Advisory Circular

CAA-AC-GEN020A
June 2018

REQUIREMENTS FOR APPROVED OPERATIONS BY SINGLE-ENGINE TURBINE-POWERED AEROPLANES (ASETPA) AT NIGHT AND/OR IN INSTRUMENT METEOROLOGICAL CONDITIONS (IMC)

1.0 PURPOSE

This Advisory Circular (AC) provides information and guidance that should be used by applicants intending to operate single engine turbine powered aeroplanes at night and or in IMC conditions. It gives additional guidance on the airworthiness and operational requirements described in KCARs, which have been designed to meet the overall level of safety intended for such operations.

1.1 CANCELLATION; This AC cancels CAA-AC-GEN020 March 2018

2.0 REFERENCE

2.1 Civil Aviation (Air Operator Certification and Administration) Regulations as amended
2.2 Civil Aviation (Operation of Aircraft-Commercial Air Transport) Regulations as amended

3.0 INTRODUCTION

Civil Aviation (Operation of Aircraft-Commercial Air Transport) Regulations 2018, Regulation 138 allows single engine turbine powered aeroplanes operations under IMC or at night.

Operations carried out ins Single-engine turbine powered aeroplanes in accordance with KCARS will be termed ASETPA operations. Operators intending to conduct ASETPA operations must seek KCAA approval.

4.0 TERMINOLOGY

AWI	Airworthiness Inspector
ASETPA	Approved Single Engine Turbine Powered Aeroplanes operations in IMC/Night
FOI	Flight Operations Inspector
KCARs	Kenya Civil Aviation Regulations

5.0 TURBINE ENGINE RELIABILITY

5.1 The power loss rate should be established as likely to be met based on data from commercial operations supplemented by available data from private operations in similar theatres of operation. A minimum amount of service experience is needed on which to base the judgment, and this should include at least 20 000 hours on the actual aeroplane/engine combination unless additional testing has been carried out or experience on sufficiently similar variants of the engine is available.

5.2 In assessing turbine engine reliability, evidence should be derived from a world fleet database covering as large a sample as possible of operations considered to be representative, compiled by the manufacturers and reviewed with the States of Design and of the Operator.

5.2.1 Engine trend monitoring should include the following:

a) an oil consumption monitoring programme based on manufacturers' recommendations; and
b) an engine condition monitoring programme describing the parameters to be monitored, the method of data collection and the corrective action process; this should be based on the manufacturer's recommendations. The monitoring is intended to detect turbine engine deterioration at an early stage to allow for corrective action before safe operation is affected.

5.2.2 A reliability programme should be established covering the engine and associated systems. The engine programme should include engine hours flown in the period and the in-flight shutdown rate for all causes and the unscheduled engine removal rate, both on a 12-month moving average basis. The event reporting process should cover all items relevant to the ability to operate safely at night and/or in IMC. The data should be available for use by the operator, the Type Certificate Holder and the State so as to establish that the intended reliability levels are being achieved. Any sustained adverse trend should result in an immediate evaluation by the operator in consultation with the State and manufacturer with a view to determining actions to restore the intended safety level. The operator should develop a parts control programme with support from the manufacturer that ensures that the proper parts and configuration are maintained for single-engine turbine-powered aeroplanes approved to conduct these operations. The programme includes verification that parts placed on an approved single-engine turbine-powered aeroplane during parts borrowing or pooling arrangements, as well as those parts used after repair or overhaul, maintain the necessary configuration of that aeroplane for operations approved in accordance with KCARs.

5.3 Power loss rate should be determined as a moving average over a specified period (e.g. a 12-month moving average if the sample is large). Power loss rate, rather than in-flight shut-down rate, has been used as it is considered to be more appropriate for a single-engine aeroplane. If a failure occurs on a multi-engine aeroplane that causes a major, but not total, loss of power on one engine, it is likely that the engine will be shut down as positive engine-out performance is still available, whereas on a single-engine aeroplane it may well be decided to make use of the residual power to stretch the glide distance.

5.4 The actual period selected should reflect the global utilization and the relevance of the experience included (e.g. early data may not be relevant due to subsequent mandatory modifications which affected the power loss rate). After the introduction of a new engine variant and whilst global utilization is relatively low, the total available experience may have to be used to try to achieve a statistically meaningful average.

6.0 OPERATIONS MANUAL

The operations manual should include all necessary information relevant to operations by single-engine turbine-powered aeroplanes at night and/or in IMC. This should include all of the additional equipment, procedures and training required for such operations, route and/or area of operation and aerodrome information (including planning and operating minima).

