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1 September 2003

Your reference number:

To: NPA Distribution List

cc: Mr. G. Rebender, Operations Director
Mr. G Litterschiedt, Maintenance Director
Mr. AB Wassell, SE-IMC WG Chairman
Ms. I van Opzeeland, NPA Administrator

**Re: NPA OPS-29 rev. 1: SINGLE - ENGINE COMMERCIAL OPERATIONS
AT NIGHT AND/OR IN IMC**

Dear Sir/Madam,

The above revision 1 to the NPA OPS-29 is sponsored by the Central JAA.

Background

After being previously circulated as an Advance NPA the subsequent regular NPA-OPS-29 was circulated on 1 July 2002 with a request to submit comments by 30 September 2002. NPA subscribers were invited to specifically comment, among several other issues, on the following proposal for Appendix Z to ACJ OPS 1.247 :

"APPENDIX Z to ACJ OPS 1.247 MAINTENANCE AND RELIABILITY

Maintenance procedures appropriate to SE-IMC Operations should be determined by the Authorities.

[It is intended that some comments will be raised by Maintenance organisations, during the consultation]"

As a part of a review of the comments submitted during this consultation, the JAA Maintenance Division (MD), after internal consultations with the Maintenance Sectorial Team (MST), developed a new text for Appendix Z. They also proposed some additional maintenance related changes in the other parts of this NPA. After further consultations with JAA MD and agreeing some amendments to the proposed text, the SE-IMC Working Group in charge of reviewing of all comments and preparation of the final text incorporated these new maintenance related texts into the Draft Final Rule main text.

The revised text (version 8b) of the Draft Final Rule with these maintenance related texts incorporated was presented to the OST meeting held on 12 May 2003.

The OST meeting raised a procedural question about the whole consultation process, particularly whether all the requirements of the JAR-11 were met in relation to the new text of Appendix Z. This new text was not part of the original NPA as circulated on 1 July 2002 and went only through a limited internal consultation within the MST.

The meeting decided on their “NAA only” session to seek advice from the JAA Regulation Director and the Regulation Sectorial Team (RST) on question whether a new round of public consultation of the new texts should be considered..

Following this request, the Regulations Director launched this process with RST. After evaluation of the responses received from the RST members and also taking into account the JAA Operations Division’s position, a common decision was taken to re-circulate the full text of Draft Final Rule as a revision 1 of the NPA OPS-29. This would also allow aviation public to fully comment on the other maintenance related amendments newly introduced into the main text together with Appendix Z.

Therefore the NPA subscribers are hereby invited to provide comments on Appendix Z to ACJ OPS 1.247 and on newly incorporated maintenance related texts which are, for easy recognition, highlighted (read also information on these paragraphs in the introductory “Justification”).

Please note that it is not the intent of this second round of consultation to generate new comments on the other parts of this NPA OPS-29 rev .1 (other than those related to maintenance) because these are result of the process which already allowed for two rounds of consultation (as an A-NPA and NPA OPS-29).

General

The NPA is the standard JAA procedure for consultation with the aviation community. In addition to this JAA process the National Authorities may also perform their own consultation.

The objective of the NPA consultation is to inform interested parties of the current position and to receive comments on the draft in the scope defined above. This means that the draft text is not necessarily the final text.

The JAA Committee expects that within the above perspective your organisation will participate efficiently in the NPA consultation. Your organisation is now invited to consider the NPA and submit comments by 1 December 2003. If no comments from your organisation by that date your agreement will be assumed.

Y Morier
Regulation Director

JOINT AVIATION AUTHORITIES

NOTICE OF PROPOSED AMENDMENT (NPA) COMMENT FORM

1. NPA NUMBER: NPA OPS-29 revision 1

Affected Requirement paragraph:

Affected ACJ/AMJ or AMC/IEM paragraph:

2. POSITION: (cross out the parts that are not applicable)

Agree / Accept / No comment

Propose different text / General comment

Propose to delete paragraph

3. PROPOSED TEXT/COMMENT:

Reason(s) for proposed text/comment:

4. ORGANISATION :
Address :

Phone :
Fax :

5. SIGNATURE
Name :

Date:

GUIDELINES TO COMMENT ON AN NPA

- 1.. For a better handling of comments we strongly recommend commentors to use this form.
- 2.. Please use **one form per comment**.
- 3.. If there is insufficient space on the form, use attachments and summarise your comments on the form.
- 4.. In case of disagreement, commentors should be aware that failure to explain the reason(s) for disagreeing may well result in the comments being laid aside for lack of understanding.
For the same reason, the commentor should explain his/her position for deleting a paragraph.
- 5.. All comments must be sent to the NPA Administrator at Central JAA (email: iopzeeland@jaa.nl) unless otherwise indicated in the NPA.
- 6.. Please note that, unless an extension period is granted, comments received after the stated comment date (see letter) will only be taken into account if practical.

