

LATITUDE

BY

POLARIS.

No. *D Aug 5 to Nov 26, 72*

U. S. ENGINEER OFFICE,

Explorations AND Surveys

West of the 100th Meridian.

ASTRONOMICAL DEPARTMENT.

*1873*



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575  
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603



No. 8.



LATITUDE BY POLARIS.

Sextant No. 2831  
 Station Gunnison N.Y.

Chronometer No. 1521  
 Date Sept 2<sup>nd</sup>

Mean obsd. 2 alt.	78° 17' - 00	Time by chron.	10 - 26 - 34.9
Index error	- 8 - 30	Chron. slow	2 - 18 - 27.9
Corrected 2d alt.	78 - 08 30	Mean time of obs.	8 <sup>h</sup> - 08 - 17.0
Altitude	39 - 04 - 15	Difference of long.	<del>7 - 20</del>
Refraction	41" $\frac{1}{4}$	Mean time at Gr.	<del>15 - 28 - 17.0</del>
Corrected alt.	39 03 - 33.6	Acc. Sid. int. with alt. m. n. =	8 - 04 37.20
Subtract 1'		Acceleration	10 - 48 - 57.94
Reduced alt	39 - 02 - 33.6	Sid. int. past Gr. m. n.	18 - 58 - 35.19
1st correction	4. 50.6	Sid. time at Gr. m. n.	
Apparent alt.	39 07 - 24.2	Sid. time of obs.	
2d correction	1 - 13		
3d correction	47.0	Log. r	1.7040
Latitude	39 - 09 - 24.2	Barometer	9.9200
<i>by C. A. of Gunnison</i>	39 - 08 - 54.9	Ther. attached	9.98857
	- 19 - 19.1	Ther. detached	
<i>Mean</i>	39 - 09 - 39.5	Refraction	0.61757

39 - 04 - 24.2  
~~08 - 54.9~~  
 79.1  
 39 - 09 - 8.5

41"  $\frac{1}{4}$



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521

Station Porto Wy.

Date Aug. 5. 1872

Mean obsd. 2 alt.	80 - 16 - 30	Time by chron.	12 - 08 - 23.4
Index error	3 - 4.2	Chron. slow fast	2 - 17 - 42.5
Corrected 2d alt.	80 12 - 48	Mean time of obs.	9 - 50 - 40.9
Altitude	40 - 06 - 24	<i>Sid. int. interval</i> Difference of long.	9 - 52 - 17.93
Refraction	57.59	<i>add. time mean watch</i> Mean time at Gr. Place	8 - 58 - 36.34
Corrected alt.	40 05 - 26.41	Acceleration <i>add. time of observ.</i>	18 - 51 - 54.29
Subtract 1'			
Reduced alt	40 - 04 - 26.41	Sid. int. past Gr. m. n.	
1st correction	7 11.4	Sid. time at Gr. m. n.	
Apparent alt.	40 - 11 - 37.81	Sid. time of obs.	
2d correction	50.00		
3d correction	1 12.32	Log. r	.1 8405
Latitude	40 - 13 - 40.13	Barometer	9.9311
		Ther. attached	9.9995
		Ther. detached	9.9592
		Refraction	1.7603

57.59



LATITUDE BY POLARIS.

Sextant No. 2821

Chronometer No. 1521

Station Puerto Rico

Date Aug 5<sup>th</sup> 1872

Mean obsd. 2 alt.	80 - 02 - 30	Time by chron.	11 - 48 - 03.9
Index error	- 3 42	Chron. slow <i>fast</i>	2 - 19 - 42.5
Corrected 2d alt.	79 - 58 - 48	Mean time of obs.	9 - 30 - 21.4
Altitude	39 - 59 - 24	<i>Sid. int. since m. n. =</i> Difference of long.	9 - 31 - 55.16
Refraction	57.7	<i>Sid. time m. n. =</i> Mean time at Gr.	8 - 58 - 36.34
Corrected alt.	39 - 58 - 26.3	Acceleration	18 - 30 - 31.50
Subtract 1'	39	<i>Sid. time</i>	
Reduced alt	39 - 57 - 26.3	Sid. int. past Gr. m. n.	
1st correction	14 - 46.4	Sid. time at Gr. m. n.	
Apparent alt.	40 - 12 - 12.7	Sid. time of obs.	
2d correction	47.4		
3d correction	1 - 13.52	Log. r	1.8420
Latitude	40 - 14 - 10.62	Barometer	9.9311
		Ther. attached	9.9995
		Ther. detached	9.9892
		Refraction	1.7618

57.7



LATITUDE BY POLARIS.

Sextant No. 2831  
 Station Puerto NY.

Chronometer No. 1521  
 Date Aug. 6<sup>th</sup> 1892

Mean obsd. 2 alt.	79-29-30	Time by chron.	10-58-12.57
Index error	- 3' 45"	Chron. slow <i>fast</i>	2-17-40.57
Corrected 2d alt.	79-25-45"	Mean time of obs.	8-40-32.05
Altitude	39-42-52.5"	<i>Sid. int. past Gr. m. n.</i> Difference of long.	8-41-57.58
Refraction	- 57.5"	<i>Sid. time at Gr. m. n.</i> Mean time at Gr.	9-02-22.28
Corrected alt.	39 41 - 55.0	Acceleration	17-44-19.86
Subtract 1'			
Reduced alt	39-40-55.0	Sid. int. past Gr. m. n.	
1st correction	30-25.4	Sid. time at Gr. m. n.	
Apparent alt.	40-11-20.4	Sid. time of obs.	
2d correction	41.09		
3d correction	1 24.68	Log. r	1.8467
Latitude	40-13-26.17	Barometer	9.9299
		Ther. attached	9.9841
		Ther. detached	9.9992
		Refraction	1.7599

57.5-







*Whitely*

LATITUDE BY POLARIS.

Sextant No.

Chronometer No. 1521

Station *Panama Atch. L.*

Date *Aug 8<sup>th</sup> 1892*

Mean obsd. 2 alt.	<i>79 - 44' - 00</i>	Time by chron.	<i>11 - 09 - 46.25</i>
Index error	<i>3' 33.6</i>	Chron. slow <i>fast</i>	<i>2 - 17 - 48.85</i>
Corrected 2d alt.	<i>79 - 40 - 26.4</i>	Mean time of obs.	<i>8 - 51 - 57.40</i>
Altitude	<i>39 - 50 - 13.2</i>	<i>Sid. int. past Gr. m. n.</i> Difference of long.	<i>8 - 53 - 24.8</i>
Refraction	<i>57.1</i>	<i>Sid. of mean noon</i> Mean time at Gr.	<i>9. 10 - 25.2</i>
Corrected alt.	<i>39 44 - 16.2</i>	Acceleration	
Subtract 1'		<i>Sid. time of Obs.</i>	<i>18.03 - 50.0</i>
Reduced alt	<i>39 - 48 - 16.2</i>	Sid. int. past Gr. m. n.	
1st correction	<i>24.021</i>	Sid. time at Gr. m. n.	
Apparent alt.	<i>40 - 12 - 18.2</i>	Sid. time of obs.	
2d correction	<i>48.8</i>		
3d correction	<i>1.16.3</i>	Log. r	<i>1.84467</i>
Latitude	<i>40 - 14 - 19.3</i>	Barometer	<i>9.9299</i>
		Ther. attached	<i>9.9841</i>
		Ther. detached	<i>9.9992</i>
		Refraction	<i>1.7578</i>

*57''*



1-2.66  
 1-18.31  
 5.65  
 26  
 3330

1-18.31  
 1-47

7

LATITUDE BY POLARIS.

