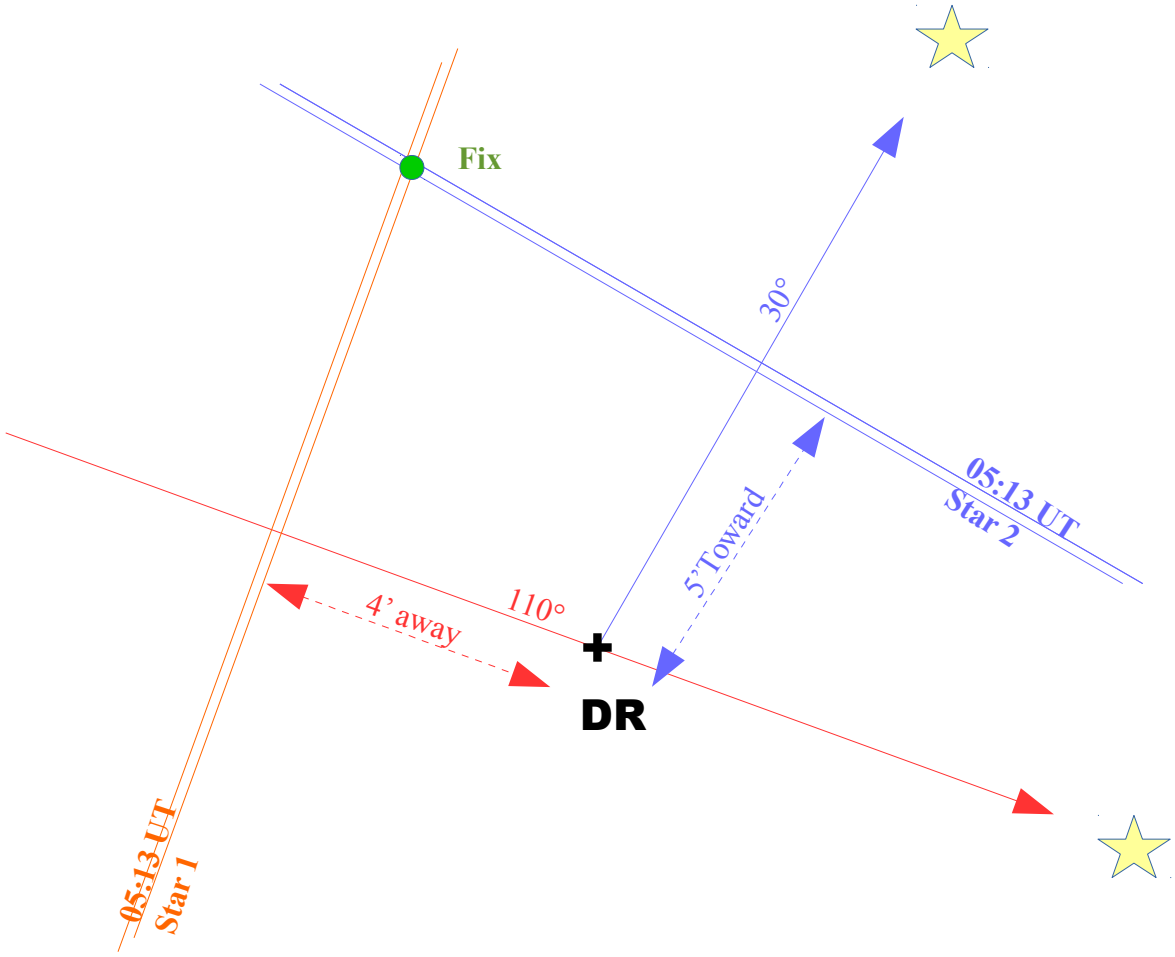
ATELIER 1 : CALCUL ET TRACÉ ELEMENTAIRES DE DROITES DE HAUTEUR

Exercice 1.1 - Drawing Line of position on plotting sheet

At 05h13min, DR position, 19°20′ N, 116°50′ E., two observations of stars were taken as follows:
1. Star 1 - Bearing 110° T, intercept 4′ away.
2. Star 2 - Bearing 030° T, intercept 5′ toward.
Find the ship's position

