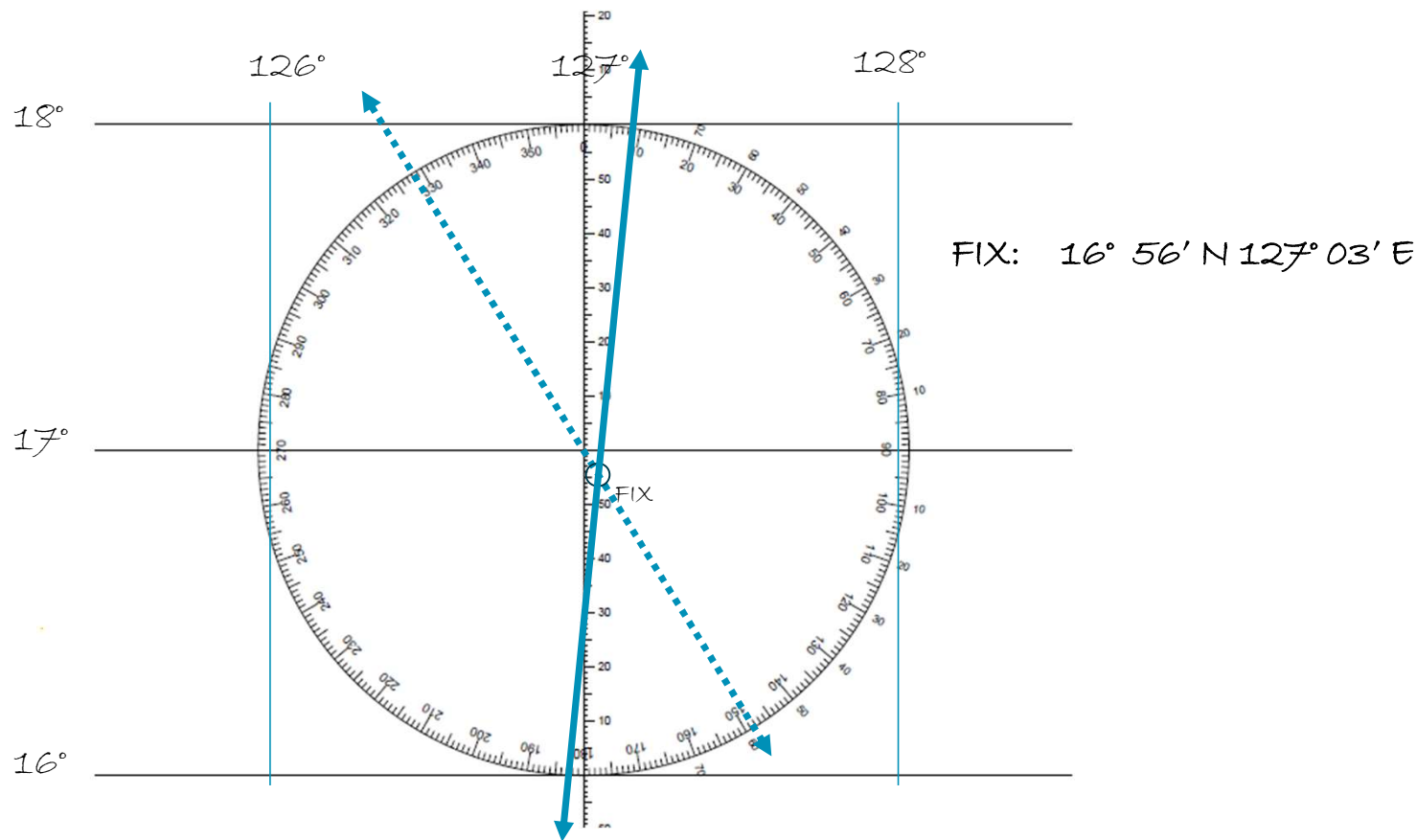


Prepare the Afternoon Plot
Afternoon Sight Reduction
Plotting of the 2nd Sight
Reduction Results