1-19-78 1, 12.66  
 1-14.16

Sextant No. 2831

Chronometer No. 1521

Station Puro N.Y.

Date Aug. 8<sup>th</sup> 1872

Mean obsd. 2 alt.	79° 32' 00	Time by chron.	11-22-27.1
Index error	3.33.6	Chron. slow	2-18-48.8
Corrected 2d alt.	79 48-26.4	Mean time of obs.	9-04-36.3
Altitude	39-54-13.2	Difference of long.	9-06-05.51
Refraction	56".7	Mean time at Gr.	9-10 25.2
Corrected alt.	39-53.16.5	Acceleration	18-16-30.71
Subtract 1'			
Reduced alt	39-52-16.5	Sid. int. past Gr. m. n.	
1st correction	19 39.8	Sid. time at Gr. m. n.	
Apparent alt.	40-11-56.3	Sid. time of obs.	
2d correction	46.3		
3d correction	1-14.16	Log. r	
Latitude	40-13-56.76	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	

Probable Error  
 $\frac{112.055 \times .455}{7 \times 6} = 3".46$   
 $\log 112.055 = 3.049431$   
 $\log 455 = 9.648366$   
 $a \text{ c log } 42 = 8.376751$   
 $8.376751$   
 $1.074542$   
 $0.537271$

40-13-40.13	7.7	59.29
40-14-10.6	22.8	479.84
40-13-26.2	21.6	466.56
40-13-57.7	3.9	15.21
40-14-19.3	9.0	81.0
40-13-56.8	2.9	8.41
40-13-44.9	3.2	10.24
40-13-44.6		
40-12-27.49		

Latitude of Puro = 40° 13' 47".84  
 Probable error of result = 3".46



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No.

Station Camp 2, Sp. 3. N. S. L.

Date

Aug 11<sup>th</sup> 1887

Between Spring Lake &amp; Sanitary mine

Mean obsd. 2 alt.	79° - 28' - 15"	Time by chron.	11 - 19 - 02.43
Index error	3' 42"	Chron. slow fast	2 - 18 - 18.56
Corrected 2d alt.	79 - 14 - 33	Mean time of obs.	9 - 00 - 43.87
Altitude	39 - 42 - 16.5	<i>Sub. with instrument</i> Difference of long. <i>none</i>	9 - 02 - 12.7
Refraction	57.0"	<i>Sub. time mean <i>none</i></i> Mean time at Gr. <i>at place</i>	9 - 22 - 30.23
Corrected alt.	39 - 41 - 19.5	Acceleration	18 - 24 - 42.93
Subtract 1'			
Reduced alt	39 - 40 - 19.5	Sid. int. past Gr. m. n.	
1st correction	16.18.3	Sid. time at Gr. m. n.	
Apparent alt.	39 - 56 - 37.8	Sid. time of obs.	
2d correction	46.21		
3d correction	1.13.9	Log. r	1.84917
Latitude	39 - 58.379	Barometer	9.9257
<i>By Chron. at top of</i>	39 - 58 - 34.23	Ther. attached	9.9992
	72.13	Ther. detached	9.9831
<i>Sub. Camp 2 =</i>	39 - 58 - 36.06	Refraction	1.75657

57"



9-13-8.59  
 1 11.83  
 9-14-20.4

LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No.

Station Camp 1. S.P.3. M.L.1  
 Near Spanish Forks U.T.

Date Aug. 9<sup>th</sup> 1892

Mean obsd. 2 alt.	79-23'-30"	Time by chron.	11-02-02.8
Index error	3 40	Chron. slow	2-18-03.6
Corrected 2d alt.	79-19-50	Mean time of obs.	8-43-59.2
Altitude	39-39-55	<i>Sub int.</i> Difference of long.	8-45-25.9
Refraction	56.2	<i>Sub time mean</i> Mean time at Gr.	9-14-24.4
Corrected alt.	39-38-58.8	Acceleration	
Subtract 1'		<i>Sub Time</i>	17-59-50.3
Reduced alt	39-37-58.8	Sid. int. past Gr. m. n.	
1st correction	25-159.94	Sid. time at Gr. m. n.	
Apparent alt.	40-03-14.74	Sid. time of obs.	
2d correction	40"		
3d correction	1-15.48	Log. r	1.84208
Latitude	40-05-10.22	Barometer	9.9257
		Ther. attached	9.9992
		Ther. detached	9.9831
		Refraction	1.74948

56.2

9.816  
 .143  
 29.568  
 39.424  
 64.892  
 71.83008



LATITUDE BY POLARIS.

Sextant No. 2821

Chronometer No. 1521

Station Camp 1 Sp. 3. M.L. 1  
near Spanish Forks

Date Aug 9. 1892

Mean obsd. 2 alt.	79 - 29 - 30	Time by chron.	11 - 11 - 25.4
Index error	- 3. 40	Chron. slow	2 18 - 18. 36
Corrected 2d alt.	79 - 25 - 50	Mean time of obs.	8 - 53 - 06.84
Altitude	39 - 42 - 55	Sid. int. Difference of long.	8 - 54 - 37.42
Refraction	56.0	Sid. time Mean time Mean time at Gr. <sup>at place</sup>	9 - 14 24.4
Corrected alt.	39 41 - 59.0	Acceleration	
Subtract 1'		Sid. time =	18 - 08 - 58.82
Reduced alt	39 - 40 - 59.0	Sid. int. past Gr. m. n.	
1st correction	22 - 163	Sid. time at Gr. m. n.	
Apparent alt.	40 - 03 - 15.8	Sid. time of obs.	
2d correction	44.99	Log. r	
3d correction	1 11.17	Barometer	
Latitude	40 - 05 - 11.46	Ther. attached	
	40 - 05 - 10.22	Ther. detached	
	21.68	Refraction	
	10.84		
	= 40 - 05 - 10.84		

Sat Camp No. 1.  
Sp. 3 M.L. 1.

*See preceding page*



LATITUDE BY POLARIS.

Sextant No. 2837. *ms* Watch Chronometer No. 625. In Johnson  
 Station Camp near Pipe Springs Date Oct 25<sup>th</sup> 1892

Mean obsd. 2 alt.	76-23-10	Time by chron.	9-04-28.05
Index error	11-40	Chron. slow fast	2-29.48
Corrected 2d alt.	76-11-30	Mean time of obs.	9-01-59.17
Altitude	38-05-45	<i>still int</i> Difference of long.	9-03-28.21
Refraction	1-03.8	<i>still m. now at place</i> Mean time at Gr.	14-17-56.5
Corrected alt.	38-04-41.2	Acceleration	23-21-24.7
Subtract 1'		<i>still time of obs =</i>	
Reduced alt	38-03-41.2	Sid. int. past Gr. m. n.	
1st correction	1-12-37.58	Sid. time at Gr. m. n.	
Apparent alt.	36-50-03.62	Sid. time of obs.	
2d correction	9".73		
3d correction	1-2.00	Log. r	1-87123
Latitude	36-51-14.35	Barometer	9.92416
		Ther. attached	0.00021
		Ther. detached	0.00427
		Refraction	1.79987

1' 03" 0



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521

Station Kamah W.M.

