



**GUIDANCE FOR NIGHT & IMC OPERATIONS OF SINGLE
ENGINE TURBINE-POWERED AEROPLANES**

Purpose— This advisory circular provides additional guidance for the certification of commercial air transport operations in single engine turbine aeroplanes at night and during instrument meteorological conditions.

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SECTION 1 POLICY & GENERAL INFORMATION

1.1 STATUS OF THIS ADVISORY CIRCULAR

This is original issuance [1]2017 of this AC.

1.2 BACKGROUND

A. ICAO Annex 6, Part I, now allows the approval of a single engine turbine aeroplanes for night and IFR operations under very specific standards.

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

- B. Those Standards have been incorporated into the Rwanda Civil Aviation Regulations and the RCAA may approve these operations after the operator demonstrates that they are capable of implementing the requirements.
- C. This AC provides additional guidance on the airworthiness and operational requirements described in Appendix RCAR Part 12 which have been designed to meet the overall level of safety intended for approved operations by single-engine turbine-powered aeroplanes at night and/or in IMC.

1.3 APPLICABILITY

This advisory circular is applicable to all AOC holders and applicants for AOC that operate single-engine turbine aeroplanes.

1.4 RELATED REGULATIONS

The following Rwanda civil aviation regulations are applicable to the Integrated Flight Safety Documents requirements—

- RCAR Part 12, AOC Certification & Administration (Appendix 2 to 12.065)

1.5 RELATED PUBLICATIONS

[Reserved]

1.6 DEFINITIONS & ACRONYMS

1.6.1 DEFINITIONS

[Reserved]

1.6.2 ACRONYMS & ABBREVIATIONS

The following acronyms and abbreviations are used in this circular—

- 1) **AC** = Advisory Circular
- 2) **AOC** = Air Operator Certificate
- 3) **FSS** = Flight Safety Services
- 4) **RCAA** = Rwanda Civil Aviation Authority
- 5) **RCAR** = Rwanda Civil Aviation Regulations

SECTION 2 GENERAL GUIDANCE

2.1 TURBINE ENGINE RELIABILITY

- A. The power loss rate required in Appendix 2 to 12.065 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.
 - B. 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
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representative, compiled by the manufacturers and reviewed with the States of Design and the RCAA.

- Since flight hour reporting is not mandatory for many types of operators, appropriate statistical estimates may be used to develop the engine reliability data.
- C. Data for individual operators approved for these operations including trend monitoring and event reports should also be monitored and reviewed by the RCAA to ensure that there is no indication that the operator's experience is unsatisfactory.

2.1.1 ENGINE TREND MONITORING

Engine trend monitoring should include the following—

- 1) an oil consumption monitoring programme based on manufacturers' recommendations; and
- 2) an engine condition monitoring programme describing—
 - (a) the parameters to be monitored,
 - (b) the method of data collection; and
 - (c) the corrective action process.

The monitoring is intended to detect turbine engine deterioration at an early stage to allow for corrective action before safe operation is affected.

The trend monitoring should be based on the manufacturer's recommendations.

2.1.2 RELIABILITY PROGRAMME

- A. A reliability programme should be established covering the engine and associated systems.
- B. The engine programme should include—
- 1) engine hours flown in the period; and
 - 2) the in-flight shutdown rate for all causes and the unscheduled engine removal rate, both on a 12-month moving average basis.
- C. The event reporting process should cover all items relevant to the ability to operate safely at night and/or in IMC.
- D. Any sustained adverse trend should result in an immediate evaluation by the operator in consultation with the RCAA and manufacturer with a view to determining actions to restore the intended safety level.

The data should be available for use by the operator, the Type Certificate Holder and the RCAA so as to establish that the intended reliability levels are being achieved.

2.1.3 PARTS CONTROL PROGRAMME

- A. 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.
- B. The programme includes verification of—
- 1) parts placed on an approved single-engine turbine-powered aeroplane during parts borrowing or pooling arrangements; and
 - 2) parts used after repair or overhaul.

This parts verification must show continuing conformance with the necessary configuration requirements of Appendix 2 to 12.065.

2.1.4 POWER LOSS RATE

- A. 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.
- B. 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.

2.2 OPERATIONS MANUAL

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

2.3 OPERATOR CERTIFICATION OR VALIDATION

- A. The certification or validation process specified by the State of the Operator should ensure the adequacy of the operator's procedures for normal, abnormal and emergency operations, including actions following engine, systems or equipment failures.
- B. 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—

- 1) proof of the achieved engine reliability of the aeroplane engine combination;

Refer to appendix 2 of 12.065.

- 2) 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;

- 3) a maintenance programme which is extended to address the necessary equipment and systems;

Refer to appendix 2 of 12.065.

- 4) an MEL modified to address the equipment and systems necessary for operations at night and/or in IMC;
- 5) planning and operating minima appropriate to the operations at night and/or in IMC;
- 6) departure and arrival procedures and any route limitations;
- 7) pilot qualifications and experience; and

- 8) the operations manual, including—
 - ◆ limitations, emergency procedures
 - ◆ approved routes or areas of operation
 - ◆ the MEL and normal procedures related to the equipment required for these operations.

2.4 OPERATIONAL & MAINTENANCE PROGRAMME REQUIREMENTS

- A. 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—
 - 1) the particular airframe/engine combinations, including the current type design standard for such operations;
 - 2) the specific aeroplanes approved; and
 - 3) the areas or routes of such operations.
- B. The operator's maintenance control manual should include a statement of certification of the—
 - 1) additional equipment required; and
 - 2) maintenance and reliability programme for such equipment, including the engine.

2.5 ROUTE LIMITATIONS OVER WATER

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

End of Advisory Circular

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