7.0 OPERATOR CERTIFICATION OR VALIDATION

The certification or validation process specified by the Authority should ensure the adequacy of the operator's procedures for normal, abnormal and emergency operations, including actions following engine, systems or equipment failures. In addition to the normal requirements for operator certification or validation, the following items should be addressed in relation to operations by single-engine turbine-powered aeroplanes:

a) proof of the achieved engine reliability of the aeroplane engine combination
b) specific and appropriate training and checking procedures including those to cover engine failure/malfunction on the ground, after take-off and en-route and descend to a forced landing from the normal cruising altitude;
c) a maintenance programme which is extended to address the equipment and systems referred to in KCARs.
d) an MEL modified to address the equipment and systems necessary for operations at night and/or in IMC;
e) planning and operating minima appropriate to the operations at night and/or in IMC;
f) departure and arrival procedures and any route limitations;
g) pilot qualifications and experience; and
h) the operations manual, including limitations, emergency procedures, approved routes or areas of operation (guidance for the pilot in command in route selection, including considerations of terrain and weather and aerodrome charts are to contain advice about areas to be avoided, if any, if there is a forced landing), the MEL and normal procedures related to the equipment referred to in KCARS.

8.0 OPERATIONAL AND MAINTENANCE PROGRAMME REQUIREMENTS

8.1 Approval to undertake operations by single-engine turbine-powered aeroplanes at night and/or in IMC specified in an air operator certificate or equivalent document should include the particular airframe/engine combinations, including the current type design standard for such operations, the specific aeroplanes approved, and the areas or routes of such operations.

8.2 The operator's maintenance control manual should include a statement of certification of the additional equipment required, and of the maintenance and reliability programme for such equipment, including the engine.

9.0 ROUTE LIMITATIONS OVER WATER

9.1 Operators of single-engine turbine-powered aeroplanes carrying out operations at night and/or in IMC should make an assessment of route limitations over water. The distance that the aeroplane may be operated from a land mass suitable for a safe forced landing should be determined. This equates to the glide distance from the cruise altitude to the safe forced landing area following engine failure, assuming still air conditions. The Authority may add to this an additional distance taking into account the likely prevailing conditions and type of operation. This should take into account the likely sea conditions, the survival equipment carried, the achieved engine reliability and the search and rescue services available.

9.2 Any additional distance allowed beyond the glide distance should not exceed a distance equivalent to 15 minutes at the aeroplane's normal cruise speed.

10.0 APPROVAL PROCESS

Operational approval for ASETPA operations shall follow the standard 5-phase certification process. The application shall be submitted using FORM: O-GEN020 as amended.

Documentation

In addition to the normal AOC application documents, applicants requesting approval to conduct ASETPA operations must also provide the following information:

- The aero plane manufacturer;
- Aero plane type and model;
- Aero plane serial number;
- Aero plane registration mark;
- Aero plane type certification status;
- Evidence that the aero plane complies with all requirements in the application form;
- Documents referenced in, or required to support references in the form.

Assessment criteria

The FOI and AWI will verify that at least the following matters have been included:

- Requirement for passengers to occupy seats that meet crashworthiness standards;
- ASETPA emergency procedures; take off, climb, cruise and descent;
- Routes used for operations, showing the procedures used for its design such as minimum altitude and tracking details;
- Procedures for the use of other than automatic engine ignition systems;
- Procedures to be followed by the pilot in command if there is a chip detector warning;
- Procedures to be followed by the pilot in command if there is a fire warning in all phases of flight;
- MEL, including ASETPA procedures;

• Procedures if the pilot recognizes that an engine performance parameter has been exceeded;

• Procedures for the occurrence of a potential malfunction at various speeds on runways of varying length;

• Aerodrome charts are to contain advice about areas to be avoided, if any, if there is a forced landing; and

• Guidance for the pilot in command in route selection, including considerations of terrain and weather.

Training and Checking

All Air operators requiring ASETPA approval must develop and maintain a training programme approved by the Authority.

The following shall be included in Operations Manual Part B and D;

• Engine failure or malfunction which necessitates stopping the aircraft on the ground

• Engine failure or malfunction which necessitates an off-airport landing after take-off on the most suitable terrain in the vicinity of the aerodrome. These can be organized into a number of procedures, depending on the height of the aircraft at the time of the failure

• Engine failure or malfunction which necessitates turning to execute a glide landing upon a serviceable runway, including a 'turn-back' maneuver. This procedure is to contain a minimum indicated airspeeds and altitudes

• Engine malfunction, during climb, cruise and descent and from the approach to land phase in VMC and IMC

• Additional procedures for the conduct of a forced landing in IMC to ground level.

Route Limitations

Routes must be within ASETPA safety distance of a suitable landing area (SLA). *'ASETPA safety distance'* is the maximum still air distance travelled in 15 minutes at the aeroplane's normal still air cruise speed plus the distance to glide to 1000 feet AGL. As the ASETPA safety distances will be directly proportional to aircraft operating altitude, certain routes will have a minimum altitude at which the aeroplane must be flown.

