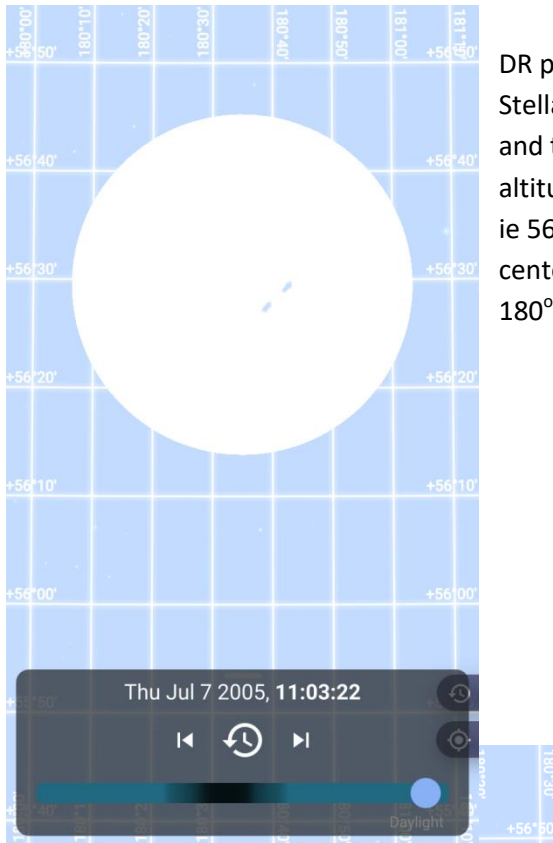


Amateur Astro Amazement :

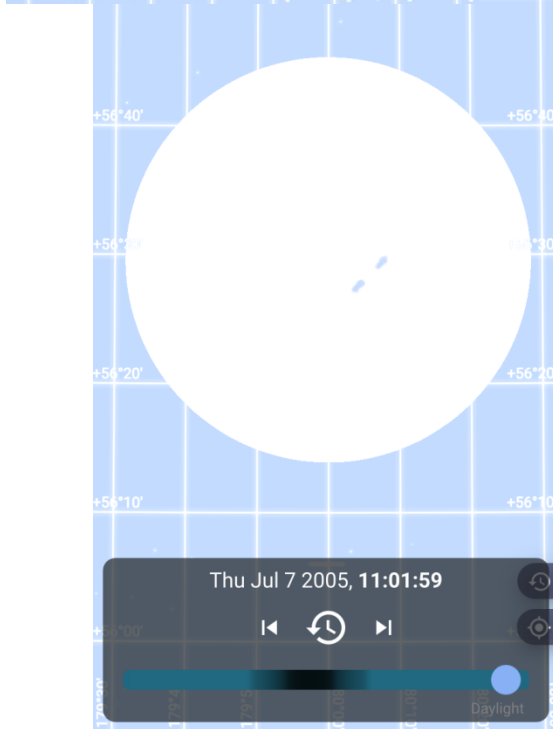
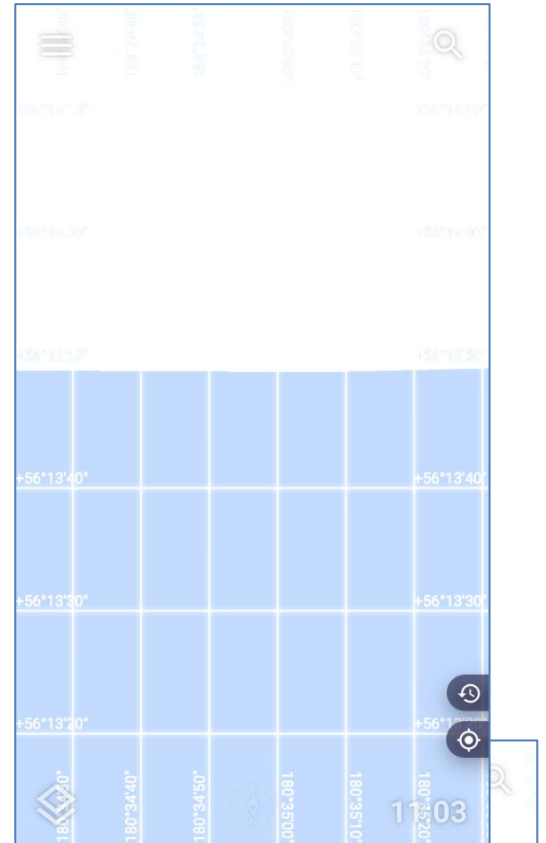
DR position  $56^{\circ} 03'.9N, 015^{\circ} 44'.0E$