How to Find the Position Fix

Practical Sextant Navigation



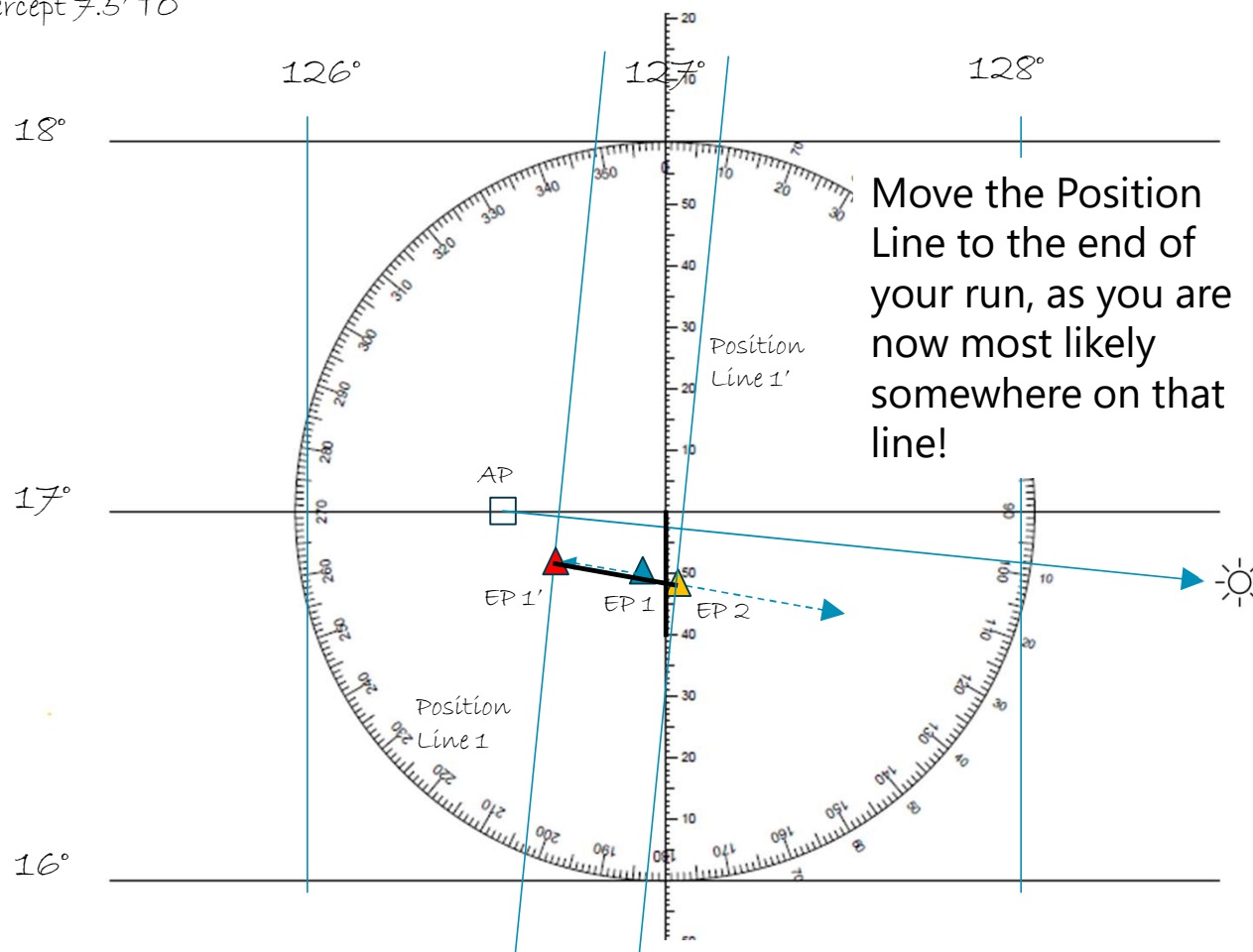
EP 16° 50' N 126° 56' E
AP 17° N 126° 30'.6 E
Zn = 096°
Intercept 7.5' TO

Run 100° 20.6 NM
EP 2: 16° 48' N 127° 02' E

Plot your run
Bearing 100° (T), 20.6 NM
Find the new EP 2

Move the Morning Position Line

Prepare the Afternoon Plot



The Afternoon Sight Reduction

The afternoon sextant reading is done at 14h 32m 12s.

Use the Estimated Position from your Plotting Sheet.

Calculate the UT of the reading = 06h 03m 52s.