Date Oct. 28<sup>th</sup> 1872

Mean obsd. 2 alt.	76-35-00	Time by chron.	8-07-11.84
Index error	- 11' 50	Chron. slow	19-43.15
Corrected 2d alt.	76-23-10	Mean time of obs.	8-26-55.04
Altitude	38°-11'-35	<sup>sub int =</sup> Difference of long.	8-28-18.31
Refraction	1-02.9	<sup>sub</sup> Mean time at Gr. <sup>near</sup> at place	14-31-11.93
Corrected alt.	38-10-32.1	Acceleration	22-59-30.24
Subtract 1'			
Reduced alt	38-09-32.1	Sid. int. past Gr. m. n.	
1st correction	1-08-42.	Sid. time at Gr. m. n.	
Apparent alt.	37-00-50.1	Sid. time of obs.	
2d correction	13.37		
3d correction	1 04.62	Log. r	1.87074
Latitude	37-02-08.09	Barometer	9.92410
		Ther. attached	0.00221
		Ther. detached	0.00421
		Refraction	1.79866

1-02.9



LATITUDE BY POLARIS.

Sextant No. 2831 Chronometer No. 1521  
 Station Kanab wy. Date Oct 28<sup>th</sup> 1872

Mean obsd. 2 alt.	76-42-41.5	Time by chron.	8-25-31.37
Index error	-11-50	Chron. slow	19-43.15
Corrected 2d alt.	76-30-51.5	Mean time of obs.	8-45-14.52
Altitude	38-15-25.75	Difference of long. <sup>Sid. int. =</sup>	8-46-40.7
Refraction	1-02.7	Mean time at Gr. <sup>Sid. int. =</sup> at place	14-31-11.98
Corrected alt.	38-14-23.05	Acceleration	23-17-52.63
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	38-13-23.05	Sid. time at Gr. m. n.	
1st correction	1-11-54	Sid. time of obs.	
Apparent alt.	37-01-29.05		
2d correction	10.01		
3d correction	1-03.72	Log. r	
Latitude	37-02-42.78	Barometer	
	37-02-08.09	Ther. attached	
	04-50.87	Ther. detached	
	37-02-25.43	Refraction	

Sext. Kanab =

difference

37-02-25

7.46



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. <sup>Watch</sup> Cas by Johnson

Station 1 1/4 miles South of Pana

Date Nov 11

Mean obsd. 2 alt.	76° - 56' - 17.1"	Time by chron.	7 - 44 - 45.1
Index error	- 12' - 30"	Chron. slow <i>fast</i>	268
Corrected 2d alt.	76 - 43 - 47.1	Mean time of obs.	7 - 49 - 18.3
Altitude	38 - 21 - 33.5	Difference of long. = <i>Sid. int.</i>	7 - 50 - 35.39
Refraction	1 - 05.2	Mean time at Gr. <i>Sid. m. n. at place</i>	= 15 - 24 - 56.96
Corrected alt.	38 - 20 - 48.3	Acceleration	30.55
Subtract 1'		<i>Sid. time of obs.</i>	23 - 15 - 32.35
Reduced alt	38 - 19 - 48.3	Sid. int. past Gr. m. n.	
1st correction	1 - 11 - 36.75	Sid. time at Gr. m. n.	
Apparent alt.	37 - 8 - 11.55	Sid. time of obs.	
2d correction	10.79		
3d correction	1 - 04.08	Log. r	1.86787
Latitude	37 - 09 - 26.42	Barometer	9.9284
<i>add 1' 10"</i>	37 - 1' - 10"	Ther. attached	0.0008
<i>Lat. of Pana</i>	37 - 10 - 36.42	Ther. detached	0.0175
		Refraction	1.8145
			1 - 05.2



LATITUDE BY POLARIS.

Sextant No. 2831  
 Station Skid E. F. Mc Senior R.

*Wate*  
 Chronometer No. 621 - by Johnson  
 Date Oct 31 1872

Mean obsd. 2 alt.	76-50-57.8	Time by chron.	6-59-16.27
Index error	- 11-40	Chron. slow	1 <sup>m</sup> 29.2
Corrected 2d alt.	76-39-17.8	Mean time of obs.	7-00-45.47
Altitude	38°-19'-38.9"	<i>Sid. int</i> Difference of long.	7 01 -54.58
Refraction	58.13	<i>Sid. m. n. at plus</i> Mean time at Gr.	14-37-34.24
Corrected alt.	38-18-40.77	Acceleration	21-39-33.82
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	38-17-40.77	Sid. time at Gr. m. n.	
1st correction	- 49 14.04	Sid. time of obs.	
Apparent alt.	37 28 26.73		
2d correction	28.2		
3d correction	1' 10.30	Log. r	1.86787
Latitude	37-30 05.23	Barometer	9.87128
		Ther. attached	0.00113
		Ther. detached	0.02418
		Refraction	1.76440

58.13



1. 8.94  
 5.42  
 .14  
 1 - 14.55-

LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No.

Station Break in Rim of Basin

Date Nov 1<sup>st</sup> 1872

Mean obsd. 2 alt.	77° 35' 26".43	Time by chron.	7 - 34 - 47.23
Index error	12 - 00	Chron. slow fast	54.15
Corrected 2d alt.	77 - 23 - 26.43	Mean time of obs.	7 - 33 - 53.08
Altitude	38 - 41 - 43.22	<sup>sub. int</sup> Difference of long. =	7 - 35 - 07.63
Refraction	59.1	<sup>sub. m. n.</sup> Mean time at Gr. at place	14 - 45 - 32.35
Corrected alt.	38 - 40 - 44.12	Acceleration	22 - 20 - 39.98
Subtract 1'			
Reduced alt	38 - 39 - 44.12	Sid. int. past Gr. m. n.	
1st correction	1° - 00' - 06".64	Sid. time at Gr. m. n.	
Apparent alt.	37 - 39 - 37.48	Sid. time of obs.	
2d correction	20.92		
3d correction	1 - 07.16	Log. r	1.8626
Latitude	37° 41' 05".56	Barometer	9.88460
		Ther. attached	0.00704
		Ther. detached	0.02323
		Refraction	1.77147

59" 1



## LATITUDE BY POLARIS.

Sextant No. 2831 Chronometer No. 2831  
 Station Head Potato Valley Date Nov 30 1892

Mean obsd. 2 alt.	77-43-36.25	Time by chron.	7-51-36.46
Index error	-12.00	Chron. slow fast	58.1
Corrected 2d alt.	77-31-36.25	Mean time of obs.	7-50-41.86
Altitude	38-45-48.12	Difference of long.	7-51-59.17
Refraction	58.25	Mean time at Gr. <sup>at place</sup>	14-53-25.46
Corrected alt.	38-44-49.87	Acceleration	22-45-24.63
Subtract 1'		Sid. time of obs.	
Reduced alt	38-43-49.87	Sid. int. past Gr. m. n.	
1st correction	1-05-43.66	Sid. time at Gr. m. n.	
Apparent alt.	37-38-06.21	Sid. time of obs.	
2d correction	16.23		
3d correction	1.06.58	Log. r	1.86134
Latitude	37-39-29.02	Barometer	9.88272
		Ther. attached	0.00083
		Ther. detached	0.01838
		Refraction 58.25	1.46524



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. *Watch* 625 by *Johann*Station *1<sup>st</sup> Camp S. of Hd. Pat. Valley*Date *Nov 18/87*

Mean obsd. 2 alt.	77 - 37 - 31.8	Time by chron.	8 - 09 - 10.8
Index error	- 12' 00	Chron. slow <i>fast</i>	1 - 04.4
Corrected 2d alt.	77 - 39 31.8	Mean time of obs.	8 - 08 - 06.4
Altitude	38° - 49' - 45.9	<i>Sid. interval</i> Difference of long.	8 - 09 - 26.6
Refraction	55.9	<i>Sid. mean</i> Mean time at Gr. <i>at place</i>	15 - 05 - 15.13
Corrected alt.	38 - 48 - 50.0	Acceleration	
Subtract 1'		<i>Sid. time of obs.</i>	23 - 14 - 41.73
Reduced alt	38 - 47 - 50.0	Sid. int. past Gr. m. n.	
1st correction	1 - 11 - 28.35	Sid. time at Gr. m. n.	
Apparent alt.	37 - 36 - 21.65	Sid. time of obs.	
2d correction	11" 04		
3d correction	1' - 05" 27	Log. r	1.8100
Latitude	37 - 37 - 37.96	Barometer	9.87171
		Ther. attached	0 00063
		Ther. detached	0,01566
		Refraction	1.74890

55.9



LATITUDE BY POLARIS.

