Longhand Haversine Sight Reduction

B = Latitude

dec = Declination

t = Meridian Angle

Haversine $hv(x) = \sin^2(x/2) = (1-\cos(x))/2$

Inverse haversine $hv^{-1}(x) = 2 * \mathrm{asin}(\sqrt{x})$

Altitude

By computation

ZD = Zenith Distance

Hc = (90 - ZD) Calculated Altitude

hv (ZD) = n+(1-(n+m))*a

Same Name

n = hv (B-dec)

m = hv (B+dec)

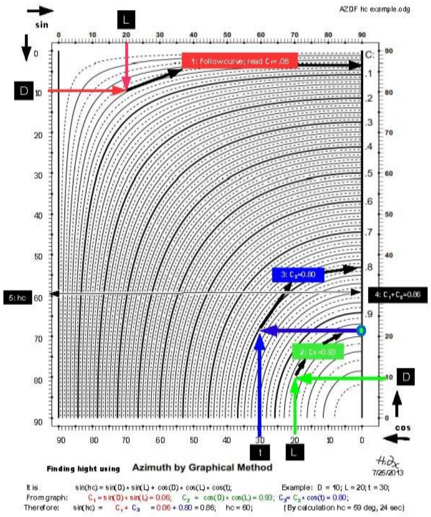
Contrary Name

n = hv (B+dec)

m = hv (B-dec)

a = hv(t)

By Hanno azimut diagram



Azimuth

By computation

hv (Z) = (a-n)/(1-(n+m))

Same Name

a = hv (90º-dec)

Contrary Name

a = hv (90º+dec)

m = hv (B+Hc)

n = hv (B-Hc)

N Latitude:

If LHA> 180◦, *Zn* = *Z*

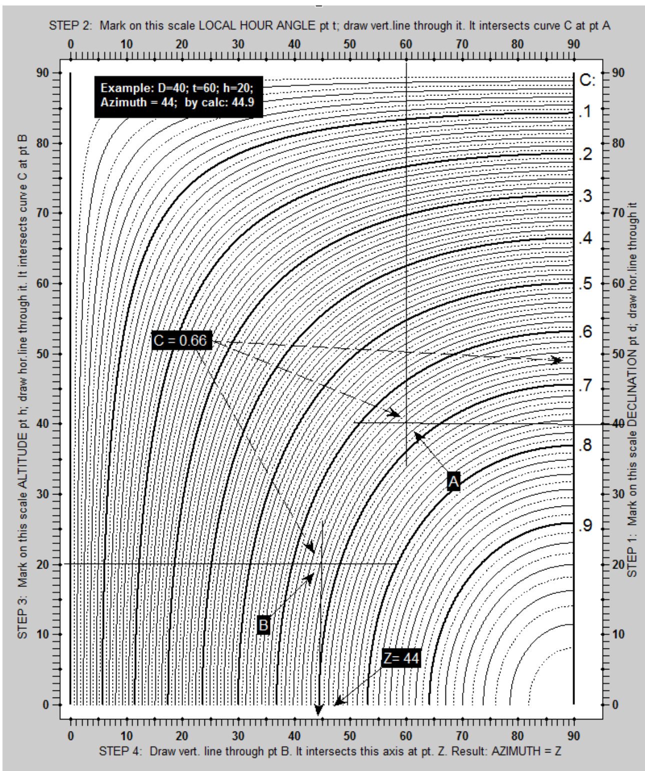
if LHA< 180◦, *Zn* = 360◦ − *Z*

S Latitude:

If LHA> 180◦, *Zn* = 180◦ − *Z*

if LHA< 180◦, *Zn* = 180◦ + *Z*

By Hanno azimut diagram



Sin Z Cos Hc = Sin t Cos dec

Doniol, Hanno Ix, Greg Rudzinski (NavList)