenance programme and at the level of performance and reliability necessary for extended diversion time operations. The operator shall ensure that the maintenance programme for its ETOPS fleet contains the standards, guidance and direction necessary to support the intended operations. Maintenance personnel and other personnel involved shall be made aware of the special nature of ETOPS and have the knowledge, skills and ability to accomplish the requirements of the programme.
2. The maintenance programme for the aeroplane being considered for ETOPS is the continuous airworthiness maintenance schedule currently approved for the operator. The operator shall

review the schedule to ensure that it provides an adequate basis for development of ETOPS maintenance requirements. The programme shall incorporate human factors principles.

3. The operator shall have procedures to preclude identical action being applied to multiple similar elements in any ETOPS significant system (e.g. fuel control change on both engines). If this is not possible, the identical actions shall be done by different maintenance personnel/teams.
4. The operator shall include in the maintenance procedures the following:-
  - (a) ETOPS related tasks shall be identified on the operator's routine work forms and related instructions.
  - (b) ETOPS related procedures, such as involvement of centralized maintenance control, shall be clearly defined in the operator's programme.
  - (c) An ETOPS service check shall be developed to verify that the status of the aeroplane and certain critical items are acceptable. This check shall be accomplished and signed off by an ETOPS qualified maintenance personnel immediately prior to an ETOPS flight.
  - (d) Log books shall be reviewed and documented, as appropriate, to ensure proper MEL procedures, deferred items, maintenance checks and system verification procedures have been properly performed.
  - (e) When the maintenance is contracted to a maintenance organization, the operator shall ensure that the contractor complies with the ETOPS requirements and procedures. The operator shall establish control procedures to ensure that:
    - i. The maintenance personnel of the contracted maintenance organization are qualified for ETOPS.
    - ii. Additional maintenance requirements as identified in the operator's CAME manual are complied with.

### **37.20 EDTO Manual**

1. The operator shall develop an ETOPS manual for use by personnel involved in such operations. This manual shall at least make reference to the maintenance programme and other requirements described in this CAN, PACA Airworthiness Requirements and clearly indicate where they are located in the operator's manual. All ETDO requirements, including supportive programme procedures, duties and responsibilities, should be identified and be subject to revision control.
2. All ETOPS requirements, including supportive programmes, procedures, duties, and responsibilities, shall be identified and be subject to revision control. This manual shall be submitted to the PACA for approval before the implementation of ETOPS by the operator.

### **37.21 Oil Consumption Programme**

The operator shall ascertain the trends for oil consumption, the operator shall have in place an oil consumption programme. The programme shall reflect the manufacturer's recommendations and be sensitive to oil consumption trends. It shall consider the amount of oil added at the departing ETOPS stations with reference to the running average consumption; i.e. the monitoring must be continuous up to, and including, oil added at the ETOPS departure station. If oil analysis is meaningful to this make and model, it shall be included in the programme. The APU oil consumption shall also be part of the oil consumption programme.

### **37.22 Engine Condition Monitoring**

1. The operator shall have an engine condition monitoring programme that describes the parameters to be monitored, method of data collection and corrective action process. The programme shall also incorporate the manufacturer's instructions and industry practice. This monitoring shall be used to detect deterioration at an early stage to allow for corrective action before safe operation is affected. The programme shall ensure that engine limit margins are maintained such that a prolonged single engine diversion may be conducted without exceeding approved engine limits (i.e., rotor speeds, exhaust gas temperature) at all approved power levels and expected environmental conditions.
2. The monitoring programme shall include assessment of in-flight shut-down (IFSD) rate of the operator's ETOPS fleet and shall be reviewed at the Reliability meetings. The assessment shall include, as a minimum, engine hours flown in the period, in flight shut-down rate for all causes and engine removal rate, both on a 12 month moving average basis. When the IFSD rate exceeds 0.05/1000 engine hours for 120 minutes diversion time or exceeds 0.03/1000 engine hours for 180 minutes diversion time, the operator must notify the PACA as soon as possible.
3. When any adverse sustained trend is noted, the operator shall in consultation with the PACA, conduct an immediate evaluation to ascertain the causes. The evaluation may result in corrective action or operational restrictions being applied.