1.18.85  
4.27  
0.5  
1-23.14  
8-26-14.2  
8-27 42.37

Sextant No.

Chronometer No.

Station *Smiths Ranch New*

Date *Aug 15 1882*

Mean obsd. 2 alt.	<i>78-46-30</i>	Time by chron.	<i>11-35-32.6</i>
Index error	<i>-15</i>	Chron. slow fast	<i>3-09-13.4</i>
Corrected 2d alt.	<i>78-46-15</i>	Mean time of obs.	<i>8-26-19.2</i>
Altitude	<i>39-23-07.5</i>	Difference of long.	<i>8-27-42.37</i>
Refraction	<i>-54.07</i>	Mean time at Gr.	<i>9-38-02.94</i>
Corrected alt.	<i>39-22-13.43</i>	Acceleration	<i>18-05-45.36</i>
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	<i>39-20-13.43</i>	Sid. time at Gr. m. n.	
1st correction	<i>23-18.15</i>	Sid. time of obs.	
Apparent alt.	<i>39-43-31.58</i>		
2d correction	<i>44.06</i>		
3d correction	<i>1-16.36</i>	Log. r	<i>1.85234</i>
Latitude	<i>39-45-31.90</i>	Barometer	<i>9.90594</i>
	<i>-6.76</i>	Ther. attached	<i>9.99904</i>
	<i>39-45-24.14</i>	Ther. detached	<i>9.98074</i>
		Refraction	<i>1.7380.6</i>

*54.07*

*3-09-13.4*  
*8-18.2*  
*-20.2*  
*.33*

*47.8*  
*58.6*  
*106.4*  
*53.2*



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. <sup>Monte</sup> 625

Station New Spr. in the Line.

Date Nov. 17, 1852

Mean obsd. 2 alt.	77-29-09.3	Time by chron.	7-43-02.2
Index error	-12'-30"	Chron. slow <i>four</i>	2-04.28
Corrected 2d alt.	77-16-29.3	Mean time of obs.	7-40-47.97
Altitude	38-38-19.65	<i>Sub int. since m. n.</i> Difference of long.	7-42-03.66
Refraction	1-01.17	<i>Sub</i> Mean time at Gr.	15-09-11.68
Corrected alt.	38-37-18.48	<i>Sub time of observation</i> Acceleration	22-51-15.34
Subtract 1'			
Reduced alt	38-36-18.48	Sid. int. past Gr. m. n.	
1st correction	1-07-07.12	Sid. time at Gr. m. n.	
Apparent alt.	37-29-17.36	Sid. time of obs.	
2d correction	15.15		
3d correction	1-06.88	Log. r	1, 86264
Latitude	37°-30'-39".39	Barometer	9, 84945
		Ther. attached	0, 00065
		Ther. detached	0, 01379
		Refraction	1, 78653



## LATITUDE BY POLARIS.

Sextant No. 2851

Chronometer No. <sup>watch</sup> 625Station *El Dorado de las Indias* Date *Nov 14<sup>th</sup> 1892*

Mean obsd. 2 alt.	77 - 06 - 33.0	Time by chron.	9 - 13 - 28.44
Index error	. 12 - 40	Chron. slow <i>fast</i>	4 - 36.81
Corrected 2d alt.	76 - 53 - 53.0	Mean time of obs.	9 - 08 - 57.63
Altitude	38 - 26 - 56.5	<i>Sid. int</i> Difference of long. =	9 - 01 - 28.72
Refraction	1 14.05	<i>Sid. m. nom</i> Mean time at Gr. applic. =	15 - 1.31
Corrected alt.	38 - 25 - 42.45	Acceleration	<i>17</i> 0.0676
Subtract 1'			9 - 10 - 21.79
Reduced alt	38 - 24 - 42.45	Sid. int. past Gr. m. n.	15 - 36 - 46.62
1st correction	1 - 21 - 29.82	Sid. time at Gr. m. n.	2
Apparent alt.	37 - 03 - 12.63	Sid. time of obs.	24 - 47 - 08.41
2d correction	00.80		
3d correction	1.02.38	Log. r	9.89700
Latitude	37 - 04 - 15.81	Barometer	9.95738
		Ther. attached	0.00072
		Ther. detached	0.01442
		Refraction	1.86952

1 - 14.05



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 625 by Johnson

Station *Manne Creek NY*Date *Nov. 13th 1892*

Mean obsd. 2 alt.	76 - 27 - 48.5	Time by chron.	7, 09 - 108
Index error	- 12 - 40	Chron. slow <i>fast</i>	5 - 56.7
Corrected 2d alt.	76 - 15 - 08.5	Mean time of obs.	7 - 03 - 14.1
Altitude	38 - 07 - 54.25	<i>Sid int</i> Difference of long. =	7 04 23.44
Refraction	1 - 07.8	<i>Sid</i> Mean time at Gr. <i>at place</i>	15 - 32 - 52.06
Corrected alt.	38 - 06 - 26.45	Acceleration	
Subtract 1'		<i>Sid time of obs.</i>	22 - 37 - 15.50
Reduced alt	38 - 05 - 26.45	Sid. int. past Gr. m. n.	
1st correction	1 - 03 - 29.9	Sid. time at Gr. m. n.	
Apparent alt.	37 - 01 - 56.55	Sid. time of obs.	
2d correction	17.52		
3d correction	1 - 04.11	Log. r	1.87124
Latitude	37 - 03 - 23.18	Barometer	9.94486
		Ther. attached	0.00068
		Ther. detached	0.01434
		Refraction	1.83102

1 - 07.8



LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No.

Station Pape Springs Ang

Date Nov. 28<sup>th</sup> 1892

Mean obsd. 2 alt.	76 - 43 - 25.7	Time by chron.	8 - 16 - 54.48
Index error	- 13 - 40	Chron. slow	3 <sup>m</sup> 39.86
Corrected 2d alt.	76 - 29 - 45.7	Mean time of obs.	8 - 20 - 34.84
Altitude	38 - 14 - 52.85	<i>Sid int</i> Difference of long.	8 - 21 - 57.06
Refraction	1 - 03.01	<i>Sid m. n.</i> Mean time at Gr. <i>applies</i>	16 - 32 - 00.56
Corrected alt.	38 - 13 - 49.84	Acceleration	
Subtract 1'		<i>Sid Time of Obs.<sup>n</sup></i>	00 - 53 - 57.62
Reduced alt	38 - 12 - 49.84	Sid. int. past Gr. m. n.	
1st correction	1 - 21 - 43.86	Sid. time at Gr. m. n.	
Apparent alt.	36 - 51 - 06.48	Sid. time of obs.	
2d correction	04.25		
3d correction	1 - 05.43	Log. r	1. 87140
Latitude	36 - 52 - 16.16	Barometer	9.92088
		Ther. attached	0.00030
		Ther. detached	0.00638
		Refraction	1.79940

1.03.01



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No.