Correction partielle
Ce tracé est à faire sur un plotting sheet pour lire la position (latitude/longitude) du point



Exercice 1.2 – Sight seeing reduction/ LOP with stars

Correction partielle

In the evening, 17th July 1981, at DR position 40° 25'N, 32° 40'W, the chronometer showed 10h 21min 07s, chronometer error 4min 09s fast.
Observed Star Dubhe with sextant altitude 43° 32,0' and star Deneb with sextant altitude 38° 12,3' ; index error 2,3' on the arc ; height of eye 15 m.
Find intercepts and positions lines.

Define GMT

Chronometer Time	10h 21min 07s	
Chronometer Error	- 4min 09s	*Fast - / Slow +*
Time GMT [12h]	10h 16min 58s	
GMT	**22h 16min 58s**	*Time on 24h*

Intercept for Dubhe

Define LHA* et D* for Dubhe

GHAγ	265° 38,0'	*NA - à l'heure ronde =22h00*
+ΔGHAγ	4° 15,2	*Pour Δt= 156min 58s*
= GHAγ	269° 53,2'	*À l'heure précise =22h 15min 58s*
+ SHA*	194° 21,9'	*NA*
GHA*	104° 15,1'	*464°15,1' [360*
- Ge	- 32° 40,0'	
LHA*	**71°35,1'**	

D* = 61° 51, 4'N

Calculate hc

$$\sin h_c = \sin\phi_e \cdot sinD + \cos\phi_e \cdot \cos D \cdot \cos LHA$$
$$= \sin(40°25') \cdot \sin(61°51,4') + \cos(40°25') \cdot \cos(61°51,4') \cdot \cos(71°35,1')$$
$$= 0,685$$
$$\rightarrow h_c = 43°14,7'$$

Hc = 43° 14,7'

Calculate Zc

$$\cos AZ_c = \frac{\sin D - \sin\phi_e \cdot \sin h_c}{\cos\phi_e \cdot \cos h_c}$$
$$= \frac{\sin(61°51,4') - \sin(40°25') \cdot \sin(43°14,7')}{\cos(40°25') \cdot \cos(43°14,7')} \approx 0,78901$$
$$\rightarrow AZ_c \approx 38°'$$
$$LHA = 71°35,1' \rightarrow Z_c = 360° - AZ_c$$

Zc = 322°

Calculate ho

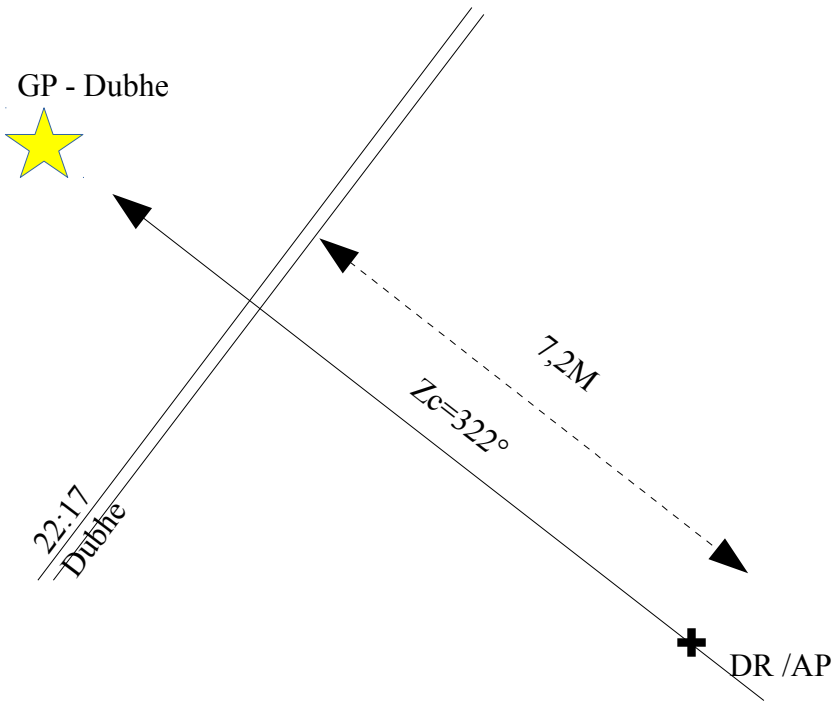
hs	**43°32,0'**
+ IC	-2,3'
+ Dip	-6,8'
ha	**43° 22,9'**
+Alt. Main correction	-1,0'
-30' for upper limb (Moon)	
+U,L, correction for Moon	
+Additionnal correction for Venus	
+Additional refraction correction (non standard Temp/pression)	
ho	**43°21,9'**