### **37.23 Verification Programme after Maintenance**

The operator shall develop a verification programme or establish procedures to ensure corrective action following an engine shut-down, primary system failure or adverse trends, any prescribed events which require a verification flight or other action. The operator shall establish the means to assure the accomplishment of the verification programme or the corrective action procedures. A clear description of who must initiate verification actions and the section or group responsible for the determination of what action is necessary shall be identified in the programme. Primary systems or conditions requiring verification actions shall be described in the operator's ETOPS manual.

### **37.24 Reliability Programme**

An ETOPS reliability programme shall be developed by the operator or the operator's existing reliability programme supplemented including the fleet average engine in-flight shut-down (IFSD) rate for the specified airframe-engine combination should be monitored by the Manufacturer of State of Design and by PACA. This programme shall be designed with early identification and prevention of ETOPS related

problems as the primary goal. The programme shall be event-orientated and incorporate reporting procedures for significant events detrimental to ETOPS flights. This information shall be readily available for use by the PACA to help establish that the reliability level is adequate, and to assess the operators' competence and capability to safely continue ETOPS. The PACA shall be notified within 72 hours of events reportable through this programme.

In the event that an acceptable level of reliability is not maintained, significant adverse trends exist, or if significant deficiencies are detected in the design of the aeroplane or propulsion system, the State of Design should inform the State of Registry and the State of the Operator of appropriate action to be taken.

### **37.25 Reporting**

1- In addition to the items required to be reported as per Section 4 Chapter 4.9 of the SAR, the following items shall be included:

- a. In-flight shut-downs
- b. Diversion or turn-back
- c. Uncommand power changes or surges
- d. Inability to control the engine or obtain desired power
- e. Unscheduled removal of engines
- f. Problems with systems critical to EDTO and
- g. Any other events detrimental to EDTO.

2- The report shall identify the following:

- (a) Aeroplane Identification (Registration Mark, Type and Serial Number);
- (b) Engine identification (position, make and serial number);
- (c) Total time, cycles and time since last shop visit;
- (d) For systems, time since overhaul or last inspection of the defective unit;
- (e) Phase of flight; and
- (f) Corrective action.

### **37.26 Engineering modifications and maintenance programme considerations**

Although these considerations are normally part of the operator's continuing airworthiness programme, the maintenance and reliability programme may need to be supplemented in consideration of the special requirements of EDTOs (see Sections 37.27 and 37.19).

The following items, as part of the operator's programme, should be reviewed to ensure that they are adequate for EDTO.

- a) Engineering modifications. The operator should provide to PACA and, where applicable the titles and numbers of all modifications, additions and changes which were made in order to substantiate the incorporation of the configuration maintenance and procedures (CMP) requirement in the aeroplanes used in EDTO;
- b) Maintenance procedures. Changes to established maintenance and training procedures, practices or limitations are required in order to qualify for EDTO. These changes should be submitted to the PACA before such changes may be adopted. Such procedures will include but are not limited to: -

- i. EDTO training for maintenance personnel.
  - ii. Maintenance procedures to ensure the same aircraft technician does not perform maintenance on the same element of identical but separate EDTO significant systems during the same check or visit.
  - iii. Maintenance procedures to preclude identical action being applied to multiple similar elements in any EDTO significant system; and
  - iv. Parts control procedures.
- c) Reliability reporting. The reliability reporting programme, supplemented as appropriate and approved, should be implemented prior to, and continued after, approval of EDTO. Data from this process should result in a suitable summary of problem events, reliability trends and corrective actions and should be provided regularly to the Omani Air Operator and to the concerned aircraft and engine manufacturers.
- d) Modifications and inspections implementation. Approved modifications and inspections that would maintain the reliability objective for the propulsion system and aircraft systems as a consequence of AD actions, updated instruction for continued airworthiness and revised CMP standards should be promptly implemented. Other recommendations made by the engine and aircraft manufacturers should also be considered for prompt implementation. This would apply to both installed and spare parts.
- e) Aeroplane dispatch and verification procedures. Procedures and centralized control processes should be established which would preclude an aeroplane's being dispatched for EDTO after propulsion system shutdown or primary aircraft system failure on a previous flight, or significant adverse trends in system performance, without appropriate corrective action having been taken. Confirmation of such action as being appropriate may, in some cases, require successful completion of verification in a flight. Such verification may be accomplished in a non-revenue flight or a revenue flight with non EDTO. If such verification is to be conducted on a regular scheduled revenue flight with EDTO, then the verification of the affected system should be satisfactorily completed prior to reaching the extended diversion time entry point. The operator should establish verification flight procedures.
- f) Maintenance programme. The operator's maintenance programme should ensure that the aircraft and propulsion systems will continue to be maintained at the level of performance and reliability necessary for EDTO. This includes such programmes as an engine condition monitoring programme and an engine oil consumption monitoring programme and, if appropriate, an APU in flight start monitoring programme.
- g) Considerations affecting contracted maintenance. Maintenance personnel involved in EDTO should be aware of any potential additional requirements of the maintenance programme associated with it and should be trained accordingly. When maintenance is contracted, the operator should ensure that the maintenance and all airworthiness flight dispatch procedures are performed to the requirement as defined in the operator's CAME, and personnel are trained in accordance with its training programme.

