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OPERATIONS OF SINGLE-ENGINE TURBINE POWERED AEROPLANES AT NIGHT AND/OR IN INSTRUMENT METEOROLOGICAL CONDITIONS (IMC)

1. Introduction

- 1.1 This AIC is issued in the exercise of powers conferred under section 24o of the Civil Aviation Act 1969.
- 1.2 Pursuant to Part 1 Chapter 5 paragraph 5.1.2 Annex 6 to the Chicago Convention, this AIC is to provide methods to be adopted by operators in determining the operations of single engine turbine powered aeroplanes at night and/or in IMC and for the safe conditions.
- 1.3 This AIC set forth a means that would be acceptable to DCA for the purpose of complying with such requirements.

2. Single-engine turbine powered operations at night and/or in IMC approval conditions

- 2.1 Single-engine turbine powered aeroplanes shall only be operated at night and/or in IMC and over such routes and diversions there from, that permit a safe forced landing to be executed in the event of engine failure.
- 2.2 In approving operations by single-engine turbine-powered aeroplanes at night and/or in IMC, the operator shall ensure that the airworthiness certification of the aeroplane is appropriate and that the overall level of safety intended by the provisions of Annexes 6 and 8 is provided by:
 - (a) the reliability of the turbine engine;
 - (b) the operator's maintenance procedures, operating practices, flight dispatch procedures and crew training programmes; and
 - (c) equipment and other requirements provided in accordance with paragraph 3.2
- 2.2.1 All single-engine turbine powered aeroplanes operated at night and/or in IMC shall have an engine trend monitoring system, and those aeroplanes for which the individual Certificate of Airworthiness is first issued on or after 1 January 2005 shall have and automatic trend monitoring system.

3. Operator shall also satisfy the following requirements for the operations of single-engine turbine powered aeroplanes at night and/or in IMC conditions:

3.1 Turbine Engine Reliability

3.1.1 Turbine engine reliability shall be shown to have a power loss of less than 1 per 100,000 engine hours.

Note: Power loss in this context is defined as any loss of power, the cause of which may be traced to faulty engine component design or installation, including design of installation of the fuel ancillary or engine control systems

3.1.2 The operator shall be responsible for the engine trend monitoring.

3.1.3 To minimize the probability of in-flight engine failure, the engine shall be equipped with:

- (a) an ignition system that activates automatically, or is capable of being operated manually, for take-off and landing, and during flight, in visible moisture;
- (b) a magnetic particle detection, or equivalent, systems that monitors the engine, accessories gearbox, and reduction gearbox, and which includes a flight deck caution indication; and
- (c) an emergency engine power control device that permits continuing operation of the engine through a sufficient power range to safely complete the flight in the event of any reasonably probable failure of the fuel control unit

3.2 Systems and Equipment

3.2.1 Single-engine turbine powered aeroplanes approved to operate at night and/or in IMC shall be equipped with the following systems and equipment intended to ensure continued safe flight and to assist in achieving a safe forced landing after an engine failure, under an allowable operating conditions:

- (a) two separate electrical generating systems each one capable of supplying all probable combinations of continuous in-flight electrical loads for instruments, equipments, equipment and systems required at night and/or in IMC;
- (b) a radio altimeter
- (c) an emergency electrical supply system of sufficient capacity and endurance, following loss of all generated power to, as minimum:
 - (1) maintain the operation of all essential flight instruments, communication and navigation systems during a descent from the maximum certificated altitude in a glide configuration to the completion of a landing;
 - (2) lower the flaps and landing gear, if applicable;
 - (3) provide power to one pitot heater, which must serve an air speed indicator clearly visible to the pilot;
 - (4) provide for operation of the landing light specified in 3.2.1 (j);