Thursday 7<sup>th</sup> July 2005

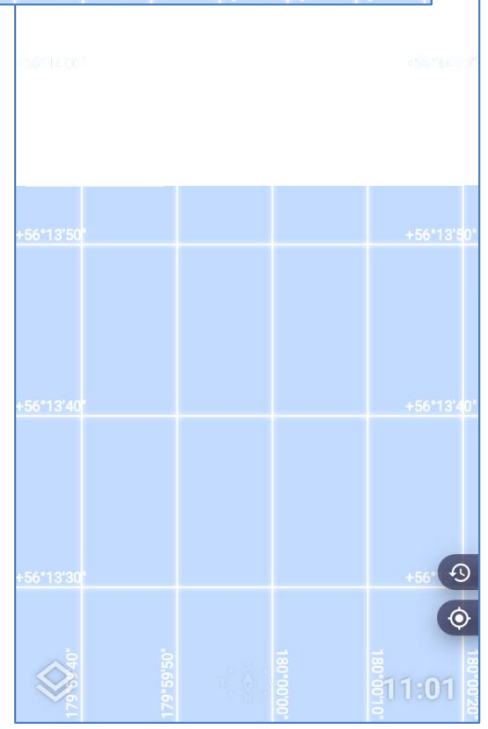
Time 11:03:22 UT @ DR



DR position entered into Stellarium along with date and time. Lower limb altitude (right) is  $56^{\circ} 13' 49''$  ie  $56^{\circ} 13'.8$ . The sun is centered over  $180^{\circ} 35' 00''$ , ie  $180^{\circ} 35'.0$ .



The actual mer pass time was 11:01:59 centered over  $180^{\circ}$ . Lower limb altitude (right) is still  $56^{\circ} 13' 49''$  ie  $56^{\circ} 13'.8$ .

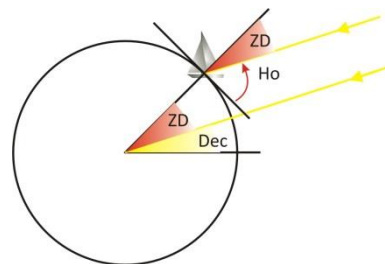


The 2005 nautical almanac can be downloaded from "thenautical almanac.com" web site for free and it gave the sun's mer pass as 12:05 UT @ Greenwich.  
 Declination for 11hr was N22° 32'.9 with a d = -0.3.  
 The almanac contains the Increments and Corrections sheets, Conversion of Arc to Time and the Altitude Corrections Tables for Sun, stars and planets.

Latitude from sight taken at 11:03:22 UT@DR assuming it to be a mer pass. It is so close to the true mer pass at 11:01:59 that the latitude will be the same.

MER PASS - SUN	Day	Date / Month	Notes and calculations
	Date	Thursday 7 <sup>th</sup> July 2005	
DR Pos <sup>n</sup> Lat	56° 03'.9N		15° 1:00:00
Long	015° 44'.0E		44'.0 3:00
	hr : m : s		
Mer Pass UT @ Gr	12:05:00		
DR Long -E/+W cor <sup>n</sup>	-1:03:00		From Conv <sup>n</sup> of Arc to Time table
Mer Pass UT @ DR	11:02:00		Target Mer Pass time
Confirm date	Same		
	SUN		
Sight time	11:03:22	Actual sight time	Time of maximum observed altitude.
Hs	56° 13'.8	☉/☽/LL	
IE	0		IE and Dip default to 0 in the apps.
Dip	0		
Ha	56° 13'.8		
Corr <sup>n</sup>	+ 15'.3		
Ho	56° 29'.1	☉/☽/LL	
Dec <sup>n</sup> (Sun) 11 hr : N	22° 32'.9	Enter d value	
d +/-	-0.3	Corr <sup>n</sup>	90° 00'.0
Dec <sup>n</sup> (Sun) : N	22° 32'.9		Ho - 56° 29'.1
ZD	33° 30'.9		ZD 33° 30'.9
Latitude	56° 03'.8	N	Latitude = Dec + ZD

*With the sun to the south of you,  
 the latitude = sum of Dec<sup>n</sup> and ZD*

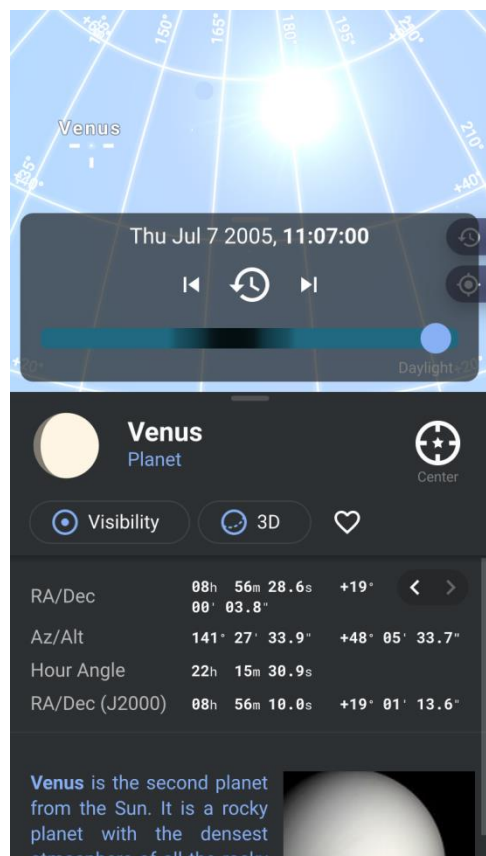


Taking the sight as is, rather than a mer pass, the intercept and bearing can be worked out as shown below. Not surprisingly I get a Zn of 180° and an intercept of 3.9nm away from a chosen position of 15° 23'.1E.