Station Pipe Springs Army

Date Nov 28<sup>th</sup> 1872

Mean obsd. 2 alt.	76 - 40 - 52.8	Time by chron.	9 - 16 - 57
Index error	18 - 40	Chron. slow	3, 39.86
Corrected 2d alt.	76 - 27 - 12.8	Mean time of obs.	9 - 20 - 36.86
Altitude	38 - 13 - 31.4	Difference of long.	9 - 22 - 08.95
Refraction	10 - 03.01	<sup>Sid</sup> Mean time at Gr. <sup>max</sup> <sub>of place</sub>	16 - 32 - 00.56
Corrected alt.	38 - 12 - 28.39	Acceleration	1
Subtract 1'			1 - 54 - 09.51
Reduced alt	38 - 11 - 28.39	Sid. int. past Gr. m. n.	
1st correction	1 - 20 - 35.94	Sid. time at Gr. m. n.	
Apparent alt.	36 - 50 - 52.40	Sid. time of obs.	
2d correction	07.50		
3d correction	1 - 05.68	Log. r	
Latitude	36 - 51 - 59.58	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



## LATITUDE BY POLARIS.

Sextant No. 2831      Chronometer No. 1521 by Meigs  
 Station Pipe Springs, Ariz      Date Nov 29<sup>th</sup> 1892

Mean obsd. 2 alt.	76 - 23 - 26.9	Time by chron.	6 - 42 - 05
Index error	13 - 05	Chron. slow	3 - 39.86
Corrected 2d alt.	76 - 10 - 21.9	Mean time of obs.	6 - 45 - 44.86
Altitude	38 - 05 - 10.95	Difference of long.	6 - 46 - 57.57
Refraction	1 03.7	Mean time at Gr. <sup>Sid. m. n.</sup> at place	16 - 39 - 57.12
Corrected alt.	38 04 - 07.25	Acceleration	
Subtract 1'		Sid. time of obs.	23 - 26 - 48.63
Reduced alt	38 - 03 - 07.25	Sid. int. past Gr. m. n.	
1st correction	1 - 13 - 29.00	Sid. time at Gr. m. n.	
Apparent alt.	36 - 49 - 38.25	Sid. time of obs.	
2d correction	9.36		
3d correction	1 - 09.52	Log. r	1,871.23
Latitude	36 - 50 - 58.13	Barometer	9.92082
		Ther. attached	0 - 00057
		Ther. detached	0 01192
		Refraction	1,80454



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1821

Station Pipe Springs Ariz

Date Nov, 29<sup>th</sup> 1887

Mean obsd. 2 alt.	76 - 40 - 26	Time by chron.	
Index error	13 - 05	Chron. slow	
Corrected 2d alt.	76 - 27 - 21	Mean time of obs.	
Altitude	38 - 13 - 40.5	Difference of long.	
Refraction	1 - 03.1	Mean time at Gr.	
Corrected alt.	38 - 12 - 37.4	Acceleration	
Subtract 1'		Sid. Time of obs	00 - 35 - 04.35
Reduced alt	38 - 11 - 37.4	Sid. int. past Gr. m. n.	
1st correction	1 - 20 - 55.34	Sid. time at Gr. m. n.	
Apparent alt.	36 - 50 - 42.06	Sid. time of obs.	
2d correction	1.30		
3d correction	1 - 07.50	Log. r	
Latitude	36 - 51 - 50.86	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



LATITUDE BY POLARIS.

Sextant No. 2821 Chronometer No. 1521  
 Station *Smith's Ranch* Date *Dec. 2nd 1871*

Mean obsd. 2 alt.	77-07-42.8	Time by chron.	7-18-07.66
Index error	-13-40.0	Chron. slow	7-59.93
Corrected 2d alt.	76-54-02.8	Mean time of obs.	7-26-01.59
Altitude	38-27-01.4	<sup>Sun</sup> Difference of long. =	7-27-14.86
Refraction	1-03.88	<sup>Sun</sup> Mean time at Gr. <sup>at place</sup>	16-49-46.58
Corrected alt.	38-25-57.52	Acceleration	
Subtract 1'			00-05-01.44
Reduced alt	38-24-57.52	Sid. int. past Gr. m. n.	
1st correction	1-18-30	Sid. time at Gr. m. n.	
Apparent alt.	37-06-27.52	Sid. time of obs.	
2d correction	03.92		
3d correction	1.08.48	Log. r	1.8626
Latitude	37-07-40.42	Barometer	9.4213
		Ther. attached	0.0068
		Ther. detached	0.0144
		Refraction	1.8053



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521

Station *Wendell's ranch*Date *Dec. 2<sup>nd</sup> 1892*

Mean obsd. 2 alt.	77-07-42.8	Time by chron.	7-18-01.66
Index error	13-40.0	Chron. <del>slow</del> fast	7-22.36
Corrected 2d alt.	76-54-02.8	Mean time of obs.	7-10-39.30
Altitude	38-27-01.4	Difference of long.	7 11 49.8
Refraction	1-03.88	Mean time at Gr. <i>altitude</i>	16 47 46.58
Corrected alt.	38 25-57.52	Acceleration	
Subtract 1'	0 - 1' 00.00		23 - 59 36.58
Reduced alt	38-25-57.52	Sid. int. past Gr. m. n.	
1st correction	1 17-56.20	Sid. time at Gr. m. n.	
Apparent alt.	37-08-01.32	Sid. time of obs.	
2d correction	4.40		
3d correction	1-08.99	Log. r	
Latitude	37-09-14.71	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



### LATITUDE BY POLARIS.

Sextant No. 2831  
Station New Skumpuk

Chronometer No. 125 by Johnson  
Date Nov. 26 1872

Mean obsd. 2 alt.	77-31-05	Time by chron.	8-20-38.16
Index error	13-50	Chron. slow	1-14.1
Corrected 2d alt.	77-17-15	Mean time of obs.	8-21-57.26
Altitude	38-38-37.5	Difference of long.	8-23-14.50
Refraction	1-02.0	Mean time at Gr.	16-24-06.23
Corrected alt.	38-37-34.6	Acceleration	
Subtract 1'			00-47-25.73
Reduced alt	38-36-34.6	Sid. int. past Gr. m. n.	
1st correction	1-21-23	Sid. time at Gr. m. n.	
Apparent alt.	37-15-11.6	Sid. time of obs.	
2d correction			
3d correction		Log. r	1.8626
Latitude		Barometer	9.9052
		Ther. attached	0.0013
		Ther. detached	0.0294
		Refraction	1.7990

1-02.9



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. <sup>corrected</sup> 628 by Johnson

Station Near Stumpah

Date Nov 26<sup>th</sup> 1872

Mean obsd. 2 alt.	77-31-05	Time by chron.	8-20-38.16
Index error	13-50	Chron. slow fast	48 <sup>s</sup> .2
Corrected 2d alt.	77-17-15	Mean time of obs.	8-19-49.96
Altitude	38-38-37.5	Difference of long.	8-21-11.84
Refraction	1.02.9	Mean time at Gr.	16-24-06.23
Corrected alt.	38-37-34.6	Acceleration	
Subtract 1'			00-45-18.07
Reduced alt	38-36-34.6	Sid. int. past Gr. m. n.	
1st correction	1-21-25.25	Sid. time at Gr. m. n.	
Apparent alt.	37-15-09.35	Sid. time of obs.	
2d correction	0.68		
3d correction	1-04.76	Log. r	
Latitude	37-16-14.79	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. <sup>Watch</sup> 625 - by Johnson

Station

Hd. Customhouse Am. W. I.

