

Appendix C: Airspeed

A number of steps are required to correct the value of airspeed as displayed on the airspeed indicator to true airspeed:

$$V_{IAS} = V_i + \Delta V_i$$

where V_i = instrument reading of airspeed
 ΔV_i = instrument error (usually small)
 V_{IAS} = indicated airspeed

$$V_{CAS} = V_{IAS} + \Delta V_P$$

where ΔV_P = position error (usually small)
 V_{CAS} = calibrated airspeed

$$V_{EAS} = V_{CAS} - \Delta V_C$$

where ΔV_C = compressibility correction (Fig. C.1)
 V_{EAS} = equivalent airspeed

$$V_{TAS} = V_{EAS} \frac{1}{\sqrt{\sigma}}$$

where $\sigma = \frac{\rho_{ambient}}{\rho_{sea\ level}}$ (Appendix B)*
 V_{TAS} = true airspeed

$$M = \frac{V_{TAS}}{a}$$

where a = local speed of sound (Appendix B)*
 M = Mach number

* Either table lookup, or derive using methods in annotation to Appendix B.

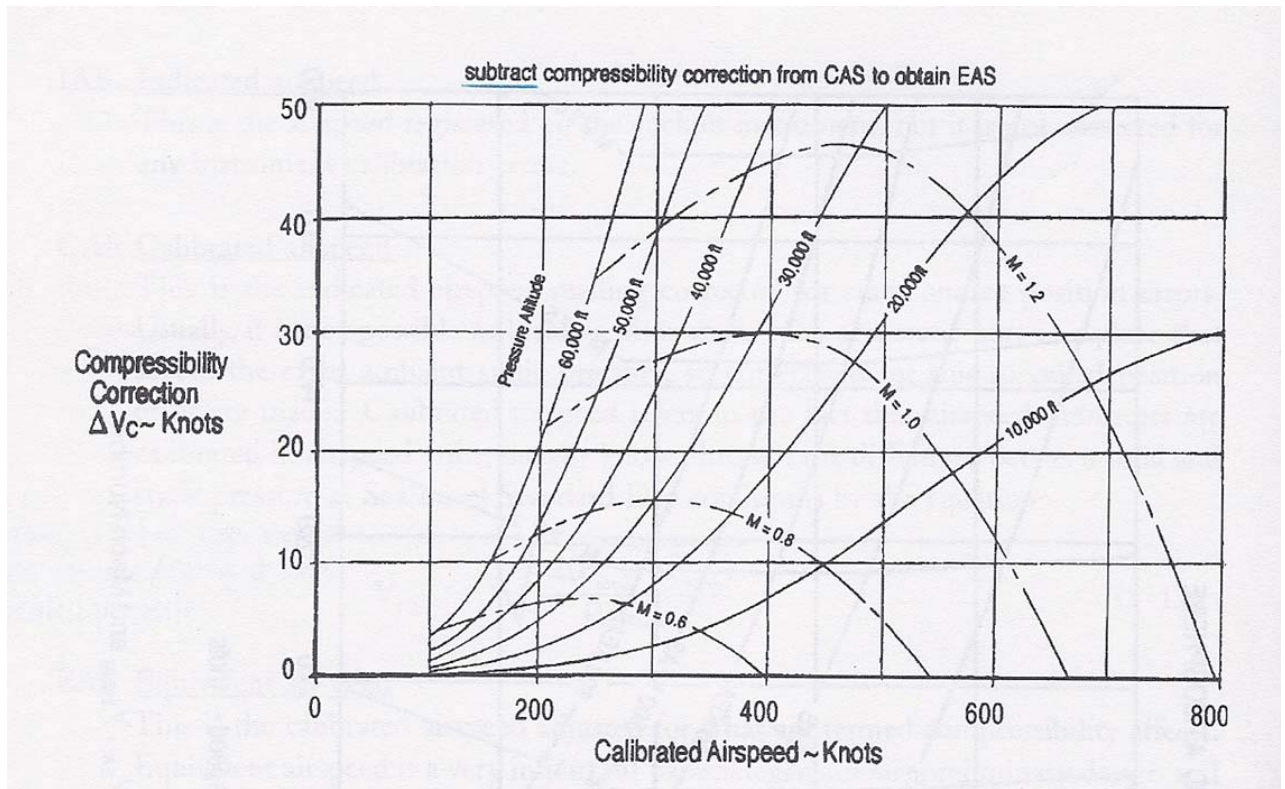


Fig. C.1 Airspeed Compressibility Correction

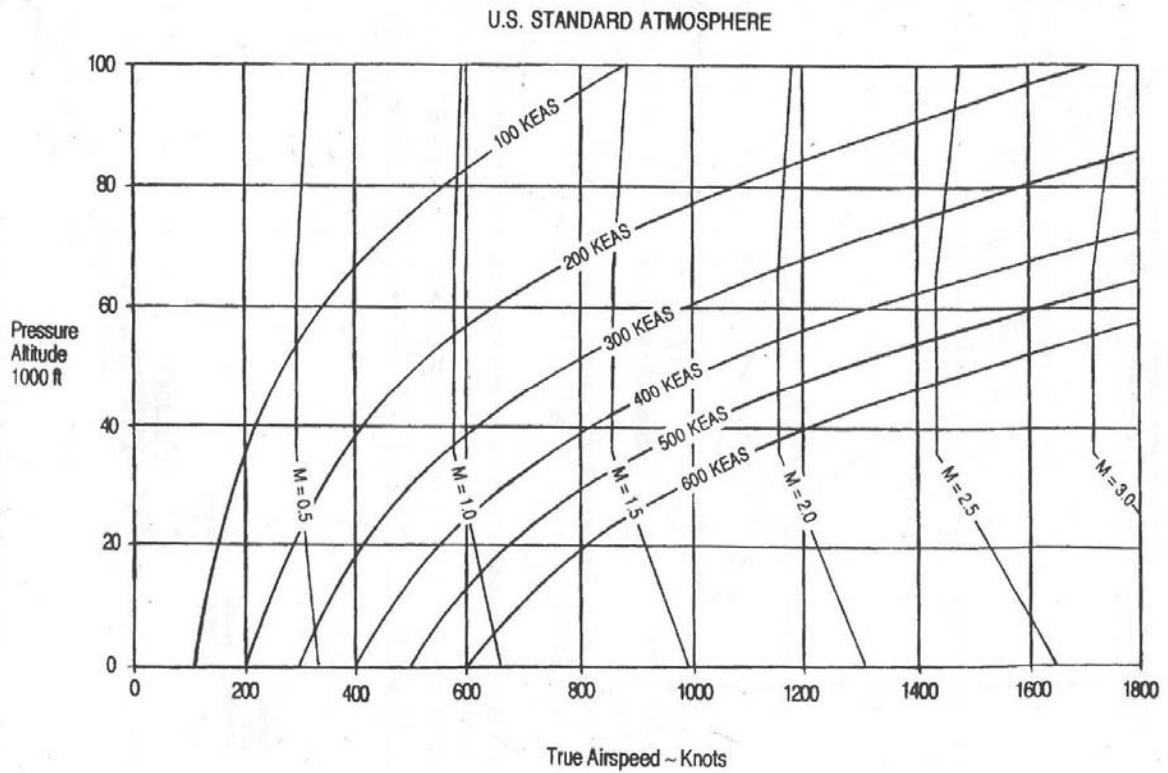


Fig. C.2 Relationship between V_{EAS} , V_{TAS} and Mach Number

The correction from calibrated airspeed (V_{CAS}) to equivalent airspeed (V_{EAS}) can be made using the equations in Raymer Appendix C, but for low speeds and altitudes the correction is quite small and Fig. C.1 can be used when precision is not required.