SUN SIGHT		Day	Date	Month	Year	Notes and Corrections
Date		Thursday	7 <sup>th</sup>	July	2005	
DR Pos <sup>n</sup> Lat		56°	03'.9N			
Long		15°	44'.0E			
Sight time	hr : m : s	11 : 03 : 22	UT @ DR			
SUN						
Hs		56°	13'.8	LL		
IE			0			
Dip			0			
Ha		56°	13'.8			
Corr <sup>n</sup> +/-			+15'.3			
Ho		56°	29'.1	LL		
GHA (Sun)	11 hr	343°	46'.4	*Enter Dec <sup>n</sup> & d		
	03 m		22 s			
GHA (Sun)		344°	36'.9			
CP Long +E		15°	23'.1	E		
LHA		360°	00'.0	Whole number		
*Dec <sup>n</sup> (Sun)	11 hr N	22°	32'.9			
*d +/-	-0.3	Corr <sup>n</sup>	0			
Dec <sup>n</sup> (Sun) N		22°	32'.9	Same / <del>Contrary</del>		
CP Lat		56°		N (whole number)		56 00 60 180
Hc		56°	00'.0	*Enter d & Z		
*d +/-	60	Corr <sup>n</sup>	33'.0	Table 5		Column 'd', row 'Dec <sup>n</sup> minutes'
Hc		56°	33'.0			
*Z			180°			N Lat, LHA > 180°, Zn = Z
Zn			180°			
Intercept		3.9nm		Away (Hc > Ho)		
				Towards (Hc < Ho)		
Bearing Zn			180°			

As Venus was also visible at the same time (bet you didn't spot that !!) a fix can be achieved. It has about 40° separation so is not too close to the sun.

From Stellarium, assuming the sight is taken a few minutes later at 11:07:00, Hs (Venus) is 48° 05'.6.



PLANET SIGHT		Day Date / Month / Year	Notes and calculations
Date		Thursday 7 <sup>th</sup> July 2005	
DR Pos <sup>n</sup> Lat		56° 03'.9N	
Long		15° 44'.0E	
Planet		VENUS	
Sight time	hr: m : s	11 : 07 : 00	UT @ DR
Hs		48° 05'.6	
IE		0	
Dip		0	
Ha		48° 05'.6	
Corr <sup>n</sup> +/-		-0'.9	
Monthly Corr <sup>n</sup>		+0'.1	Venus & Mars only
Ho		48° 04'.8	
GHA 11 hr		316° 24'.0	*Enter V, Dec <sup>n</sup> & d
7 m 0 s		1° 45'.0	
*V - 0.6 Corr <sup>n</sup>		- 0'.1	
GHA Planet		318° 08'.9	
CP Long +E		15° 51'.1	E
LHA Planet		334°	(whole number)
*Dec <sup>n</sup> 11 hr N		19° 00'.2	
*d+/- - 0.8 Corr <sup>n</sup>		- 0'.1	
Dec <sup>n</sup> Planet N		19° 00'.1	Same / <del>Contrary</del>
CP Lat		56°	N (whole number)
Hc		48° 10'.0	*Enter d & Z
*d+/- + 56 Corr <sup>n</sup>		0	Table 5
Hc		48° 10'.0	
*Z		142°	
Zn		142°	LHA
Intercept		5.2nm	Away (Hc > Ho) Towards (Hc < Ho)
Bearing Zn		142°	

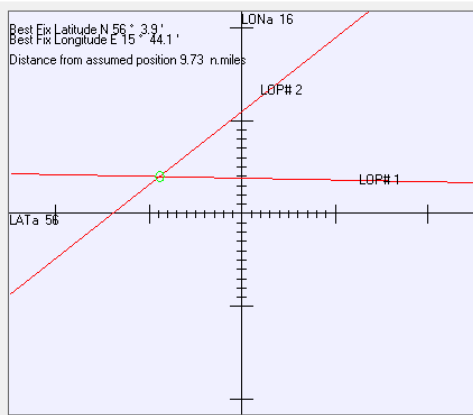
-0.6, N19° 00'.2, -0.8

48 10 56 142

Column 'd', row 'Dec<sup>n</sup> minutes'

N Lat, LHA > 180, Zn = Z

PLOT OF LOPS



Entering the 2 sights into TeacupNav, the fix is shown as 56° 03'.9N, 15°44'.1E.

From the manual plot, the fix is :  
56° 03'.5N, 015° 43'.5E.