The sextant reading is $52^{\circ} 34'.7$ on the Lower Limb.

Calculate the True Altitude (Ho) – IE – DIP – Alt. Corr.

Find the GHA

Choose the assumed Longitude and find the LHA.

Choose the assumed Latitude.

Find the Declination.

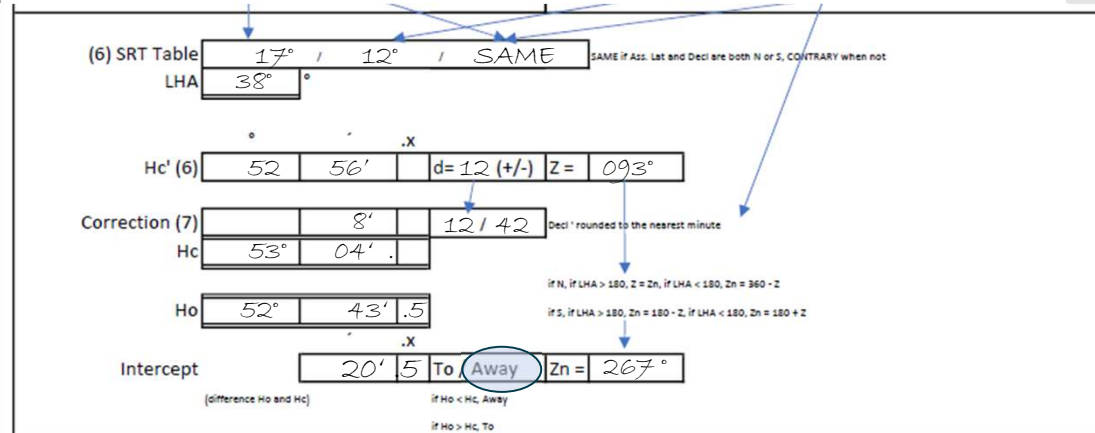
Find the Calculated Sextant Altitude (Hc), and the bearing to the Sun.

Calculate the intercept. And the bearing.

SUN SIGHT PRO FORMA



Date: April 23, 2024		Ship time h m s 14 32 12	
EP/DR: $16^{\circ} 48' N$ / $127^{\circ} 02' E$		(1) Long Time 08 28 20 UT time 06 03 52	
Sextant Reading Sextant Reading: Lower / upper 4.0 m Index Error: 3.0 on/off		Greenwich Date: 4 23 Chronometer Correction UT Sight: 06 03 52	
Sex. Alt. $52^{\circ} 34'.7$ I.E. $-3'.0$ (off +, on -) (2) DIP $-3'.5$ (-/+) Apparent Alt. $52^{\circ} 28'.2$ (3) Alt. corr. $15'.3$ True Alt. (Ho) $52^{\circ} 43'.5$		(4) GHA h $270^{\circ} 26'.0$ (5) + Incr m $0^{\circ} 58'.0$ GHA $271^{\circ} 24'.0$ Ass. Long $126^{\circ} 36'.0$ W/E LHA $398^{\circ} 00'.0$ $-360 = 38^{\circ}$	
Assumed Latitude $17^{\circ} N$		(4) Decl. $12^{\circ} 42'.5$ N s $d=0.8+$ (+/-) (5) d' $0'.0$ (+/-) Decl. $12^{\circ} 42'.5$ N s	

