Midday Sun mer pass and Moon sight to cross – 2024

Scenario :

Actual position (AP) for entry in the app :

19° 50'.30" S, 26° 17'.12" W.   (19° 50'.5 S, 26° 17'.2 W).

Date : Monday 12th Feb 2024

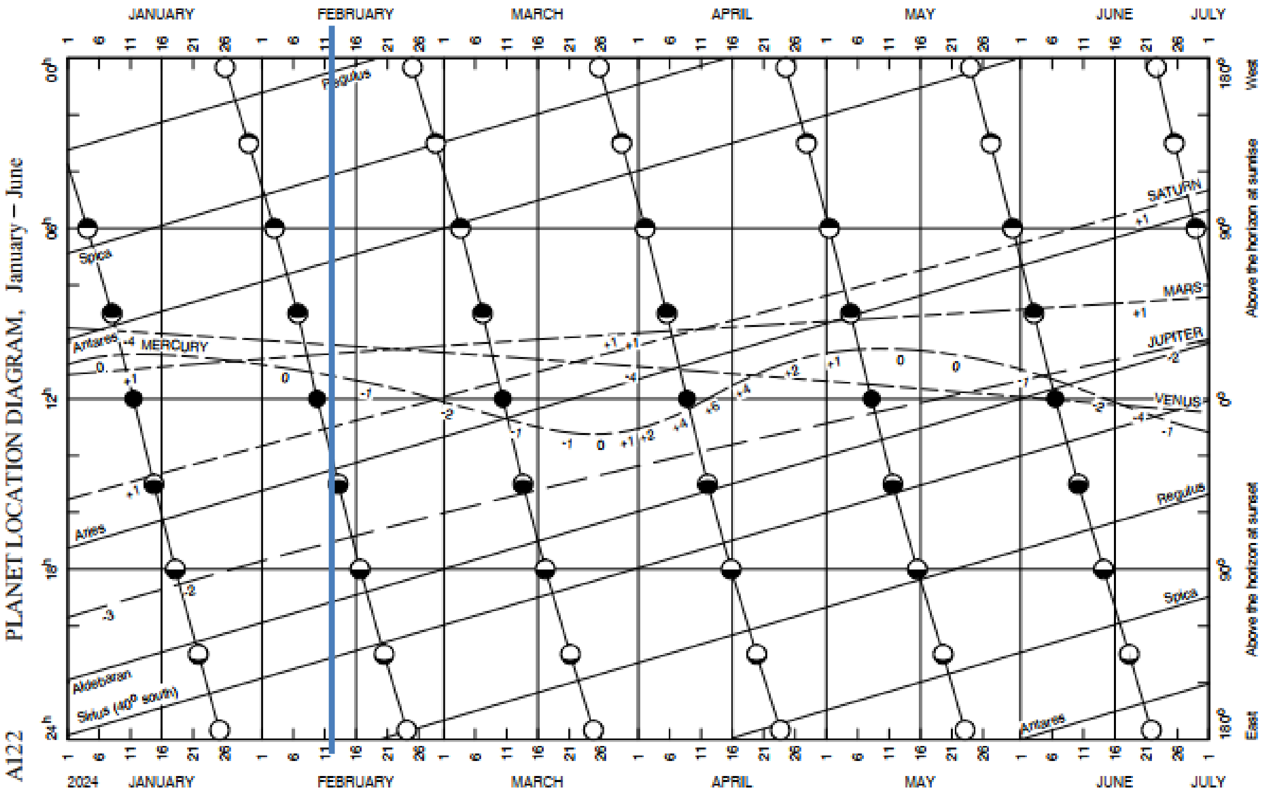
DR Position for use in the sight reduction process :

19° 09'.0 S, 26° 29'.0 W.

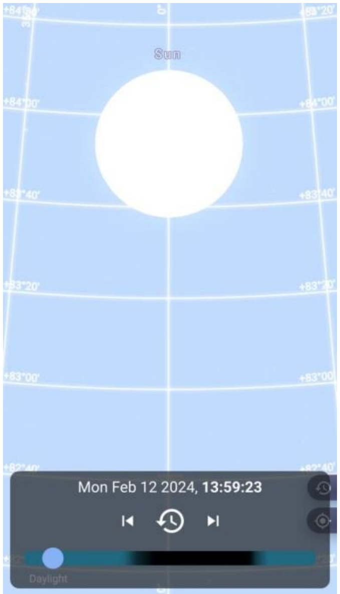
The aim is to obtain your latitude from a midday Sun mer pass. You can use the Planet Location Diagram to see if another heavenly body is available for a second sight at the same time to cross the latitude and give you a position.