NPA OPS-29 revision 1: JAR-OPS 1
SINGLE-ENGINE COMMERCIAL OPERATIONS
AT NIGHT AND/OR IN IMC

Justification.

The work of the SE-IMC Working Group has been reviewed by the Central JAA. All comments received in relation to the NPA OPS-29 have been reviewed and have been dealt with correctly as noted in the minutes of the sponsoring OST on 12 May 2003. The Comment Response Document has been amended to take account of the advice of the OST and to address the additional comments received from the RST, OST and MST during their review process (approximately 400 comments in total). It was concluded that procedural requirements of the JAR-11 were followed.

Nevertheless, comments have been received stating that the development of Appendix Z (Maintenance Standards) has not been subjected to public scrutiny. This is correct as the text, developed by the MST, was not available at the time of the issue of NPA OPS-29 in July 2002 even though commenters were invited to submit proposals as part of the comment process. None did so although many commenters stated that no special, additional requirements were necessary over and above those of JAR OPS-M and JAR-145.

To satisfy this call for a further review, the text of Appendix Z is published herewith for formal public review. Although the text of the full rule/guidance material proposed to sanction single-engine operations at night or IMC is provided so that Appendix Z can be seen in its correct context, no further comments on this are requested. In addition, changes were made to the main text to reflect the maintenance issues covered by Appendix Z, which should also be taken into consideration in this consultation.

The first draft of Appendix Z was sent to the Working Group in January 2003: this was reviewed by the Working Group in February, but it was not until 4 March that it was possible to have the first discussion between representatives of the Working Group and the JAA Maintenance Division. The output of this meeting was subjected to a full consultation by the MST from which 11 comments were received. The Working Group has addressed these and the outcome has been recorded in the Comment Response Document.

The main changes relating to maintenance in the proposed rule and guidance material are detailed below:

- a) JAR-OPS 1.247 (a) (8): New text developed to cover changes required to the Maintenance Management Exposition.

- b) Appendix 2 to JAR-OPS 1.247, 2: Defines the maintenance responsibilities of an AOC holder.
- c) ACJ JAR-OPS 1.247, 1 General, (c): Gives guidance on maintenance responsibilities. A Note draws attention to Appendix Z.
- d) ACJ JAR-OPS 1.247, 3.3: Gives guidance on maintenance activities necessary for Operator approval.
- e) ACJ JAR-OPS 1.247, 3.4.3: Gives guidance to ensure maintenance has been completed satisfactorily.
- f) ACJ JAR-OPS 1.247, 3.7 (6): Give guidance on what has to be reported and is linked to similar guidance provided within Appendix Z.

PROPOSED AMENDMENTS TO JAR-OPS 1,

Modify JAR-OPS 1.240 as shown:

JAR-OPS 1.240 - Routes and Areas of Operation

(a) An operator shall ensure that operations are only conducted along such routes or within such areas, for which:

...

(6) **Except as provided for by JAR-OPS 1.247**, if single-engine aeroplanes are used, surfaces are available which permit a safe forced landing to be executed.

Add a new paragraph JAR OPS 1.247:

JAR-OPS 1.247 Specially Approved Operations with single-engine aeroplanes. (See ACJ OPS 1.247)

(a) An operator shall not operate a single-engine Class B aeroplane at night and/or in IMC conditions unless the following are complied with -

- (1) The aeroplane's type certificate includes an appropriate certification basis which shall be to a recognised airworthiness code not older than JAR-23 (Initial Issue), or FAR23 through Amendment 28. For stalling speeds above 61 kt, an acceptable equivalent safety case must be provided;
- (2) The aeroplane complies with specific additional requirements for such operations (See Appendix 1);
- (3) An application for such operations is made in a form and manner acceptable to the Authority;
- (4) An acceptable level of propulsion system reliability can be or has been achieved in service by the world fleet for the particular airframe-engine combination. This reliability shall be established by the TCH and/or STC Holder and approved by the Authority. Additional testing or other relevant data may be considered as a compensating factor for insufficient service experience;
- (5) The operator has been approved by the Authority for such operations;
- (6) Specific procedures for ensuring the intended levels of continued airworthiness and reliability of the aeroplane and its propulsion system are defined and approved by the relevant Authority;
- (7) The Air Operator's Certificate contains the relevant information (See Appendix 2);
- (8) The Operator's Maintenance Management Exposition (MME) (See JAR-OPS 1 Subpart M) includes the appropriate policies and procedures and, where applicable, those associated with the coordination of any maintenance accomplishment procedures used by a Maintenance Organisation under JAR-145 (See Appendix 2).