Over Water Operations

The general nature of the terrain surrounding the route must be such that it could reasonably be assumed that a successful forced landing resulting in minimal injury to the aeroplane's occupants could be executed if required during the time of the proposed operation.

Factors that are to be considered include:

• Seasonal influences

• The conduct of operations at night

• Adverse weather patterns

• Nature of the terrain below or in the proximity of the route used in the operation.

Approval Process

Phase I

This includes a pre-application meeting whereby the applicant is informed of the approval process and required documentation. The ASETPA application/assessment form is given to the applicant after all expectations are discussed

Phase II

Following an operator applying to conduct ASETPA operations, a desktop assessment to verify that the form is properly filled and all necessary supporting documentation is attached is conducted.

Phase III

This in-depth exercise shall verify that the operator has satisfactory processes and procedures to conduct ASETPA operations safely.

Phase IV

Inspection of operator's library and training records shall be conducted in Phase IV. A demonstration/proving flight shall be at the discretion of the CPM/FOI.

Manner of Approval

Where the operator is adding an ASETPA aeroplane type to an AOC, the operations specifications (ops specs) will be amended to include " Approved for Single Engine Turbine Powered Aeroplane Operations at Night and/or in IMC" in item 19 of the Ops specs.

Kenya Civil Aviation Authority

Appendix 1

In addition to information contained in this Advisory Circular, the following are examples (non-exhaustive) of acceptable contents of an Operator's manuals addressing ASETPA.

Operations manual A

(Operator) shall establish procedures for route selection with respect to the availability of surfaces, which permits a safe forced landing. The instructions for the assessment of landing sites (elevation, landing direction, and obstacles in the area) shall be contained OM C.

Operations manual B

Flight Planning Procedures

At the flight-planning phase, any selected landing site should have been assessed as acceptable for carrying out a safe forced landing with a reasonable expectation of no injuries to persons in the aeroplane or on the ground.

Information related to landing sites available for operations approved shall include:

- a description of the landing site (position, surface, slope, elevation, etc.);
- the preferred landing direction; and
- obstacles in the area.

Non-normal or emergency procedures

Non-normal or emergency procedures for single engine operations in IMC or at night includes instructions in case of an engine failure in flight to proceed to an emergency landing site. Situational awareness of en route terrain obstacles can be enhanced by use of independent terrain mapping, such as terrain awareness and warning systems (TAWS) and Synthetic Vision. Enhanced ground proximity warning systems (EGPWS), and terrain awareness and warning systems (TAWS) informs the pilot whether there are terrain risks between the point of the engine failure and the intended emergency landing field. They help the pilot to identify, locate and avoid terrain risks in instrument meteorological conditions (IMC). The procedures for engine failure in IMC or night would include:

1. The glide path shall immediately be established after the engine failure in accordance with QRH/Instructions for dealing with engine failures;
2. Pick best landing field by selecting "nearest suitable airfield" on the GPS;
3. Proceed toward the selected field using Heading (HDG) mode from the autopilot, not NAV mode;
4. Complete "Engine failure" checklist;
5. Glide to the key point (1500 feet AGL;
6. Use CDI for finals set-up.

MEL Operations Manual Part B

All equipment in Civil Aviation (Instrument & Equipment) Regulations, as required for this operations shall be operative before takeoff or operations restricted to day/VFR.

Operations Manual Part C

(Operator) shall evaluate or alter routes to minimize the risk exposure of passengers in the event of an engine failure while en route in single engine turbine powered aeroplanes in IMC/night. The **criteria for the assessment of each new route** should address the following:

- identification and assessment, at least on an annual basis, of the continued suitability of landing sites (obstacles, dimensions of the landing area, type of the surface, slope, etc.) along the route when no aerodrome is available; the assessment may be performed using publicly available information or by conducting on-site surveys (e.g. google maps or similar)
- the selection of aerodromes along the route;

These landing sites suitable for a diversion or forced landing shall be programmed into the navigation system so that track and distance to the landing sites are immediately and continuously available to the flight crew. None of these pre-programmed positions shall be altered in-flight.
(Operator) shall evaluate and structure the routes by considering terrain and gliding distance when flying over water.

Operations Manual Part D

Initial and recurrent training in an approved simulator shall cover engine failure procedures in IMC and/or at night. If a simulator is not available, such training can be conducted in VMC conditions under the hood. Training shall cover:

- Pilot's initial response to engine failure, selection of a suitable landing surface, the descent in instrument conditions, the avoidance of terrain hazards during the descent, and the practice of forced landings under various degraded surface weather conditions.
- Simulator and emergency training shall include either ground briefing or practice of engine failure/forced landing procedures under instrument flight conditions/night or in designated mountainous regions.

Airworthiness related items

See Advisory Circular CAA-AC-AWS Reliability Programme Paragraph 10