

Calculation of Distance from Greencastle, Pa., Launch Point
To Mountain Empire Airport, Wytheville, Va., Landing Point
F3A-21 Record Flight by M. Hill, Sept. 28, 1983

The equations for computing great circle distance on the surface of the earth are given as (1) and (2) below. Arithmetic solutions are herein provided.

Eq. 1) $\cos S = \sin L_1 \sin L_2 + \cos L_1 \cos L_2 \cos (\lambda_2 - \lambda_1)$
 where: S = angle (in degrees) subtended between the two points
 λ_1 = initial longitude = $77^\circ 41' 42''$ W (77.69500 degrees)
 L_1 = initial latitude = $39^\circ 47' 48''$ N (39.79666 degrees)
 λ_2 = final longitude = $81^\circ 20' 58''$ W (81.34944 degrees)
 L_2 = final latitude = $36^\circ 52' 42''$ N (36.87833 degrees)
 now: $\sin L_1 = .640065$
 $\sin L_2 = .6001177$
 $\cos L_1 = .7683207$
 $\cos L_2 = .7999116$
 $\cos (\lambda_1 - \lambda_2) = .9979666$
 so: $\cos S = (.640065)(.6001177) + (.7683207)(.7999116)(.9979666)$
 $= 0.9974532$
 and $\therefore S = 4.0900373^\circ$

Eq. 2) Distance $d = \frac{R \cdot S}{57.29578}$ where d = distance on earth's surface
 R = earth's radius
 S = subtended angle in degrees
 57.29578 = degrees per radian
 \therefore Distance flown = $6378.245 \frac{\text{km}}{\text{rad}} \times \frac{4.090037 \text{ deg}}{57.29578 \text{ deg/rad}}$
 $= 455.308 \text{ km}$
 $= 282.91 \text{ mi}$

The accuracy of this calculation is 1 part in 10,000 or 0.01%.

NOTE NOW USING EARTH RADIUS. 6371.0 KM.

Certified correct:

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