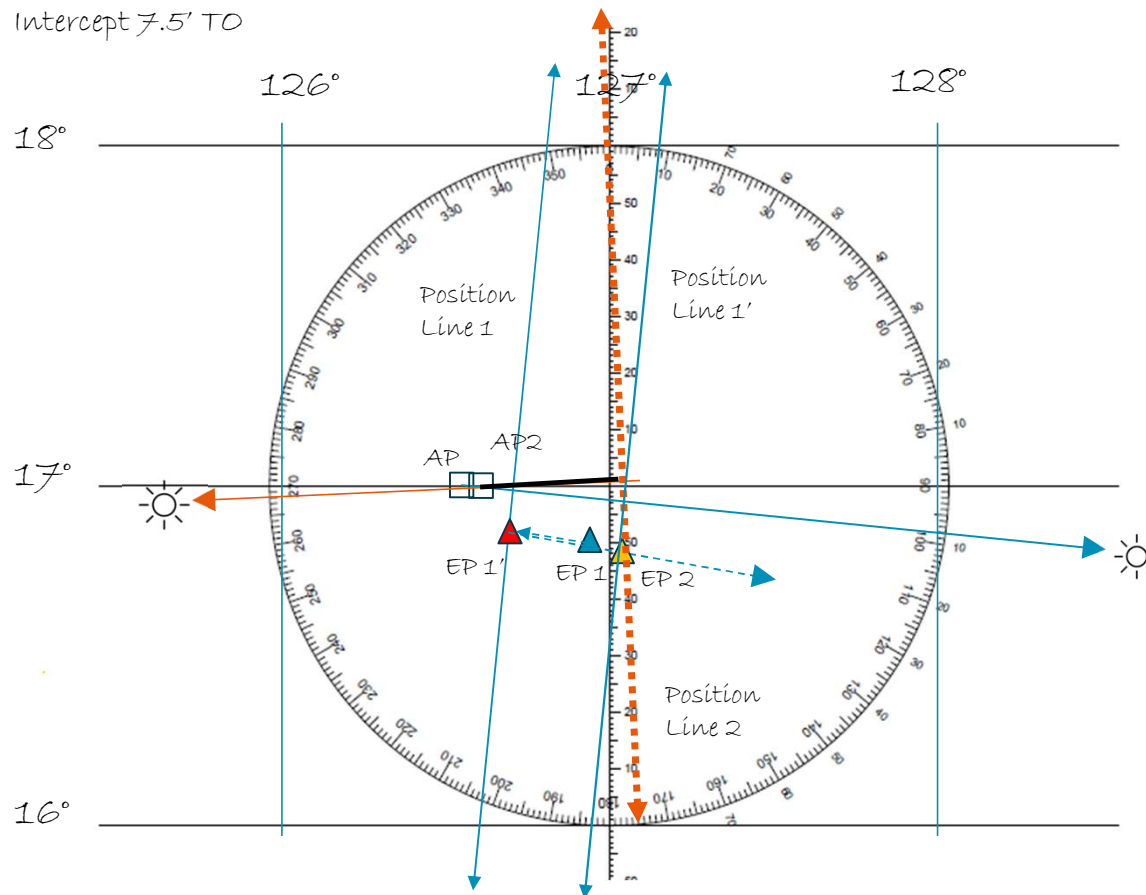




EP $16^{\circ} 50' N$ $126^{\circ} 56' E$
AP $17^{\circ} N$ $126^{\circ} 30'.6 E$
 $Z_n = 096^{\circ}$
Intercept $7.5'$ TO

Run $100^{\circ} 20,6 NM$
EP 2: $16^{\circ} 48' N$ $127^{\circ} 02' E$

AP 2: $17^{\circ} 00' N$ $126^{\circ} 36' E$
 $Z_n = 267^{\circ}$
Intercept $20.5'$ AWAY



- Plot your afternoon AP (2)
- Plot the afternoon Sun Line
- Plot the 2nd Position Line at the Intercept

