Direct Calculation of Longitude and Latitude

You must set sight 1 as the celestial body with that is the farthest west while still being within 180° longitude of the other body. If both have the same GHA, choose the northernmost as sight 1.

	UT	Celestial Body	Ho	GHA	Dec
Sight 1					
Sight __ advanced					
Sight 2					

Running Fix Adjustments

Calculate the amount to add to the GHA and Declination of a celestial body in order to advance it to the same time as a later sight. N is +, S is -

Degrees of GHA to Add	Degrees of Declination to Add	Symbols
$\theta_{GHA} = \sin C \int_0^D \frac{1}{\cos(L + x\cos C)} dx$ $= \frac{180}{\pi} \tan C \left[ln\left(\frac{\tan\left(45° + \frac{L + D\cos C}{2}\right)}{\tan\left(45° + \frac{L}{2}\right)} \right) \right]$ Special case for traveling due east or west (C is 90° or 270°): $\theta_{GHA} = D \frac{\sin C}{\cos(L)}$	$\theta_{Declination} = D \cos C$	C = Course of travel in degrees D = nautical miles traveled L = Original declination

$\cos(D_{12}) = \sin(Dec_1) \sin(Dec_2) + \cos(Dec_1) \cos(Dec_2) \cos(GHA_1 - GHA_2)$

$\cos(A) = [\sin(Dec_2) - \sin(Dec_1) \cos(D_{12})] / [\cos(Dec_1) \sin(D_{12})]$

$\cos(B) = [\sin(H_2) - \sin(H_1)\cos(D_{12})] / [\cos(H_1)\sin(D_{12})]$

$\sin(Lat) = \sin(Dec_1)\sin(H_1) + \cos(Dec_1)\cos(H_1)\cos(A \pm B)$

$\cos(LHA_1) = [\sin(H_1) - \sin(Dec_1)\sin(Lat)] / [\cos(Dec_1)\cos(Lat)]$

D_{12}		A		B	

	A+B	A-B
Lat		
LHA_1		
Long = LHA_1 – GHA_1		

West longitude is negative

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