Calculate the intercept/LOP

ho	43°21,9	
- hc	- 43° 14,7'	
= **i**	+ **7,2'**	**Zc= 322°**

Draw the LOP

XDD



Exercice 1.3 – Sight seeing reduction / LOP with the SUN

At 0900 LMT, 25th October 1981, DR position 43°15′ N, 38°25′ W, the chronometer shows 11h 40min 32s, chronometer error is 2m 20s slow.
Sextant altitude of the sun's lower limb is 24°02.3′ ; index error 1.5′ off the arc; height of eye 12 m.
Find intercept and position line:

Define GMT

Ge/15 = 2h 33min 40s

Chronometer Time	11h 40min 32s
Chronometer Error	2min 20s
Time GMT [12h]	11h 42min 52s
GMT	11h 42min 52s

Fast - / Slow +

Time on 24h

Approx LMT 09h00
\+ *Ge 2h 33min 40s*
Approx GMT 11h 33 min 40s

Define LHA/GHH et D

GHA_a	348° 58,5'
$+\Delta GHA_a$	10° 43,0'
= GHA_a	359° 41,5'
- Ge	- 38° 25,0'
LHA_a	**321° 16,5'**

NA - à l'heure ronde =11h00
Pour Δt= 42min 52s / d=0,9
À l'heure précise =22h 15min 58s

D	12° 09' S
$+\Delta D$	+ 06'
D	**12° 15' S**

Calculate hc

$$\sin h_c = \sin\phi_e \cdot sinD + \cos\phi_e \cdot \cos D \cdot \cos LHA$$
$$= \sin(43°15') \cdot \sin(-12°15') + \cos(43°15') \cdot \cos(-12°15') \cdot \cos(321°16{,}5')$$
$$= 0{,}4099$$
$$\rightarrow h_c = 65°48{,}0'$$

Hc = 65° 48,0'

Calculate Zc

$$\cos AZ_c = \frac{\sin D - \sin\phi_e \cdot \sin h_c}{\cos\phi_e \cdot \cos h_c}$$
$$= \frac{\sin(-12°15') - \sin(43°15') \cdot \sin(65°48')}{\cos(43°15') \cdot \cos(65°48')} \approx -0{,}0295'$$
$$\rightarrow AZ_c \approx 91{,}5°$$
$$LHA - astre\ à\ l'est. \rightarrow Z_c = AZ_c = 91{,}5°$$

Zc = 91,5°

Calculate ho

hs	**24°02,3'**
+ IC	+ 1,5'
+ Dip	-6,8'
ha	**43° 22,9'**
+Alt. Main correction	-1,0'
-30' for upper limb (Moon)	
+U,L, correction for Moon	
+Additionnal correction for Venus	
+Additional refraction correction (non standard Temp/pression)	
ho	**43°21,9'**

Calculate the intercept/LOP

ho	43°21,9	
- hc	- 43° 14,7'	
= **i**	+ **7,2'**	**Zc= 322°**

Draw the LOP

ATELIER 2 : TRANSPORT DE DROITES

ATELIER 3 : PROBLEMES DIVERS