Plot the Afternoon Position Line

Plotting the 2nd Sight Reduction Results

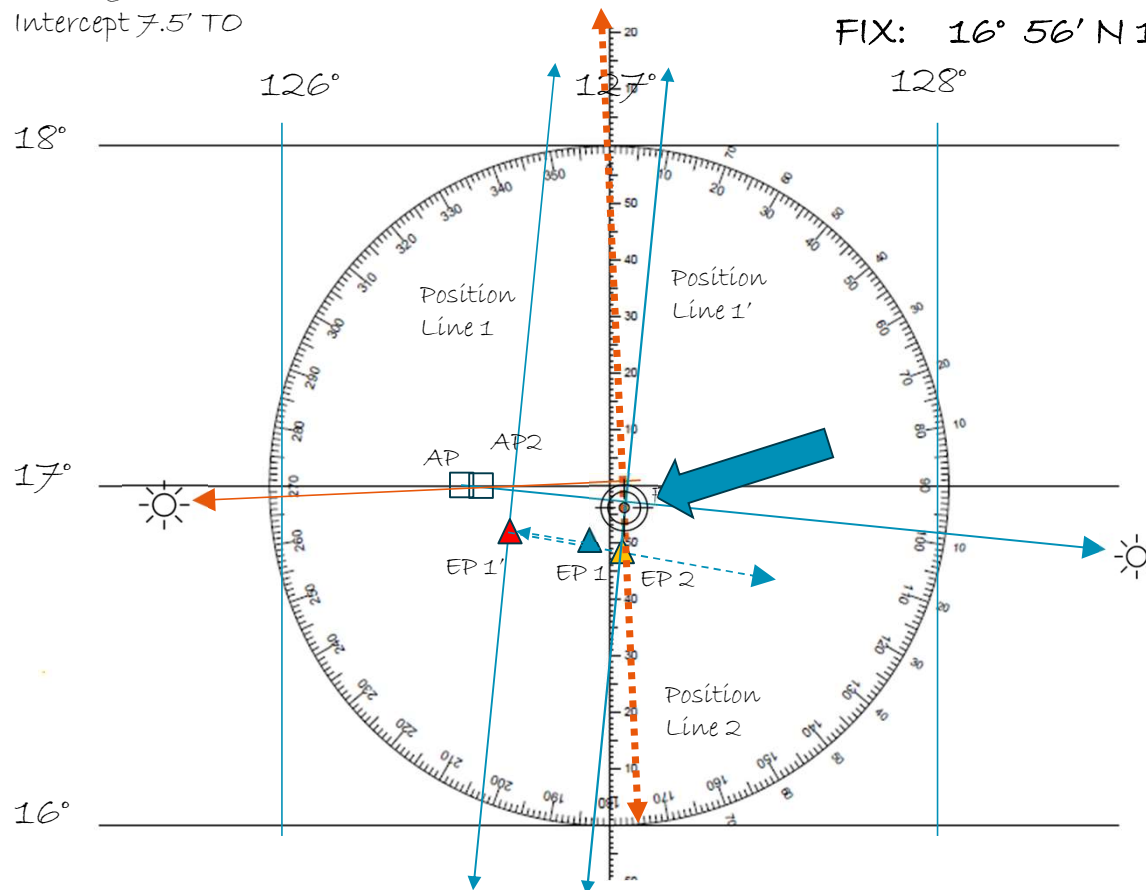


EP $16^{\circ} 50' N$ $126^{\circ} 56' E$
AP $17^{\circ} N$ $126^{\circ} 30'.6 E$
 $Z_n = 096^{\circ}$
Intercept $7.5'$ TO

Run $100^{\circ} 20,6 NM$
EP 2: $16^{\circ} 48' N$ $127^{\circ} 02' E$

AP 2: $17^{\circ} 00' N$ $126^{\circ} 36' E$
 $Z_n = 267^{\circ}$
Intercept $20.5'$ AWAY

FIX: $16^{\circ} 56' N$ $127^{\circ} 03' E$



Find the FIX at the crossing of the 2
position lines

Find the FIX

Plotting the 2nd Sight Reduction Results

Arc	Time	Distance
1 °	4 min	60 nm
1 ′	4 sec	1 nm
0,25 ′	1 sec	0,25 nm
0,1 ′	0,4 sec	0,1 nm

Inaccurate Timing

EP- Circle of Error

Sextant Reading Accuracy

How Reliable is our Fix?

Plotting the Fix

We assume all our instruments to be calibrated and the pro forma calcs properly done. What else can go wrong?

Potential sources for errors to begin with, are Sight Time recording, estimating the Run Position, and the Sextant Reading itself.

- A time back log of 1 sec of the sight results in a 0,25 nm difference.
- In Coastal navigation we use a 10% error margin (of the distance) for the Run position fix. The use of the Position Line mitigates this error.
- Most professional sextants offer an instrument accuracy of 0,1' ~ 0,1 nm. The common accepted reading accuracy is 1,5' up to 5', allowing a position fix accuracy of 5 – 10 nm typically .

Indications of errors

- Intercept > 30', definitely when > 1°.
- Position Line not near (> 10'-20') the EP.
- No Position Line crossings on the plot.

Troubleshooting

- Check the values taken from the tables and proper columns.
- Check the proper use of formulas.
- Check the calcs.

Practical Sextant Navigation v202403