(b) (1) An operator shall ensure that the routings and cruise altitude shall, to the extent reasonably practical, be selected so as to have a Landing Site (See Appendix X to ACJ OPS 1.247) within gliding range. For operations over water or above inhospitable terrain, the risk period (when a Landing Site is not within gliding range) shall not exceed 15 minutes.

- (2) If the 15-minute risk period is used, then carriage of appropriate survival equipment shall be specified by the Operator and shall be acceptable to the Authority.
- (c) Operators shall establish procedures, which shall be approved by the Authority, for crew actions following a Propulsion Unit failure: these procedures shall cover all phases of flight and include forced landing procedures in all weather conditions.

Appendix 1 to JAR-OPS 1.247

Additional Certification Items - Systems and Equipment Requirements

In addition to the requirements of JAR-OPS 1, Subparts K and L, the aeroplane shall be fitted with the items of equipment (primary systems) listed below:

- (i) Two separate electrical generating systems, each one capable of supplying adequate power for all essential flight instruments, navigation systems and aeroplane systems required for continued flight to the destination *or* alternate.
- (ii) Two attitude indicators, powered from independent sources
- (iii) For passenger operations, a shoulder harness or a safety belt with a diagonal shoulder strap for each passenger seat.
- (iv) Airborne weather radar equipment.
- (v) In a pressurised aeroplane, sufficient additional oxygen for all occupants to allow descent following engine failure from the maximum certificated cruising altitude, to be made at the best range gliding speed and in the best gliding configuration, assuming the maximum cabin leak rate, until sustained cabin altitudes below 13,000 feet are reached.
- (vi) An area navigation system using equipment qualified for approach accuracies (according to JTSC-C129a, Class A1) and capable of being programmed with the positions of aerodromes and emergency Landing Sites. The data needed for pre-flight programming must come from an approved database supplier or be independently verified. Pre-programmed positions shall not be altered in flight.
- (vii) A radio altimeter.
(Note : Instruments showing closure rate, for example by use of an analogue display are considered preferable).
- (viii) A landing light, capable of illuminating the touchdown point from 200 feet on the power-off glide path.
- (ix) An emergency electrical supply system (battery) of sufficient capacity and endurance capable of providing power following the failure of all generated power, for those additional loads essential for:
 - (a) Essential flight instruments and area navigation during descent from maximum operating altitude after engine failure;
 - (b) The means to provide for one attempt at engine restart;
 - (c) If appropriate, the extension of landing gear and flaps;
 - (d) Use of the radio altimeter throughout the landing approach;
 - (e) A landing light;
 - (f) One pitot heater;
 - (g) If appropriate, means to ensure a clear view for landing.
- (x) An ignition system capable of operation for the full duration of any flight.

- (xi) A particle detector system that monitors the engine and reduction gearbox, and which includes a flight deck caution indication.
- (xii) An engine control system which incorporates, within its design, a secondary control system, mechanically and electrically separate from the primary control, which permits a diversion to be made to a suitable aerodrome in the event of a failure of the primary engine control system.

Appendix 2 to JAR-OPS 1.247

Air Operator's Certificate

1 An aeroplane shall not be operated on a single-engine night and/or IMC flight unless the AOC includes specific approval for such operations. The following will be specified in the Operations Specifications:

- The particular airframe/engine combination, including the current type design standard for the intended operation;
- The identification of those individual aeroplanes designated for single-engine night and/or IMC operation by make, model and registration.
- The authorised areas and/or routes of operation.

2 The Operator's Maintenance Management Exposition shall describe maintenance management specific to single-engine night and/or IMC operation.

Modify JAR-OPS 1.295 as shown:

JAR - OPS 1.295 Selection of aerodromes

...

(b) (4) For operations approved under JAR-OPS 1.247, 30 minutes flight time.

...

Modify Appendix 1 to JAR-OPS 1.430 as shown:

Appendix 1 to JAR-OPS 1.430 Aerodrome operating minima

(a) *Take-off minima*

...

(3) *Required RVR/Visibility*

...

(iii) For single-engine aeroplane as provided by JAR-OPS 1.247 (See ACJ OPS 1.247).

Modify JAR-OPS 1.525 as shown:

JAR - OPS 1.525 General

(a) **Except as provided for by JAR-OPS 1.247**, an operator shall not operate a single-engine aeroplane:

- (1) At night; or
- (2) In Instrument Meteorological Conditions except under Special Visual Flight Rules.

