



Advisory Circular (AC)

Performance Credit For Use Of Power And Propeller Blade Pitch During Accelerate Stop And Landing Ground Roll

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1.0 INTRODUCTION..... 2

1.1 Purpose..... 2

1.2 Guidance Applicability..... 2

1.3 Description of Changes..... 2

1.4 Termination 2

2.0 REFERENCES..... 2

2.1 Reference Document 2

2.2 Cancelled Document..... 2

3.0 BACKGROUND..... 2

4.0 ACCEPTABLE MEANS OF COMPLIANCE 3

5.0 AEROPLANE FLIGHT MANUAL (AFM)..... 3

6.0 HEADQUARTERS CONTACT 4

1.0 INTRODUCTION

1.1 Purpose

The purpose of this Advisory Circular (AC) is to provide guidance for the airworthiness approval of Commuter Category Aeroplanes. Like all advisory material, this AC is not mandatory and does not constitute a regulation. It is issued for guidance purposes and to outline a method of compliance with the rules. In lieu of following this method without deviations, the applicant may elect to follow an alternate method, provided the alternate method is also found by Transport Canada to be an acceptable means of complying with the requirements of Chapter 523 of the Airworthiness Manual. Because the method of compliance presented in this AC is not mandatory, the term "must" used herein applies only to an applicant who chooses to follow this particular method without deviations.

This AC applies to Commuter Category turbo propeller powered aeroplanes.

This advisory material is presently the subject of international harmonization, and this AC is issued for use during type approval programs. When harmonization is completed, this AC will be amended, or revoked and the corresponding harmonized advisory material adopted.

1.2 Guidance Applicability

This document is applicable to Headquarters (HQ) and Regional Aircraft Certification personnel, including delegates.

1.3 Description of Changes

This document, formerly AMA No. 523/5A, is reissued as an AC. With the exception of minor editorial changes, the content is unaltered.

1.4 Termination

This document does not have a terminating action. It will however, be reviewed periodically for suitability of content.

2.0 REFERENCES

2.1 Reference Document

It is intended that the following reference material be used in conjunction with this document:

Chapter 523 of the Airworthiness Manual (AWM) — *Normal, Utility, Aerobatic and Commuter Category Aeroplanes*, sections 523.45, 523.55, 523.75, and 523.143.

2.2 Cancelled Document

As of the effective date of this document, AMA No. 523/5A dated 30 June 1999 is cancelled.

3.0 BACKGROUND

Paragraph 523.55(b) "Accelerate Stop Distance", and 523.75(g) "Landing" allow means other than wheel brakes to be used for deceleration provided that the device used is safe and reliable, consistent results can be expected and exceptional skill is not required. Section 523.143 requires that an aircraft be safely controllable during take-off and landing. This AC describes an acceptable means for the use of engine power and propeller blade pitch (limited reverse thrust) in determining the accelerate-stop and landing distances.

In Transport Canada's experience, use of high reverse thrust levels has not been shown to be safe and reliable or produce consistent results due to variations in crosswind conditions, pilot technique, engine power response and propeller blade pitch angles. Credit may therefore be claimed only for thrust levels obtainable at Ground Idle (see paragraph 4.(a)).

4.0 ACCEPTABLE MEANS OF COMPLIANCE

- (a) **Definition** - For the purpose of this AC, *Ground Idle (GI)* is defined as a power and/or propeller blade angle setting which results in not less than zero thrust at zero aircraft speed. It is also known as Ground Fine or Discing.
- (b) **Accelerate-Stop Distance** - Ground Idle may be used during the stop segment of the accelerate-stop distance. For the one-engine-inoperative (OEI) accelerate-stop distance, the propeller of the inoperative engine must be in the position it would take following normal power lever selection. In addition it must be demonstrated that adequate controllability can be maintained under typical operational conditions such as a wet runway and adverse cross-wind. This may be demonstrated on a dry runway with the nosewheel free to swivel.
- (c) **Landing Distance**
 - (i) Ground Idle may be used for ground deceleration. A one-engine-inoperative landing distance (abnormal) must be established in addition to the normal all-engine-operating (AEO) distance. However, for the normal distance, engine failure must still be considered in the late stages of a landing approach in order to comply with 523.75(g)
 - 1) The normal landing distance is the longer of:
 - (A) All-engine-operating (AEO) distance; or
 - (B) The distance obtained assuming engine failure in the final stages of landing approach (prior to touchdown) with the inoperative engine propeller in the position it would take following normal power lever selection. If the resulting distances do not exceed the all-engines-operating landing distances by more than two percent (2%), they are not "noticeably increased" and the all-engines-operating landing distances can be used for the Aeroplane Flight Manual (AFM).
 - 2) The OEI landing distance is the distance obtained with the propeller on the inoperative engine feathered.
 - (ii) It must be shown that adequate controllability can be maintained under typical operational conditions such as a wet runway and adverse crosswind. This may be demonstrated on a dry runway with the nosewheel free to swivel.
 - (iii) Consideration will be given to allowing credit for more reverse thrust than that produced by GI in the performance tests of (i)(1)(B) and (i)(2), provided that adequate controllability is demonstrated with the nosewheel free to swivel and an adverse crosswind of 10 knots.
 - (iv) It should be noted that if the applicant does not wish to establish separate AEO and OEI landing distances, then the landing distance determined according to section 523.75 is the longer of (i)(1)(A), (i)(1)(B) or (i)(2).
- (d) **System Reliability** - It must be shown that the operation of any Flight/Ground interlock system and selection of GI is safe and reliable in both the all-engines-operating and one-engine-inoperative configurations.

5.0 AEROPLANE FLIGHT MANUAL (AFM)

The AFM must state the procedures used to determine the accelerate-stop and landing data. The OEI landing data must be included as part of the applicable abnormal procedures.

6.0 HEADQUARTERS CONTACT

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