Date

Nov 21/82

Mean obsd. 2 alt.	77-18-31.4	Time by chron.	
Index error	13-10	Chron. slow	
Corrected 2d alt.	77-05-21.4	Mean time of obs.	
Altitude	38-32-40.7	Difference of long.	
Refraction	1-00.8	Mean time at Gr.	
Corrected alt.	38-31-39.9	Acceleration	
Subtract 1'			
Reduced alt	38-30-39.9	Sid. int. past Gr. m. n.	
1st correction	1-06-06	Sid. time at Gr. m. n.	
Apparent alt.	37-24-33.9	Sid. time of obs.	22-46-52.11
2d correction	13.5		
3d correction	1-13.6	Log. r	1.8652
Latitude	37-25-50.8	Barometer	9.9005
		Ther. attached	0.0008
		Ther. detached	0.0175
		Refraction	1.7840
			1-00.8



## LATITUDE BY POLARIS.

Sextant No. 283/

Chronometer No. 132/

Station Westport Springs N.H.

Date Oct. 4<sup>th</sup> 1872

Mean obsd. 2 alt.	76-52-00	Time by chron.	7-47-05.4
Index error	.	Chron. slow	3-46.5
Corrected 2d alt.		Mean time of obs.	7-50-31.9
Altitude		Difference of long.	7-52-04.2
Refraction		Mean time at Gr.	12-55-10.2
Corrected alt.		Acceleration	
Subtract 1'			20-47-19.4
Reduced alt		Sid. int. past Gr. m. n.	
1st correction		Sid. time at Gr. m. n.	
Apparent alt.		Sid. time of obs.	
2d correction			
3d correction		Log. r	
Latitude		Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521

Station Hiram Spier, W.V.

Date Oct 4 1887

Mean obsd. 2 alt.	76-52-00	Time by chron.	7-47-05.7
Index error	- 11-00	Chron. slow fast	2-37.5
Corrected 2d alt.		Mean time of obs.	7-44-27.9
Altitude	76-41-00	Difference of long.	7-48-44.2
Refraction	38-20-30	Mean time at Gr.	12-55-10.2
Corrected alt.	38-19-03.8	Acceleration	
Subtract 1'			20-40-54.4
Reduced alt	38-18-26.2	Sid. int. past Gr. m. n.	
1st correction	- 30-50.73	Sid. time at Gr. m. n.	
Apparent alt.	37-47-38.44	Sid. time of obs.	
2d correction	38.95		
3d correction	1-09.78	Log. r	1.86787
Latitude	37-49-24.20	Barometer	9.43734
		Ther. attached	0.00000
		Ther. detached	0.00000
		Refraction	1.80520

63.8



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 8212. Fordham

Station Sutter

Date Sept 6<sup>th</sup> 1872

Mean obsd. 2 alt.	78-05-00	Time by chron.	8-08-14.0
Index error	8-35	Chron. slow	7-23.4
Corrected 2d alt.	77-56-25	Mean time of obs.	8-09-37.4
Altitude	38-58-12.5	Difference of long.	8-310-557.8
Refraction	56.8	Mean time at Gr.	11-04-45.71
Corrected alt.	38-57-15.7	Acceleration	
Subtract 1'			19-14-53.51
Reduced alt	38-56-15.7	Sid. int. past Gr. m. n.	
1st correction	-11-02.38	Sid. time at Gr. m. n.	
Apparent alt.	38-55-13.35	Sid. time of obs.	
2d correction	47.4		
3d correction	1-13.0	Log. r	1.84464
Latitude	38-57-13.75	Barometer	9.92882
		Ther. attached	9.99948
		Ther. detached	9.98927
		Refraction	1.75741

56.8



## LATITUDE BY POLARIS.

Sextant No. 2831  
 Station Sabine N.Y.

Chronometer No. 8212 Ketchum  
 Date Sept 6<sup>th</sup> 1872

Mean obsd. 2. alt.	77-49-45.7 8-35	Time by chron.	7. 43-57.27
Index error		Chron. slow	11-23.47
Corrected 2d alt.	77-39-10	Mean time of obs.	7-45-14.64
Altitude	38-49-35	Difference of long.	7-46-31.06
Refraction	38.8	Mean time at Gr.	11-04-45.71
Corrected alt.	38-48-36.2	Acceleration	118-157-+116.77
Subtract 1'			
Reduced alt	38-47-36.1	Sid. int. past Gr. m. n.	
1st correction	+ 7-24.18	Sid. time at Gr. m. n.	
Apparent alt.	38-55-00.28	Sid. time of obs.	
2d correction	46.8		
3d correction	1-15.68	Log. r	1. 860005
Latitude	38-57-02.76	Barometer	9. 92082
		Ther. attached	9. 94448
		Ther. detached	9. 98427
		Refraction	1. 76962
			38.8

Subtends Sabine = 38-57-14.43 }  
 " 11.3 }  
 " 13.75 } Polaris  
 " 02.76 }  
 42.24  
 Mean = 38°-57'-10.56



*Experiment*  
LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 8212 <sup>00</sup> *Fordshams*Station *Union Valley*Date *Sept 7<sup>th</sup> 1878*

Mean obsd. 2 alt.	<i>77-46-45</i>	Time by chron.	<i>7-54-04.8</i>
Index error	<i>8-35</i>	Chron. slow <i>slow</i>	<i>2 23.13</i>
Corrected 2d alt.	<i>77-38-10</i>	Mean time of obs.	<i>7-56-32.93</i>
Altitude	<i>38-49-05</i>	<i>Sid. int.</i> Difference of long. =	<i>7-57-51.20</i>
Refraction	<i>57.7</i>	<i>Sid. time m. n.</i> Mean time at Gr. at place	<i>11-08-42.00</i>
Corrected alt.	<i>38-48-07.3</i>	Acceleration	
Subtract 1'			<i>19-06-33.29</i>
Reduced alt	<i>38-47-07.3</i>	Sid. int. past Gr. m. n.	
1st correction	<i>+1-57.18</i>	Sid. time at Gr. m. n.	
Apparent alt.	<i>38-49-04.48</i>	Sid. time of obs.	
2d correction	<i>47.40</i>		
3d correction	<i>1-14.30</i>	Log. r	<i>1.86005</i>
Latitude	<i>38-51-06.18</i>	Barometer	<i>9.89579</i>
		Ther. attached	<i>0.00021</i>
		Ther. detached	<i>0.00546</i>
		Refraction	<i>1.76151</i>

*57.7*



Finab

41

LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 8212

Station Alameda Grant's Valley

Date Sept 8<sup>th</sup> 1872

Mean obsd. 2 alt.	78-08-00	Time by chron.	8-41-32.2
Index error	9'-40	Chron. slow	3-06.53
Corrected 2d alt.	77-58-20	Mean time of obs.	8-44-38.73
Altitude	38-59-10	Difference of long. = <sup>Sub mer</sup>	8 46-04.91
Refraction	55.3	Mean time at Gr.	11 12-38.64
Corrected alt.	38-58-54.7	Acceleration	
Subtract 1'	-16-33.46		19-58 43.55
Reduced alt	38-57-14.7	Sid. int. past Gr. m. n.	
1st correction	-16-33.46	Sid. time at Gr. m. n.	
Apparent alt.	38-40-41.24	Sid. time of obs.	
2d correction	45.40		
3d correction	1-08.56	Log. r	1.85747
Latitude	38-42-35.20	Barometer	9.88375
		Ther. attached	0.00008
		Ther. detached	0.00181
		Refraction	1.74311