Note: Limitations on the operation of single-engine aeroplanes are covered by JAR - OPS 1.240(a)(6).

(b) An operator shall treat two-engine aeroplanes which do not meet the climb requirements of Appendix 1 to JAR - OPS 1.525(b) as single-engine aeroplanes.

Modify JAR-OPS 1.542 as shown:

**JAR - OPS 1.542 En-Route – Single-engine aeroplanes
(See IEM OPS 1.542)**

Except as provided for by JAR-OPS 1.247:

- (a)
- (b)

Add a new ACJ OPS 1.247:

ACJ OPS 1.247

1 GENERAL

This ACJ contains guidance material for airworthiness and operational regulations to ensure the safe operation of single-engine aeroplanes, powered typically with a single turbopropeller engine, at night or in conditions of IMC, for passenger operations and/or the carriage of freight.

- (a) Airworthiness guidance includes:
 - (i) The engine and airframe reliability criteria necessary before operations may commence;
 - (ii) Additional equipment necessary for such operations;
 - (iii) Information relating to the continued assurance of the safety of such operations.
- (b) Operational guidance necessary for Operational approval includes:

- (i) Consideration of additional equipment;
- (ii) Additional navigation and route planning criteria;
- (iii) Flight Crew training.

(c) Maintenance guidance includes:

- (i) Consideration of conditions for release to service;
- (ii) Separate parts control, where appropriate, to cover approved build standard changes introduced in accordance with this ACJ;
- (iii) A reporting system in accordance with this ACJ;
- (iv) A reliability monitoring system to monitor the engine together with those additional systems and equipment set out in Appendix 1.

Note: For maintenance standards see Appendix Z.

2.0 TYPE DESIGN CERTIFICATION / VALIDATION CONSIDERATIONS

2.1 Introduction

The suitability of the design features of an aeroplane type intended to be used for single-engine night and/or IMC operations will be determined by the Authority by carrying out an evaluation and flight test programme. These should address the additional requirements as defined for night and/or IMC operations, in accordance with type certification procedures and taking in-service experience into account. In some cases, modifications to systems may be necessary, hence any element of additional certification must be addressed by the Type Certificate Holder, STC Holder or considered as additional operational requirements.

2.2 Reliability and Design Safety Objectives

(a) JAR-OPS 1.247 (a) (4) requires that the propulsion system reliability of the world fleet is judged to be at an acceptable level. The world fleets of airframe and propulsion systems of the types to be used in single-engine night and/or IMC operations should have accumulated sufficient experience in service.

(b) To achieve the safety objective of (a) above, the data considered relevant and reliable for the engine-airframe combination should have demonstrated, or be likely to demonstrate, a rate of propulsion system in-flight shutdown, or loss of power for all causes such that a forced landing is inevitable, of less than 10 per 10⁶ hours. An event monitoring system should be established by the Type Certificate Holders to track this rate.

The in-service experience of the intended airframe/propulsion system combination should be at least 20,000 hours, demonstrating the required level of reliability. If this experience has not been accumulated, but if experience exists for a similar or related type of airframe and propulsion system, then an equivalent safety argument may be developed by the Type Certificate Holder in order to demonstrate that the reliability criteria is achievable.

2.3 Additional AFM Information

Additional AFM information should be produced where existing information is inadequate or has changed as a result of the introduction of single-engine Night and/or IMC Operations. This may relate to:

- (a) Limitations;
- (b) Procedures following propulsion system failure in any phase of flight;
- (c) Procedures for the use of engine ignition systems;
- (d) Procedures for flight in icing conditions;
- (e) Revisions to performance;
- (f) Revisions to configurations;
- (g) Additional equipment required by Airworthiness or Operational regulations;
- (h) Markings and Placards;
- (i) Text to the effect that the type design reliability and performance of the airframe/engine combination have been evaluated in accordance with this ACJ, and found suitable for single-engine night and/or IMC operations, and that the Type Design Approval does not constitute Operational approval to conduct single-engine night and/or IMC operations.

2.4. Continued Airworthiness

An event monitoring system, to satisfy the Safety Objectives of paragraph 2.2 of this ACJ, should cover the in-service reliability of the airframe / propulsion system combination. The data generated by this monitoring system should be forwarded to and reviewed by both the Type Certificate Holders of the airframe and of the engine/propeller. The system would be expected to contain, at least, the following elements:

- (i) A reliability programme where those engine parameters critical to engine performance and condition are monitored and recorded;
- (ii) A reporting system, devised by the operator and acceptable to the authority, that will provide his Authority and the Type Certificate Holders with a record of events in accordance with JAA TGM/21/04 together with additional propulsion system reliability information: this should include minor incidents that might have led to significant events. This system should include details of the relevant build standards at the time of any event to enable the effect of the modification standard to be assessed;
- (iii) A review by the Type Certificate Holders of operational data supplied in accordance with JAR-OPS 1.420 and ACJ OPS 1.247, 3.7 (6) as part of a review of worldwide data. Proposals for corrective action should be developed in order to maintain the desired level of propulsion system reliability. Due allowance may be made for events which are judged as very unlikely to re-occur following the adoption of appropriate design modifications, maintenance or operational procedures.