- (5) provide for one engine restart, if applicable; and
- (6) provide for the operation of the radio altimeter;
- (d) two altitude indicators, powered from independent sources;
- (e) a means to provide for at least one attempt at engine re-start;
- (f) airborne weather radar
- (g) a certified area navigation system capable of being programmed with the positions of aerodromes and safe forced landing areas, and providing instantly available track and distance information to those locations;
- (h) for passenger operations, passenger seats and mounts which meet dynamically-tested performance standards and which are fitted with a shoulder harness or a safety belt with a diagonal shoulder strap for each passenger seat;
- (i) in pressurized aeroplanes, sufficient supplemental oxygen for all occupants for descent following engine failure at the maximum glide performance from the maximum certificated altitude to an altitude at which supplemental oxygen is no longer required;
- (j) a landing light that is independent of the landing gear and is capable of adequately illuminating the touchdown area in a night forced landing; and
- (k) an engine fire warning system

3.3 Minimum Equipment List

The operator shall provide a Minimum Equipment List in accordance with paragraph 2 above and approved by DCA to specify the operating equipment required for night and/ or in IMC operations, and for day/VMC operations.

3.4 Flight Manual Information

Operator flight manual shall include limitations, procedures, approval status and other information relevant to operations by single-engine turbine powered aeroplanes at night and/or in IMC.

3.5 Event Reporting

An operator approved for operations by single-engine turbine powered aeroplanes at night and/ in or IMC shall report all significant failures, malfunction or defects to DCA .

3.6 Operator Planning

Operator route planning shall take account of all relevant information in the assessment on intended routes or areas of operations, including the following:

- (a) the nature of the terrain to be over flown, including the potential for carrying out a safe forced landing in the event of an engine failure or major malfunction:
- (b) weather information, including seasonal and other adverse meteorological influences that may affect the flight; and
- (c) other criteria and limitations as specified by DCA

- 3.6.1 An operator shall identify aerodromes or safe forced landing areas available and their position for use in the event of engine failure.

Note 1. - A 'safe' forced landing in this context means a landing in an area at which it can reasonably be expected that it will not lead to serious injury or lost of life, even though the aeroplane may incur extensive damage.

4. 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.

5. Operator certification or validation

- 5.1 The operator shall demonstrate the ability to conduct operations by single-engine turbine-powered aeroplanes at night and/or in IMC through a certification and approval process specified by DCA. The certification or validation process specified by the DCA 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 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 Appendix 3, paragraph 2;
- 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, the MEL and normal procedures related to the equipment.

6. Operational and maintenance programme requirements

- 6.1 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 route of such operations.

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

7. Flight crew experience, training and checking

7.1 An operator's flight crew training and checking shall be appropriate to night and/or IMC operations by single-engine turbine-powered aeroplanes, covering normal, abnormal and emergency procedures and, in particular, engine failure, including descent to a forced landing in night and/or in IMC conditions.

7.2 The pilot-in-command should:

- a) for operations under the IFR or at night, have accumulated at least 50 hours flight time on the class of aeroplane, of which at least 10 hours shall be as pilot in command;
- b) for operations under the IFR, have accumulated at least 25 hours flight time under the IFR on the class of aeroplane, which may form part of the 50 hours flight time in sub-paragraph (a);
- c) for operations at night, have accumulated at least 15 hours flight time at night, which may form part of the 50 hours flight time in sub-paragraph a;
- d) for operations under the IFR, have acquired recent experience as a pilot engaged in a single pilot operation under the IFR of;
 - i) at least five IFR flights, including three instrument approaches carried out during the preceding 90 days on the class of aeroplane in the single pilot role; or
 - ii) an IFR instrument approach check carried out on such an aeroplane during the preceding 90 days;
- e) for operations at night, have made at least three take-offs and landings at night on the class of aeroplane in the single pilot role in the preceding 90 days; and
- f) have successfully completed training programmes that include, passenger briefing with respect to emergency evacuation; autopilot management; and the use of simplified in-flight documentation.

7.3 The initial and recurrent flight training and proficiency checks indicated in **7.1 and 7.2** shall be performed by the pilot-in-command in the single pilot role on the class of aeroplane in an environment representative of the operation.

8. Route limitations over water

8.1 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 from a land mass suitable for a safe forced landing that the aeroplane may be operated should be determined, which equates to the glide distance from the cruise altitude to the safe forced landing area, following engine failure, assuming still air conditions. States 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.

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

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