55.3



*1<sup>st</sup> App.*

## LATITUDE BY POLARIS.

Sextant No. *28<sup>21</sup>*Chronometer No. *8212 Froelich*Station *3<sup>d</sup> Camp Cross Valley*Date *Sept 12<sup>th</sup> 1872*

Mean obsd. 2 alt.	<i>77 - 33 - 15</i>	Time by chron.	<i>8 - 37 - 24.9</i>
Index error	<i>9' - 30</i>	Chron. slow	<i>6 - 41.1</i>
Corrected 2d alt.	<i>77 23 - 48</i>	Mean time of obs.	<i>8 - 44 - 06.0</i>
Altitude	<i>38 - 41 - 52.5</i>	Difference of long.	<i>8 - 45 - 32.0</i>
Refraction	<i>55.3</i>	Mean time at Gr.	<i>11 - 28 - 24.9</i>
Corrected alt.	<i>38 - 40 - 57.2</i>	Acceleration	
Subtract 1'			<i>20 - 13 - 57.0</i>
Reduced alt	<i>38 - 39 - 57.2</i>	Sid. int. past Gr. m. n.	
1st correction	<i>- 21 - 52.53</i>	Sid. time at Gr. m. n.	
Apparent alt.	<i>38 - 18 - 04.47</i>	Sid. time of obs.	
2d correction	<i>43.1</i>		
3d correction	<i>1 - 07.86</i>	Log. r	<i>1. 843.94</i>
Latitude	<i>38 - 19 - 55.43</i>	Barometer	<i>9 8538</i>
		Ther. attached	<i>9 9994</i>
		Ther. detached	<i>9 9946</i>
		Refraction	<i>1 7420</i>

*55.3*



## LATITUDE BY POLARIS.

Sextant No. 2831 -

Chronometer No.

Station 3<sup>d</sup> Camp, Green ValleyDate Sept 12<sup>th</sup> 1892

Mean obsd. 2 alt.	77-28-45	Time by chron.	8-32-02.11
Index error	9-30	Chron. slow	0-41.1
Corrected 2d alt.	77-18-15	Mean time of obs.	8-38-43.22
Altitude	38-39-07.5	Difference of long.	8-40-08.19
Refraction	55.6	Mean time at Gr.	11-28-27.4
Corrected alt.	38-39-11.9	Acceleration	
Subtract 1'			20-08-33.09
Reduced alt	38-38-11.9	Sid. int. past Gr. m. n.	
1st correction	-20-07.64	Sid. time at Gr. m. n.	
Apparent alt.	38-18-10.21	Sid. time of obs.	
2d correction	43.1		
3d correction	1-08.38	Log. r	
Latitude	38-20-01.69	Barometer	
	38-19-55.43	Ther. attached	
	2) 39-57.12	Ther. detached	
	.19-58.56	Refraction	

Lat Camp 3<sup>uth</sup> Sp. 5 (3<sup>d</sup> Camp Green valley) = 38-19-58.56



*Approximate*  
LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. <sup>watch</sup> 621 - by JohnsonStation *Chimney Pt. Fk. Sevier*  
*Camp 6<sup>th</sup> U.S. M.S.L.*Date *Sept 13<sup>th</sup> 1892*

Mean obsd. 2 alt.	76-50-00	Time by chron.	7-56-23
Index error	9.35-	Chron. slow	11-17.6
Corrected 2d alt.	76-40-25	Mean time of obs.	8-07-40.6
Altitude	38-20-12.5	Difference of long.	8-09-00.7
Refraction	88.8	Mean time at Gr.	11-32-21.4
Corrected alt.	38-19-13.7	Acceleration	
Subtract 1'			19-41-22.1
Reduced alt	38-18-13.7	Sid. int. past Gr. m. n.	
1st correction	-10-28.62	Sid. time at Gr. m. n.	
Apparent alt.	38-07-45.08	Sid. time of obs.	
2d correction	45.82		
3d correction	1-11.34	Log. r	1.8678
Latitude	38-09-32.24	Barometer	9.9062
		Ther. attached	9.9997
		Ther. detached	9.9955
		Refraction	1.7042

*58.8*



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No.

Station Camp E. Fort Sumner  
Camp "f" S.P.S.

Date

Sept 13<sup>th</sup> 1878

Mean obsd. 2 alt.	76 - 51 - 00	Time by chron.	7 - 54 - 46.7
Index error	9 - 35	Chron. slow	8 - 05.1
Corrected 2d alt.	76 - 41 - 25	Mean time of obs.	8 - 05 - 57.8
Altitude	38 - 20 - 42.5	Difference of long.	8 - 07 - 11.91
Refraction	58.8	Mean time at Gr.	11 - 32 - 21.4
Corrected alt.	38 - 19 - 43.7	Acceleration	
Subtract 1'			19 - 39 - 33.0
Reduced alt	38 - 18 - 43.7	Sid. int. past Gr. m. n.	
1st correction	- 9.50.37	Sid. time at Gr. m. n.	
Apparent alt.	38 - 08 - 53.33	Sid. time of obs.	
2d correction	45.8		
3d correction	1 - 11.52	Log. r	1.8678
Latitude	38 - 10 - 50.65	Barometer	9.9062
		Ther. attached	9.9997
		Ther. detached	9.9955
		Refraction	58.8



## LATITUDE BY POLARIS.

Sextant No. 2831 -

Chronometer No.

Station Cairn E. 7k. Sevier

Date Sept 13<sup>th</sup> 1892

Mean obsd. 2 alt.	76 - 53 - 20	Time by chron.	7 -
Index error	9.35 -	Chron. slow	
Corrected 2d alt.	76 - 43 - 40 -	Mean time of obs.	
Altitude	38 - 21 - 52.5 -	Difference of long.	
Refraction	58.7	Mean time at Gr.	
Corrected alt.	38 - 20 - 53.8	Acceleration	
Subtract 1'			
Reduced alt	38 - 19 - 53.8	Sid. int. past Gr. m. n.	
1st correction	10 - 54.27	Sid. time at Gr. m. n.	
Apparent alt.	38 - 08 - 59.67	Sid. time of obs.	<sup>h</sup> 19 - <sup>m</sup> 42 - <sup>s</sup> 37.8
2d correction	45.7		
3d correction	1 - 11.5 -	Log. r	
Latitude	38 - 10 - 56.87	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



## LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

Date

Mean obsd. 2 alt.	76 - 56 - 00	Time by chron.	
Index error	9 - 35	Chron. slow	
Corrected 2d alt.	76 - 46 - 25	Mean time of obs.	
Altitude	38 - 23 - 12.5	Difference of long.	
Refraction	5 - 8.6	Mean time at Gr.	
Corrected alt.	38 - 22 - 13.9	Acceleration	
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	38 - 21 - 13.4	Sid. time at Gr. m. n.	
1st correction	12 - 14.52	Sid. time of obs.	19 - 46 - 21.2
Apparent alt.	38 - 08 - 59.38		.631
2d correction	45.7	Log. r	
3d correction	1 - 11.5	Barometer	
Latitude	38 - 10 - 56.58	Ther. attached	
		Ther. detached	
		Refraction	

38 - 10 - 50.65

38 - 10 - 56.87

38 - 10 - 56.58

164.10

$\text{True Lat} = 38^\circ - 10' - 54.7''$



LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521, by Myers

Station Circleville W.T.