All data should be reviewed by the appropriate Authority to ensure that the products have an appropriate reliability level and that the design approval and safety assumptions, for compliance with JAR-OPS 1.247, are maintained.

3.0 OPERATIONAL APPROVAL

In addition to requirements contained elsewhere in JAR-OPS 1, operational approval should be subject to the following conditions:

3.1 In-service Experience.

In considering an operator's application for approval of night and/or IMC operations, an assessment should be made of the operator's overall safety record, past performance, flight crew training and experience and maintenance management. The data provided with the request should substantiate the operator's ability and competence to conduct and support these operations.

The Authority may extend the requirements as regards the above prior to granting approval. Temporary restrictions may be applied (e.g. specific routes) until such time as the Authority is satisfied.

3.2 Propulsion System Reliability

Propulsion system reliability should be as agreed by the Authority (See paragraph 2.2 of this ACJ).

3.3 Maintenance.

3.3.1 Maintenance Programme

The Maintenance Programme should be designed to take into account the Type Certificate Holder's recommendations for those systems and equipment requirements specified in Appendix 1 to JAR-OPS 1.247 and the output required from the reliability programme as defined in subparagraph. 1(c) (iv) and paragraph. 2.4 of this ACJ.

3.3.2 Maintenance Personnel

Maintenance personnel (whether involved via JAR-OPS M or JAR-145) should have the training, knowledge and skills appropriate to the tasks defined in this ACJ.

3.4 Flight Preparation and In-flight Considerations

3.4.1 General

The flight preparation and in-flight considerations in this section amplify or add to the requirements contained in JAR-OPS 1 and specifically apply to single-engine night and/or IMC operations.

3.4.2 Minimum Equipment List

The operator's MEL, based upon the approved Type Certificate Holder's MMEL should specifically address those items necessary for single-engine night and/or IMC operations.

3.4.3 Verification after Maintenance

The Operator should develop a verification programme and associated procedures. The purpose of these is to ensure corrective action following either a failure or adverse trends being identified in a primary system required by single-engine operations at night and/or in IMC. The procedures should clearly set out associated responsibilities and the conditions which require verification action.

3.4.4 Minima

(a) Planning minima

Planning minima shall be in accordance with JAR-OPS 1.297. Planning procedures should include the consideration of en-route weather information relevant to Landing Sites (See Appendix X to this ACJ) to the extent that such information is available from local or other sources.

(b) Operating minima

The operator should specify aerodrome operating minima, according to JAR-OPS 1.225 and should include (i) and (ii) below.

(i) Operational minima for Take-off. The minimum RVR/Visibility specified for take-off should in no case be lower than the relevant value from Table 1 of Appendix 1 to JAR-OPS 1.430. Values below 800m should be specifically approved by the Authority. Where there is a particular need to see and avoid obstacles during departure or in case of a forced landing, additional conditions (e.g. minimum ceiling) should be specified.

(ii) Operational Minima for landing should be no lower than the published minima in accordance with JAR-OPS 1.430.

3.5 Flight Crew Training and Checking

3.5.1 The operator should specify in the Operations Manual minimum experience requirements for pilots performing Single-Engine Aeroplane Commercial Air Transport Operations at Night or in Instrument Meteorological Conditions. The minimum requirements should be no less restrictive than those of JAR-OPS 1.960 (a)(1)(ii), with the exception that no multi-engine experience is required. For single pilot operations, the experience requirements of Appendix 2 to JAR-OPS 1.940 should be used by the operator.

3.5.2 The operator's flight crew training and checking, established in accordance with JAR-OPS subpart N, should incorporate the elements listed in Appendix Y to this ACJ.

3.6 Route Approval/Planning Considerations

The operator should demonstrate to the Authority his capability safely to carry out the operation in all proposed areas (and, where applicable, on all specified routes). In addition to the general

planning requirements of JAR-OPS 1; the following specific requirements should be met for single-engine night and/or IMC operations:

a) Departure

The operator should select and specify in the operational flight plan a take-off alternate if it would not be possible to return to the aerodrome of departure for meteorological or performance reasons. The take-off alternate should be located within 30 minutes flight time at normal cruising speed in still air conditions, based on the actual take-off mass (See JAR-OPS 1.295 (b) (4)).