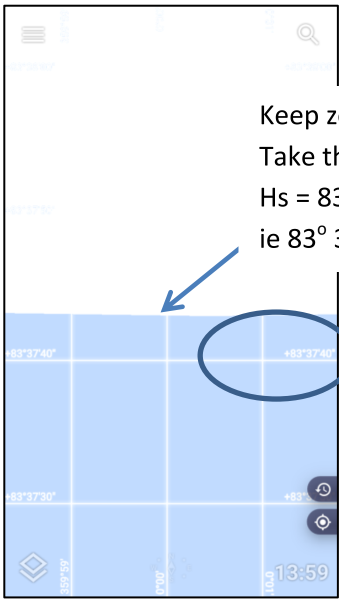
The Planet Location Diagram is year specific so you need the 2024 version.

Draw a line across the diagram on the 12th Feb.



The central 12h horizontal line represents the sun's mer pass and is the chart's reference line. Where the moon line crosses the blue 12th Feb line, there is a crescent moon that has its mer pass around 3 hours after the sun's. You don't need its mer pass but the diagram tells you that the moon follows the sun and will be visible around midday when you are shooting the sun. The same applies to Jupiter around 5 hours behind but will probably be too low in the sky for a good sight.



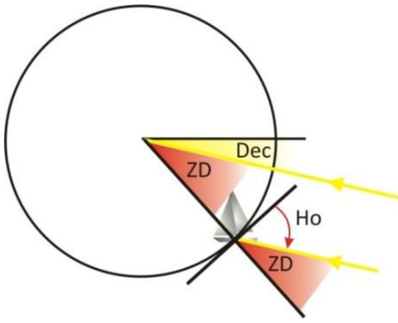


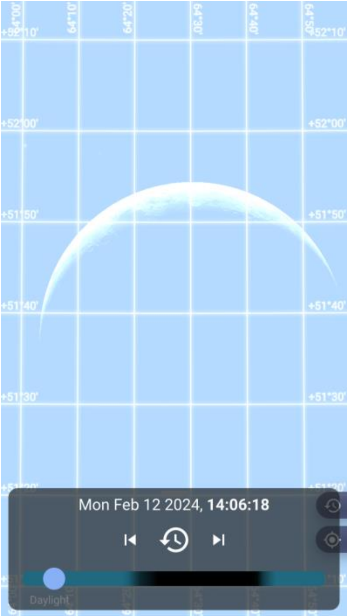
Keep zooming in.
Take the sight as :
Hs = 83^0 37’43”
ie 83^o 37’.7

Using the proformas, you firstly need to sort out the sun’s mer pass time.

MER PASS - SUN	Day	Date / Month	Notes and calculations
Date	Monday 12^{th} Feb 2024		
DR Pos^n Lat	19° 09’.0 S		
Long	026°29’.0 W		
	hr : m : s		
Mer Pass UT @ Gr	12:14:00		
DR Long +W cor^n	1:46:00		From $Conv^n$ of Arc to Time table
Mer Pass UT @ DR	14:00:00		Target Mer Pass time
Confirm date	Same		
	SUN		
Sight time	13:59:23	Actual sight time	Time of maximum observed altitude.
Hs	83° 37’.7	LL	
IE	0		
Dip	0		
Ha	83° 37’.7		
$Corr^n$	+16’.1		
Ho	$\boxed{83° 53’.8}$	LL	
Dec^n (Sun) 13 hr : S	13° 45’.1	Enter d value	
d +/- +0.8 $Corr^n$	+ 0’.8		90° 00’.0
Dec^n (Sun) : S	$\boxed{13° 45’.9}$		Ho - <u>83° 53’.8</u>
ZD	6° 06’.2		ZD 6° 06’.2
Latitude	19° 52’.1	S	Latitude = Dec + ZD

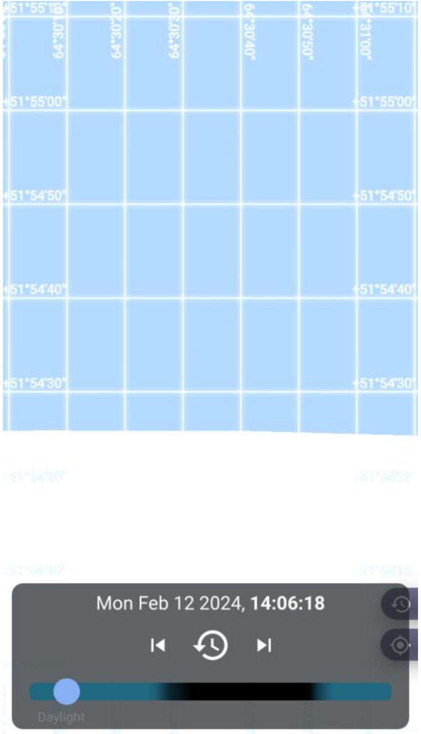
Compare to the AP latitude of 19^o 50’.5 S. This is close enough to show your workings are correct.



