



Federal Aviation Administration

Memorandum

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Subject: Corrections to TSO-C46a, *Maximum Allowable Airspeed Indicator Systems*, Appendix A

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Introduction

TSO-C46a *Maximum Allowable Airspeed Indicator Systems*, Appendix A, Paragraph (1) and (2) have typographical errors in the equations for calibrating the maximum allowable airspeed pointer. Paragraph (1) addresses altitudes from sea level to altitude where $V_{MO} = M_{MO}$:

$$V_{MO} = C_{SO} \sqrt{\frac{2}{k-1} \left\{ \left[1 + \frac{P}{P_0} \left[\left(\frac{V_M^2}{5C_{SO}^2} + 1 \right) \frac{k}{k-1} - 1 \right] \right] \frac{k-1}{k} - 1 \right\}}$$

Paragraph (2) addresses altitudes where M_{MO} is the limiting factor:

$$V_{MO} = C_{SO} \sqrt{\frac{2}{k-1} \left\{ \left[\frac{P}{P_0} \left[\left(1 + \frac{k-1}{2} \cdot M_{MO}^2 \right) \frac{k}{k-1} - 1 \right] + 1 \right] \frac{k-1}{k} - 1 \right\}}$$

Why Current Version is Incorrect

These equations convert maximum allowable equivalent airspeed to a maximum allowable airspeed, using the calibrated and equivalent airspeed equations. However, the ratio of specific heat for air, $k/(k-1)$ and $(k-1)/k$, was treated as a multiplier instead of an exponent in both equations, leading to incorrect results.

Corrected Version

The corrected equations are based on the “Effect of Mach number and altitude on calibrated air

speed” chart in the current TSO-C46a. This table is used by all manufacturers. From this date, applicants must use the following equations in lieu of the equation in Appendix A Paragraphs (1) and (2) above. The corrected equations show the ratio of specific heats for air, $k/(k-1)$ and $(k-1)/k$, in exponential form.

Paragraph (1) is changed as follows for altitudes from sea level to altitude where $V_{MO} = M_{MO}$:

$$V_{MO} = C_{SO} \sqrt{\frac{2}{k-1} \left\{ \left(\frac{P}{P_o} \left[\left(1 + \frac{k-1}{2} \cdot \frac{V_M^2}{C_{SO}^2 (P/P_o)} \right)^{\frac{k}{k-1}} - 1 \right] + 1 \right)^{\frac{k-1}{k}} - 1 \right\}}$$

Paragraph (2) is changed as follows for altitudes where M_{MO} is limiting factor:

$$V_{MO} = C_{SO} \sqrt{\frac{2}{k-1} \left\{ \left(\frac{P}{P_o} \left[\left(1 + \frac{k-1}{2} \cdot M_{MO}^2 \right)^{\frac{k}{k-1}} - 1 \right] + 1 \right)^{\frac{k-1}{k}} - 1 \right\}}$$

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