The operator should ensure that, to the extent reasonably practicable, the only Standard Instrument Departures (SID) to be followed are those where the flight path would ensure that, in the event of a loss of power, the aeroplane could land on an aerodrome, Landing Site or in a clear area.

b) Arrival

The operator should ensure that, to the extent practicable, the only Standard Instrument Arrivals (STAR) to be followed are those where the flight path would ensure that, in the event of a loss of power, the aeroplane could land on an aerodrome, Landing Site or in a clear area.

c) En Route

The operator should ensure that, to the extent reasonably practical, any planned or diversionary route should be selected, and be flown at an altitude, such that in the event of a loss of power, the pilot would be able to make a safe landing at a Landing Site.

Landing Sites suitable for a diversion or forced landing should be programmed into the area navigation system so that track and distance are immediately and continuously available (See also Appendix 1 to JAR-OPS 1.247, sub-paragraph (vi)).

d) ATC Flight Plan

The status of the flight (single-engine flight at night and/or IMC) should be made clear to ATC.

3.7 Operations Manual

The following information and guidance should be included in the Operations Manual, and accepted by the Authority:

1) Aeroplane Equipment

Details of all equipment required by Appendix 1 to JAR-OPS 1.247 and operating procedures for use of that equipment in normal, abnormal and emergency conditions.

2) Route and Aerodrome Information

- (i) Approved Areas and/or Routes
- (ii) Planning Minima (See 3.4.4(a) of this ACJ)
- (iii) Aerodrome Operating Minima
- (iv) Landing Sites (including elevation, preferred landing direction and obstacles in the area)
- (v) Procedure for assessing acceptability of Landing Sites

3) Minimum Equipment List (MEL)

The MEL should show which equipment is required for single-engine night and/or IMC operations.

4) Operating Procedures

Normal, Abnormal and Emergency Procedures that relate specifically to single-engine night and/or IMC operations should be specified.

5) Training and Checking Requirements

The Training Manual (Operations Manual Part D) should include the flight crew training and checking requirements (See 3.5.1. of this ACJ)

6) Reporting

In addition to the requirements of JAR-OPS 1.430 and in accordance with ACJ OPS 1.247, 2.4 (ii), the commander should submit reports as required by paragraph 2.2 of this ACJ to include the following:

- (i) Problems with single-engine night and/or IMC primary systems (See JAR-OPS 1.247, Appendix 1);
- (ii) Diversion or turn-back;
- (iii) Un-commanded power changes, power loss or surges;
- (iv) Inability to control the engine or obtain desired power;
- (v) Other failures or events which could lead to loss of power.

(See Appendix Z to this ACJ, paragraphs 5 and 9).

3.8 Validation of Operational Capability

Observation by the Authority of a validation flight, simulating the proposed operation in the aeroplane should be carried out before an approval is granted. This should include normal planning, preflight and postflight procedures, and a demonstration of the following simulated emergency procedures, in the most adverse conditions for which approval is sought including:

- a. Total failure of the propulsion system;
- b. Total loss of normal generated electrical power

APPENDIX X to ACJ OPS 1.247 LANDING SITES

A Landing Site is an aerodrome or an area where a landing can be safely performed by day or night without injury to passengers and crew. It should be assessed by the operator as acceptable for carrying out a safe forced landing. For such Landing Sites on scheduled routes and, as far as is practicable on all other routes, the assessment should include confirmation of terrain characteristics and the presence of obstacles.

APPENDIX Y to ACJ OPS 1.247 CREW TRAINING

Conversion Training and Checking and Recurrent Training and Checking for Single-engine night and/or in IMC (Other than under Special Visual Flight Rules).

Conversion Training and Checking and Recurrent Training and Checking should include all training and checking required for Day VFR operation. Any pilot carrying out flights at Night or in IMC should have completed all the guidance of this ACJ.