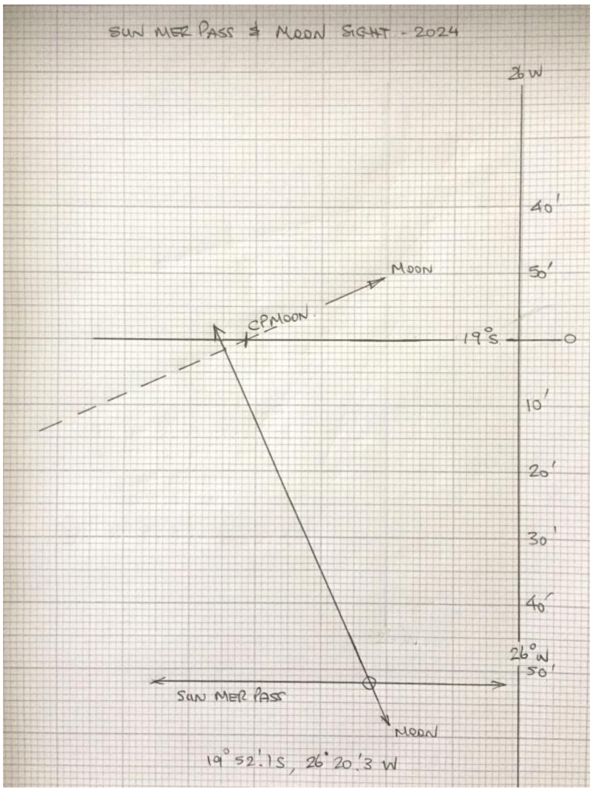


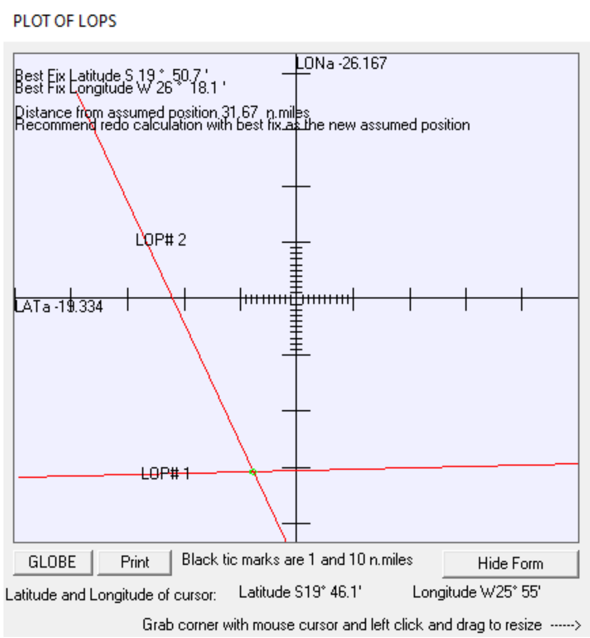
You can now find and shoot the moon's upper limb to give you a crossing position line. It is not brilliant but as it is available it will give you a reasonable position instead of just the latitude. Assume you take the sight a few minutes later at 14:06:18 UT@DR.

After zooming in you can read off 51° 54' 25", ie 51° 54'.4.



MOON SIGHT	Day	Date / Month / Year	Notes and calculations
Date	Monday 12th Feb 2024		
DR Pos^n Lat	19° 09'.0 S		
Long	026°29'.0 W		
	hr: m : s		
Sight time	14:06:18	UT @ DR	
	MOON		
Hs	51° 54'.4	UL	Look up GHA, Dec^N, V, d & HP at this point, need HP to get Ho.
IE	0		
Dip	0		
Ha	51° 54'.4		14Hr GHA 351° 13'.1, S 1° 12'.0, V= +10.6, d= +17.7, HP 60.7
First Corr^n +	45'.5		
*HP 60.7 Corr^n +	4'.6	UL	
	-0° 30'.0	applies UL ONLY	51° 54'.4
Ho	52°14'.5		45'.5
GHA 14 hr	351° 13'.1	*Ent V, Dec^n, HP, d	4'.6
06 m 18 s	1° 30'.2		52° 44'.5
*V +/- +10.6 Corr^n	+ 1'.1		- 30'.0
GHA Moon	352° 44'.4		52°14'.5
CP Long -W	26° 44'.4	W	
LHA Moon	326°	(whole number)	
*Dec^n 14 hr S	1° 12'.0		
*d+/- +17.7 Corr^n	+ 1'.9	Inc & Corr 6 mins	
Dec^n Moon S	1° 13'.9	Same / ~~Contrary~~	
CP Lat	19° S	~~N~~/S (whole number)	From Vol 2 : 52 08 +30 114
Hc	52° 08'.0	*Enter d & Z	
*d+/- +30 Corr^n	+ 10'.0	Table 5	Column 'd', row 'Dec^n minutes'
Hc	52° 18'.0		
*Z	114°		LHA > 180, southern hemi.
Zn	66°		Zn = 180 - Z
Intercept	3.5nm	Away (Hc > Ho)	
		Towards (Hc < Ho)	
Bearing Zn	66°		





The fix at 14:06 UT@DR was :

19° 52'.1S, 26° 20'.3W.

TeacupNav came out with 19° 50'.7S, 26° 18'.1 W.

These compared to the AP of 19° 50'.5S, 26° 17'.2W.