**37.27 Continuing Surveillance**

The fleet average IFSD rate for the specified airframe engine combination shall continue to be monitored in accordance with propulsion system reliability assessment and EDTO maintenance requirements. The PACA is authorized to ensure that the operation continues to be conducted safely. In the event that an acceptable level of reliability is not maintained, significant adverse trend exists or if significant deficiencies are detected in the conduct of EDTO operation, the PACA will initiate a special evaluation, impose operational restriction, if necessary, and stipulate corrective action for the operator to adopt to resolve the problems in a timely manner or suspend the EDTO authorization unless there is a corrective action plan acceptable to the PACA.

The Operator and PACA shall alert respectively the Manufacturer of Design and the State of Design when a special evaluation is initiated and provide for its participation independent of the determined cause

**37.28 ETOPS Approval**

After Scrutinizing all the DATA and the Item included into the PACA form is AWR /OPS 027 by both designated Airworthiness and Flight Operation inspectors, if found satisfactory. Approval to conduct EDTO is made by the issuance of operation specification by the PACA containing appropriate limitations. Any amendment to the EDTO manual requires DGCA approval.

Failure of an operator to reduce the maximum diversion time when required constitutes grounds for removal of EDTO approval.

**37.29 Basic Concept**

1. Threshold Time

The threshold time is not an aircraft operating limit but one of the criteria to safeguard overall level of safety for turbine-powered commercial air transport aeroplanes flying long distances away from adequate en-route alternate aerodromes. An operation where the aeroplane flies beyond this threshold time is referred to as EDTO operation and will need to be approved. As specified in CAR-OPS, the threshold time is –

- (a) In respect of an aeroplane with 2 turbine engines, 60 minutes; or
- (b) In respect of an aeroplane with more than 2 turbine engines, 180 minutes.

2. Maximum Diversion Time

As defined in CAR-OPS, maximum diversion time is the maximum allowable range specified in an EDTO operational approval, expressed in time, from a point on a route to an en-route alternate aerodrome.

**37.30 Operational Approval**

1. Notification of plan for EDTO

- 1.1 In view of the complexity of this subject which requires heavy investment in manpower resources, operators plan to operate in EDTO environment are advised to notify PACA as soon as possible.