Where appropriate, Type/Class Rating training may account for part of the Conversion Training requirement.

a) Conversion Training Requirements

Conversion training should be conducted in accordance with a syllabus devised for the operation of single-engine aeroplanes at night and in IMC and include at least the following, in addition to the relevant requirements of JAR-OPS Subpart N:

- 1) Normal Procedures:
 - (i) Anti- and de-icing systems operation
 - (ii) Navigation systems procedures
 - (iii) Radar positioning and vectoring when available
 - (iv) Use of Radio Altimeter
- 2) Abnormal Procedures
 - (i) Anti- and de-icing system failures
 - (ii) Navigation system failure
 - (iii) Pressurisation system failures
 - (iv) Electrical System failures
 - (v) Emergency descent in simulated IMC
- 3) Emergency Procedures
 - (i) Engine failure shortly after take-off
 - (ii) Engine failure other than above:
 - Recognition of failure; symptoms, type of failure, actions to be taken and consequences;
 - (iii) Depressurisation
 - (iv) Engine re-start procedures
 - Choice of aerodrome or Landing Site
 - Use of Area Navigation System
 - (v) ATC communications
 - (vi) Use of radar positioning and vectoring (when available)
 - (vii) Use of Radio Altimeter
 - (viii) Practice forced landing procedure to touchdown in simulated IMC, with zero thrust set, and operating on simulated emergency electrical power

b) Use of simulator (Conversion Training)

- 1) A flight simulator, qualified in accordance with JAR-STD and approved for the purpose, may be used to carry out training in the items required in (a) above for single-

engine night and/or IMC Conversion Training.

2) A flight training device, qualified in accordance with JAR-STD and approved for the purpose, may be used to carry out training in Normal Procedures specified in (a)(1) above.

c) Conversion Checking

The following items should be included in the list of required items to be checked following completion of single-engine night and/or IMC Conversion Training, normally as part of the Operator Proficiency Check (OPC):

- (i) Practice forced landing procedure to touchdown in simulated IMC, with zero thrust set, and operating on simulated emergency electrical power
- (ii) Engine re-start procedures
- (iii) Depressurisation following engine failure
- (iv) Emergency descent in simulated IMC

d) Use of simulator (Conversion Checking)

A flight simulator, qualified in accordance with JAR-STD and approved for the purpose, may be used to carry out checking of the items required in (c) above for single-engine night and/or IMC Conversion Checking.

e) Recurrent Training

Recurrent training for single-engine night and/or IMC should be included in the Recurrent Training required by JAR-OPS 1 for pilots carrying out single-engine night and/or IMC operations. This training should include all the items in (a).

f) Use of Simulator (Recurrent Training)

Following Conversion Training and Checking, the next Recurrent Training session may be carried out either on the aeroplane, or on a full flight simulator, qualified in accordance with JAR-STD and approved for the purpose. Thereafter, Recurrent Training may be carried out alternately on the aeroplane and such a simulator.

g) Recurrent Checking

The following items should be included in the list of required items to be checked following completion of single-engine night and/or IMC Recurrent Training, normally as part of the Operator Proficiency Check (OPC):

- (i) Practice forced landing procedure to touchdown in simulated IMC, with zero thrust set, and operating on simulated emergency electrical power
- (ii) Engine re-start procedures.
- (iii) Depressurisation following engine failure
- (iv) Emergency descent in simulated IMC

h) Use of Simulator (Recurrent Checking)

Following Conversion Training and Checking, the next Operator Proficiency Check (OPC) including single-engine night and/or IMC items may be carried out either on the aeroplane, or on a full flight simulator, qualified in accordance with JAR-STD and approved for the purpose. Thereafter, single-engine night and/or IMC OPCs may be carried out either on the aeroplane or in such a simulator.

APPENDIX Z to ACJ OPS 1.247

MAINTENANCE STANDARDS FOR SINGLE-ENGINE OPERATIONS AT NIGHT AND/OR IN IMC

1 GENERAL

Single engine operations at night and/or in IMC requirements should include specific considerations for the certification basis, operations and continued airworthiness which all have maintenance implications. This Appendix sets out those additional maintenance aspects to be addressed by the Operator to satisfy these requirements.

As such maintenance management (JAR-OPS subpart M) and maintenance accomplishment (JAR-145) personnel should be trained in and supported by standards that address the special needs of these operations. Such standards should reflect the applicable Certification Maintenance Procedures (CMP's) published by the Type Certificate Holder (TCH).

Note: For the purposes of this appendix, 'primary systems' are those identified in Appendix 1 to JAR-OPS 1.247

2 STANDARDS AND PROCEDURES

The Operators Maintenance Management Exposition (MME) together with required Operator maintenance programme should contain the standards, guidance and responsibilities necessary to support the intended operations including maintenance of related aeroplane primary systems.

Note: Where different to the Operator, the JAR-145 approved maintenance organization must establish procedures to address the accomplishment of the maintenance set out in this Appendix while also satisfying the standards of the JAR-OPS Operator.

3 MAINTENANCE PROGRAMME

The maintenance programme should be reviewed to ensure that it provides adequate inspection standards to maintain the certification basis of the primary systems for these operations.

