

From CAS to EAS – Calculating and Plotting the Compressibility Correction Chart

How to convert CAS to EAS in a fast way?

Relatively cumbersome is the conversion between calibrated airspeed (CAS) and equivalent airspeed (EAS), because it involves the calculation of incompressible flow. Equations are quite long. This report uses the equations to calculate and construct the CAS to EAS Compressibility Chart. In this way, the result can be read quickly from the chart.

PURPOSE

Relatively cumbersome is the conversion between calibrated airspeed (CAS) and equivalent airspeed (EAS), because it involves the calculation of incompressible flow. Equations are quite long. If calculations on the Computer are required, a conversion with these equations is necessary. In contrast, this report uses the equations to calculate and construct the CAS to EAS Compressibility Correction Chart (Figure 1). In this way, the result can be read quickly from the chart.

METHODOLOGY

In Excel, compressibility correction is achieved through equations from flight mechanics. The correction is calculated with two distinct functions; one based on Mach number and the other on pressure altitude. These functions are graphed individually and then integrated to produce the Compressibility Correction Chart.

FINDINGS

The Compressibility Correction Chart was successfully created as a 2-D graph. Upon comparison with other correction charts, the determined correction for CAS showed no variation, proving the accuracy of the findings.

RESEARCH LIMITATIONS

Due to a limitation in Excel, which allows for 255 series for plotting, the range of input parameters had to be adjusted accordingly. The iterations of altitude span 1000 ft intervals, while those for Mach Number span 0.05 intervals.

PRACTICAL IMPLICATIONS

Pilots can easily use the Compressibility Correction Chart for a quick and highly accurate conversion between CAS and EAS.

ORIGINALITY

CAS-EAS Compressibility Correction Charts are also available from other sources. This report presents a creation of the 2-D Correction Chart using Excel as spreadsheet.

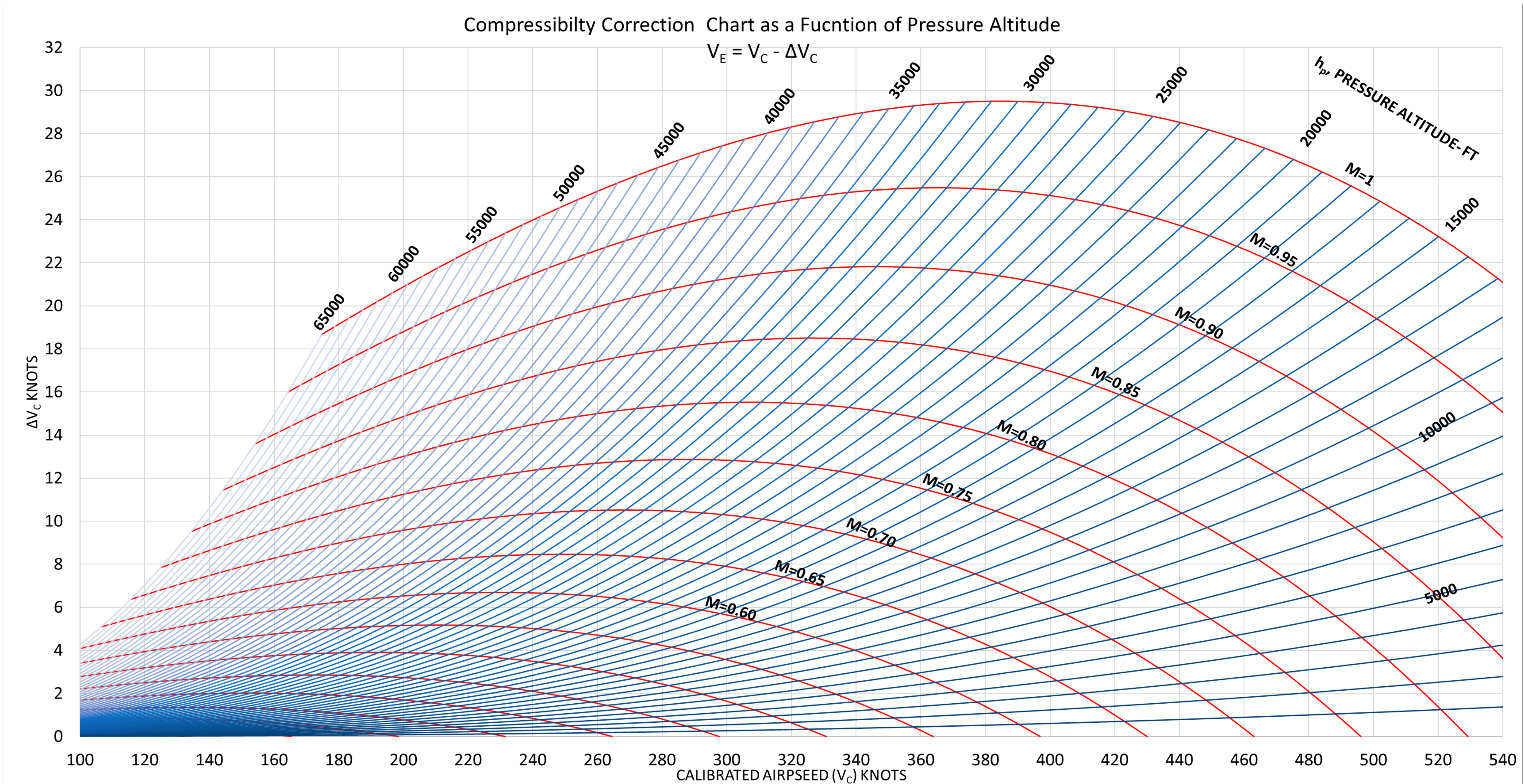


Figure 1: The Compressibility Correction Chart: Converting from CAS to EAS.

All details in the Bachelor Thesis of Sarmiento Beltran (2024):
<https://nbn-resolving.org/urn:nbn:de:gbv:18302-aero2024-03-27.012>