- 1.2 Subject to completeness and timeliness of the application, the evaluation of a standard EDTO application requires at least three months while that of an Accelerated/Early or EIS EDTO may take six months or more.
2. In evaluating an application for EDTO (or a variation to increase an approved maximum diversion time), besides the requirements in CAR-OPS and set forth in this CAN, PACA would also take the following into consideration: -
  - (a) The operator's past experience and compliance record is satisfactory;
  - (b) The operator has demonstrated that the flight can continue to a safe landing under the anticipated degraded operating conditions which would arise from situations such as:
    - i. total loss of thrust from a critical engine; or
    - ii. total loss of engine generated electric power; and
    - iii. any other condition which PACA considers to be equivalent in airworthiness and performance risk; and
  - (c) Specific mitigation measures that the operator may take, following the safety risk assessment.
3. Eligibility and eligibility progression for EDTO for an aeroplane with 2 turbine engines (ETOPS).
  - 3.1 PACA would consider an application for ETOPS operational approval with following maximum diversion times after the operator has acquired the respective operating experience:
    - (a) ETOPS with 120 minutes maximum diversion time (120-minute ETOPS) – after 12 months of operating experience on the same airframe/engine combination at 60 minutes diversion time.
    - (b) ETOPS with 180 minutes maximum diversion time – after 12 months of operating experience on the same airframe/engine combination under a 120- minute ETOPS operation approval.
  - 3.2 For 120-minute ETOPS, PACA may grant, subject to special considerations, extension to the maximum diversion time of up to 138 minutes (additional 15% of 120 minutes).
  - 3.3 PACA may consider granting ETOPS Operational Approval of up to 207 minutes (additional 15% of 180 minutes) maximum diversion time on a case-by-case basis provided that the operator complies with the 207 minute requirements promulgated in Appendix 2 of FAA AC 120-42B.
4. Accelerated/Early and EIS (entry into service) EDTO
  - 4.1 "Accelerated EDTO" and "Early EDTO" are terms for EDTO eligibility without going through the qualifying time progression as promulgated in paragraph 2.3, while "EIS EDTO" is EDTO eligibility at launch of the airframe/engine type.
  - 4.2 A matured operator with proven good track record and sound infra-structural supports for EDTO operation may apply to PACA for Accelerated/Early or EIS EDTO citing such supports as international best practices satisfactory risk assessment including assessment of human performance limitations.

**37.31 EDTO Operational Considerations**

1. To maintain the required level of safety for EDTO operations, it is necessary that:
  - (a) The airworthiness certification of the aeroplane type, taking into account the aeroplane system design and reliability aspects, specifically permits operations beyond the threshold time.
  - (b) The reliability of the propulsion system is such that the risk of double engine failure from independent causes is extremely remote.
  - (c) Any necessary special maintenance requirements are fulfilled.
  - (d) Specific flight dispatch requirements are met and
  - (e) Necessary in-flight operational procedures are established.

**37.32 Airworthiness Certification**

1. The operator must show that the design features of the particular airframe/engine combination are suitable for the intended EDTO operations. Evidence that the type design of an aeroplane with two turbine engines is approved for EDTO is normally reflected in the Aircraft Flight Manual (AFM) and Type Certificate Data Sheet (TCDS) or Supplement Type Certificate (STC), which contains directly or by reference the following information as applicable:
  - (a) Special limitations (if necessary), including any limitations associated with a maximum diversion time and time limited systems (e.g. the endurance of cargo fire suppression system);
  - (b) Additional markings or placards (if required);
  - (c) Reference to the performance section;
  - (d) Specific airborne equipment, installation and flight crew procedures required for EDTO operations;
  - (e) Description or reference to a document containing the approved aeroplane configuration, maintenance and procedures (CMP) standards.
2. Although EDTO certification is not required for aeroplane with more than two engines, a review of the time capabilities of the relevant EDTO time limited systems should be performed to adequately consider the relevant time capabilities during EDTO operations. On most aeroplanes with more than two engines, the only relevant time limited system is the cargo fire suppression system.

**37.33 Airworthiness Requirements**

1. The operator should pay special attention to ensuring the required level of safety will be maintained under conditions which may be encountered during such operations, e.g. flight for extended periods following failure of an engine and/or essential systems.
2. Information or procedures specifically related to EDTO operations should be incorporated into the aeroplane flight manual, maintenance manual or other appropriate document.
3. For ETOPS, the maintenance programme required in the Third Schedule of CAR -OPS may be the continuing airworthiness maintenance schedule approved by the PACA. The operator should review

the schedule to ensure that it provides an adequate basis for development of ETOPS maintenance requirements.

4. The operator is required to implement procedures to prevent identical action being applied to multiple similar elements. This may be achieved, if other procedural measures are not possible, by having the identical action being performed by different maintenance personnel or teams.
5. As part of an APU in-flight start programme, the operator should perform an APU in-flight start once every three months for each aircraft of its EDTO fleet. The result of the in-flight start shall be annotated in the Technical Log of the aircraft.