From the review, it is expected that specific tasks will be identified which should be annotated as such within the maintenance programme. Where appropriate the Operator may need to develop a service check to verify that the status of the aeroplane and critical items are acceptable for the intended flight.

4 ENGINE MONITORING

In addition the Operator's maintenance programme will ensure that:

The Operator establishes an oil consumption monitoring programme based on manufacturer's recommendations. To monitor trends with reference to the running average consumption; i.e., the monitoring must be continuous and take account of oil added. An engine oil analysis programme should be required at periods recommended by the engine manufacturer. The opportunity to perform frequent (recorded) power checks on a calendar basis should be considered.

Any shop visit, for whatever reason, should have a recorded engine test performed and the engine only released if the engine performs within published parameters and limitations, as agreed with the operator's JAA-NAA.

The programme should also provide for engine condition monitoring describing the parameters to be monitored, method of data collection and corrective action process. They should reflect manufacturer's instructions and industry practice. This monitoring will be used to detect propulsion system deterioration at an early stage to allow for corrective action before safe operation is affected.

5 RELIABILITY PROGRAMME

5.1 A propulsion and primary systems reliability programme should be developed or the existing reliability programme supplemented for the particular engine/airframe combination. This programme should be designed to achieve early identification and prevention of problems, which would affect the ability of the aeroplane to safely perform its intended flight.

Where the single-engine night and/or IMC fleet is part of a larger fleet of the same airframe-engine combination, data from the Operator's total fleet will be acceptable.

Note: Where statistical assessment alone may not be applicable, e.g., when the fleet size is small, the Operator's performance will be reviewed on a case-by-case basis. A & GM Section Two, Part Three TGL 25 provides additional guidance on reliability programmes for numerically small fleets of aeroplanes.

5.2 For engines, the programme should incorporate reporting procedures for all significant events. This information should be readily available (with the supporting data) for use by the Operator, Type Certificate Holder (TCH) and Authority to help establish that the reliability levels set out in paragraph 2.2 of ACJ OPS 1.247 are achieved. Any adverse sustained trend would require an immediate evaluation to be accomplished by the Operator in consultation with the Authority. The evaluation may result in corrective action or operational restrictions being applied.

The engine programme should include, as a minimum, engine hours flown in the period and the in flight shut-down rate for all causes and engine removal rate, both rates on a 12 month moving average basis.

6 MAINTENANCE RECORDS

In addition to the Operators maintenance programme the Operator will need to ensure that:

- a. The additional tasks related to these operations are specifically identified on the Operator's routine work forms and related instructions.
- b. Log books should record maintenance specific to these operations including use of MEL procedures, defect rectification, scheduled maintenance, and system verification procedures.

7 MAINTENANCE PERSONNEL

Involved personnel (those being either maintenance management JAR-OPS M or maintenance

accomplishment personnel JAR-145) should have the knowledge, skills and ability to manage and/or accomplish the requirements of the maintenance for these operations and thus should be specifically trained.

Maintenance training should in addition to normal maintenance training include dedicated maintenance and procedural aspects associated with these operations. The goal of this training is to ensure that all involved personnel are competent to accomplish the specific maintenance management and maintenance tasks.

Qualified personnel are those that have completed the Operator's specific training programme and have satisfactorily performed such tasks under supervision, within the framework of the Operator's/JAR-145 Maintenance Organisation approved procedures of personnel training. Where this includes certification of maintenance they will need to be specifically authorized by an appropriately approved JAR-145 organization in accordance with their procedures.

8 PARTS CONTROL

The Operator should develop a parts control system that ensures the proper parts and configuration are maintained for these operations, which interfaces with the reliability programme. The programme is to include verification that parts installed on an approved aeroplane during parts borrowing or pooling arrangements, as well as those parts used after repair or overhaul, maintain the approved configuration for that aeroplane.

9 REPORTING

a. In addition to the items required to be reported under sub-paragraph 3.7 (6) of ACJ OPS 1.247, the items below relating to maintenance management and maintenance accomplishment should be reported to the appropriate airworthiness Authority and TCH:

- (i) Problems with primary systems (See JAR-OPS 1.247 Appendix 1);
- (ii) Unscheduled removals related to reportable items
- (iii) Inability to control the engine or obtain desired power;

Note: The list is not exhaustive.

b. The report should identify the following:

- (i) Aeroplane identification;
- (ii) Aeroplane make and registration;
- (iii) Total time, cycles and time since new;
- (iv) Build and modification standard as appropriate;
- (v) Where appropriate for engines and components time, cycles and time since last shop visit;
- (vi) Where appropriate for systems, time since overhaul or last inspection of the defective unit;
- (vii) Phase of flight; and
- (viii) Corrective action.