Advisory Circular (AC)

Flight Characteristics With Lateral Centre Of Gravity

File No.	5009-6-525	**AC No.**	525-013
RDIMS No.	528468-V3	**Issue No.**	01
Issuing Branch	Aircraft Certification	**Effective Date**	2004-12-01

1.0 INTRODUCTION

1.1 Purpose

The purpose of this Advisory Circular (AC) is to provide guidance material for acceptable means, but not the only means, of demonstrating compliance with the requirements of Chapter 525 of the Airworthiness Manual (AWM), dealing with lateral centre of gravity.

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

1.2 Guidance Applicability

This document is applicable to all Transport Canada personnel, delegates and industry.

1.3 Description of Changes

This document, formerly AMA No. 525/11A, 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 Documents

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

Chapter 525 of the Airworthiness Manual (AWM) — *Transport Category Aeroplanes.*

2.2 Cancelled Document

As of the effective date of this document, AMA No. 525/11A dated 12 November 1999 is cancelled.

3.0 BACKGROUND

The design of current fixed wing aeroplane is such that a significant lateral centre of gravity is possible with wing fuel load asymmetry.

525.161(b) specifically requires that "the aeroplane must maintain lateral and directional trim with the most adverse lateral displacement of the centre of gravity within the relevant operating limitations...". Compliance has often been shown by demonstrating the maximum fuel asymmetry at which it is possible to trim the aeroplane and quoting this (or some lesser number) as an operating limitation. However, section 525.23 requires that "if a weight and centre of gravity combination is allowable only within certain load distribution limits (such as spanwise) that could be inadvertently exceeded, these limits and corresponding weight and centre of gravity combinations must be established". It is further stated that the load distribution limits may not exceed "the limits at which compliance with each applicable flight requirement of this subchapter is shown". Although it is not specifically stated, it is clear that fuel-loading asymmetry should be considered.

Operation of the aircraft within the lateral centre of gravity limits specified in the AFM is considered to be normal operation. Hence, it is appropriate to ensure that, where critical, the flight requirements are met with the maximum permitted lateral centre of gravity, including fuel-loading limitations.

4.0 ACCEPTABLE MEANS OF COMPLIANCE

The following are acceptable means of compliance:

(a) It is acceptable to establish an allowable lateral centre of gravity (C of G) for take-off which is different from the in flight value. If an appreciable lateral C of G is allowed for take-off, then V_{MCA} and the take-off crosswind limitations should be established with this value unless it is demonstrated that the asymmetry has no effect.

(b) The following flight characteristics should be considered with the maximum in-flight lateral C of G:

(i) V_{MCL};

(ii) Directional and Lateral Trim;

(iii) Stall Demonstration, Characteristics and Warning.

In addition other tests may be required depending on the characteristics of the aeroplanes.

(c) Depending on the safety assessment analysis of the fuel system, additional flight characteristics tests may be required to show compliance with 525.1309, e.g. when a probable failure would result in the loading limitation being exceeded.

(d) Since the allowable lateral C of G is usually established as a rolling moment, analysis and/or tests are usually required to determine the critical fuel loading(s) for the permitted lateral C of G.

5.0 AEROPLANE FLIGHT MANUAL (AFM)

The take-off (if applicable), and in-flight lateral C of G limits, as established in section 4, should be presented as operating limitations. When an appreciable lateral centre of gravity can only be obtained from asymmetric fuel loading, then the AFM need only contain the appropriate fuel loading limits.

6.0 HEADQUARTERS CONTACT

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