### **37.34 Propulsion System Maturity and Reliability**

1. The basic elements for EDTO operational approval are the maturity and reliability of the propulsion system. These should be such that the risk of complete loss of power from independent causes is extremely remote.
2. The only way to assess the maturity of the propulsion system and its reliability in service is to exercise engineering judgment, taking account of the worldwide experience with the engine.
3. For a propulsion system whose reliability has already been assessed, PACA will evaluate the ability of the operator to maintain that level of reliability, taking into account the operator's record of reliability vis-à-vis engines of closely related types.
4. The engine/APU oil consumption monitoring programme is part of the overall need to monitor engine reliability. For the purpose of monitoring the oil consumption, the operator should account for the amount of oil added at the departing ETOPS stations with reference to the running average consumption, i.e. monitoring should be continuous up to and including oil added at the ETOPS departure station. If appropriate, oil analysis should be included in the programme.
5. For purpose of monitoring the engine condition, the assessment of IFSD rate should include monitoring the following matters on a 12-month moving average basis –
  - (a) Engine hours flown in the period.
  - (b) All causes for IFSD and
  - (c) Engine removal.
6. When the IFSD rate exceeds the limits in paragraph 6.7, the operator should –
  - (a) Notify PACA as soon as possible; and
  - (b) Conduct an immediate evaluation to ascertain the causes of the IFSD rate; and
  - (c) Take such corrective action or restrict its operations as PACA may advise.
7. Unless otherwise specified by PACA as part of the approval, the relevant IFSD rate is: -
  - a) 0.05 per 1000 engine hours for 120-minute ETOPS;
  - b) 0.03 per 1000 engine hours for ETOPS maximum diversion time of more than 120 minutes but up to 180 minutes; or
  - c) 0.02 per 1000 engine hours for ETOPS maximum diversion time of more than 180 minutes.

**37.35 Flight Dispatch Requirements**

1. In applying the general flight dispatch requirements, particular attention should be paid to the conditions which might prevail during EDTO operations, e.g. extended flight with one engine inoperative, major systems degradation, reduced flight altitude, etc. For compliance with the requirements, the operator must ensure that at least the following aspects are satisfied during flight dispatch: -
  - (a) Required en-route alternate aerodromes are identified.
  - (b) Prior to departure, the flight crew has been provided with the most up-to-date information on the identified en-route alternate aerodromes, including operational status and meteorological conditions and in flight, make available means for the flight crew to obtain the most up-to-date weather information.
  - (c) Methods have been established to enable two-way communications between the aeroplane and the operator's operational control center.
  - (d) A means has been established to monitor conditions along the planned route including the identified alternate aerodromes and that procedures are in place for the flight crew to be advised of any situation that may affect safety of flight.
  - (e) The intended route does not exceed the approved maximum diversion time;
  - (f) Aircraft systems, including the relevant items in the minimum equipment list, are serviceable pre-flight;
  - (g) Communication (such as SATCOM), and navigation facilities and capabilities, are available;
  - (h) Fuel requirements are met; and
  - (i) Relevant performance information for the identified en-route alternate aerodrome(s) are available.

**37.36 Operational and Diversion Planning Principles**

1. When planning or conducting EDTO, the operator and pilot-in-command should ensure that:
  - (a) The minimum equipment list, the communications and navigation facilities, fuel and oil supply, en-route alternate aerodromes or aeroplane performance are appropriately considered.
  - (b) In the event of an aeroplane engine shutdown, the aeroplane can proceed to and land at the nearest (in terms of the least flying time) en-route alternate aerodrome where a safe landing can be made; and
  - (c) In the event of a single or multiple failure of an EDTO significant system or systems (excluding engine failure), the aeroplane can proceed to and land at the nearest available en-route alternate aerodrome where a safe landing can be made unless it has been determined that no substantial degradation of safety will result from any decision made to continue the planned flight.

**Note:** A PACA form is AWR /OPS 027 is used by both Airworthiness and flight operation inspectors

**Anwar Abdullah AL-Raisi**

**Acting Director General of Civil Aviation Regulation**