Date Sept 14<sup>th</sup> 1872

Camp "g" S.P. & H.S. 1

Mean obsd. 2 alt.	76-21-00	Time by chron.	9-43-30.7
Index error	9-27	Chron. slow fast	2-20-04.2
Corrected 2d alt.	76-11-33	Mean time of obs.	7-23-26.5
Altitude	38-05-46.5	Difference of long. <i>Sid. int.</i>	7-24-39.3
Refraction	59"	Mean time at Gr. <i>Sid. time now. at place</i>	11-36-17.4
Corrected alt.	38-04-44.5	Acceleration	
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	38-03-47.5	Sid. time at Gr. m. n.	
1st correction	+ 3-58.52	Sid. time of obs.	19-00-57.2
Apparent alt.	38-07-46.02	Log. r	1.8711
2d correction	45.8	Barometer	9.9062
3d correction	1-15.2	Ther. attached	9.9941
Latitude	38-09-47.02	Ther. detached	9.9997
		Refraction	1.7811

57"



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521

Station Cincinnati N.Y.

Date Sept 14 1872

Mean obsd. 2 alt.	76-21-30	Time by chron.	
Index error	9-27	Chron. slow	
Corrected 2d alt.	76-12-03	Mean time of obs.	
Altitude	38-06-07.5	Difference of long.	
Refraction	58".9	Mean time at Gr.	
Corrected alt.	38 05-026	Acceleration	
Subtract 1'			
Reduced alt	38-04-02.6	Sid. int. past Gr. m. n.	
1st correction	+ 3-44.54	Sid. time at Gr. m. n.	
Apparent alt.	38-07-47.19	Sid. time of obs.	19-01-38.2
2d correction	45.7		
3d correction	1-15.2	Log. r	
Latitude	38-09-48.09	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521

Station Anclawille W.T.

Date

Sept 14<sup>th</sup> 1892  
Meyers

Mean obsd. 2 alt.	76-22-00	Time by chron.	
Index error	9-27	Chron. slow	
Corrected 2d alt.	76-22-33	Mean time of obs.	
Altitude	38-06-16.5	Difference of long.	
Refraction	38.4	Mean time at Gr.	
Corrected alt.	38-05-17.6	Acceleration	
Subtract 1'			
Reduced alt	38-04-17.6	Sid. int. past Gr. m. n.	
1st correction	3-36.5	Sid. time at Gr. m. n.	
Apparent alt.	58-07-54.1	Sid. time of obs.	19-02-00.2
2d correction	45.7		
3d correction	1-15.2	Log. r	
Latitude	58-09-55.0	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521 *Weyss*Station *Circleville W. Va.*Date *Sept 14 1872*

Mean obsd. 2 alt.	<i>76 - 22 - 30</i>	Time by chron.	
Index error	<i>9. 27</i>	Chron. slow	
Corrected 2d alt.	<i>76 - 13 - 03</i>	Mean time of obs.	
Altitude	<i>38 - 6 - 31.5</i>	Difference of long.	
Refraction	<i>58.9</i>	Mean time at Gr.	
Corrected alt.	<i>38 05 - 32.6</i>	Acceleration	
Subtract 1'			
Reduced alt	<i>38 - 04 - 32.6</i>	Sid. int. past Gr. m. n.	
1st correction	<i>3' - 17.53</i>	Sid. time at Gr. m. n.	
Apparent alt.	<i>38 - 07 - 50.13</i>	Sid. time of obs.	<i>19 - 02 - 57.3</i>
2d correction	<i>40.7</i>		
3d correction	<i>1 - 15.1</i>	Log. r	
Latitude	<i>38 - 09 - 50.93</i>	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521 *Navy*Station *Circleville N.Y.*Date *Sept 14<sup>th</sup> 1872*

Mean obsd. 2 alt.	76 - 23 - 00	Time by chron.	
Index error	9.27	Chron. slow	
Corrected 2d alt.	76 13 - 33	Mean time of obs.	
Altitude	38 - 06 - 47.5	Difference of long.	
Refraction	58.85	Mean time at Gr.	
Corrected alt.	38 - 05 - 48.65	Acceleration	
Subtract 1'			
Reduced alt	38 - 04 - 48.65	Sid. int. past Gr. m. n.	
1st correction	2 - 58.92	Sid. time at Gr. m. n.	
Apparent alt.	38 - 07 - 47.57	Sid. time of obs.	19 - 03 - 22.7
2d correction	45.96		
3d correction	1 - 14.79	Log. r	
Latitude	38 - 09 - 48.32	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521

Station

Circleville W. Va.

Date

Sept 14<sup>th</sup> 1872

Mean obsd. 2 alt.	76 - 23 - 30	Time by chron.	
Index error	9.27	Chron. slow	
Corrected 2d alt.	76 - 14 - 03	Mean time of obs.	
Altitude	38 - 07 - 01.5	Difference of long.	
Refraction	58.85	Mean time at Gr.	
Corrected alt.	38 - 06 - 02.65	Acceleration	
Subtract 1'			
Reduced alt	38 - 05 - 02.65	Sid. int. past Gr. m. n.	
1st correction	2 - 53.33	Sid. time at Gr. m. n.	
Apparent alt.	38 - 07 - 55.98	Sid. time of obs.	19 - 04 - 07.9
2d correction	45.9		
3d correction	1 - 14.79	Log. r	
Latitude	38 - 09 - 56.67	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



## LATITUDE BY POLARIS.

Sextant No. 2831 Chronometer No. 1521 *Weynes*  
 Station *Cirehville whf* Date *Sept 14<sup>th</sup> 1872*

Mean obsd. 2 alt.	76-24-00	Time by chron.	
Index error	9-27	Chron. slow	
Corrected 2d alt.	76-14-33	Mean time of obs.	
Altitude	38-07-16.5	Difference of long.	
Refraction	58.8	Mean time at Gr.	
Corrected alt.	38-06-17.7	Acceleration	
Subtract 1'			
Reduced alt	38-05-17.7	Sid. int. past Gr. m. n.	
1st correction	2-39.19	Sid. time at Gr. m. n.	
Apparent alt.	38-07-56.89	Sid. time of obs.	10-04-49.23
2d correction	45.9		
3d correction	1-14.8	Log. r	
Latitude	38-09-57.59	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	

38-09-47.02

" " 48.09

" " 55.00

" " 50.93

" " 48.32

" " 56.67

" " 57.59

363.62

38-09-51.94 = *Subtract of Cirehville*



## LATITUDE BY POLARIS.

Sextant No. 2831 Chronometer No. 576  
 Station W. Sumner Date July 13<sup>th</sup> 1872

Mean obsd. 2 alt.	79 - 11 - 00	Time by chron.	10 - 46 - 41.3
Index error	6 - 34.5	Chron. slow fast	2 - 19 - 19.8
Corrected 2d alt.	79 - 04 - 25	Mean time of obs.	8 - 27 - 21.5
Altitude	39 - 32 - 12.5	Difference of long.	8 - 28 - 44.8
Refraction	53.1	Mean time at Gr.	9 - 30 - 08.74
Corrected alt.	39 - 31 - 19.4	Acceleration	
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	39 - 30 - 19.4	Sid. time at Gr. m. n.	
1st correction	25 - 42.3	Sid. time of obs.	17 - 58 - 53.59
Apparent alt.	39 - 56 - 01.7		
2d correction	43.98		
3d correction	1 - 23.14	Log. r	1.8446
Latitude	39 - 58 - 08.92	Barometer	4.8994
		Ther. attached	9.9491
		Ther. detached	9.9823
		Refraction	1.7254

53.14



M. A. P. —

## LATITUDE BY POLARIS.

Sextant No. 2831 Chronometer No. 8249. Bunnell  
 Station Camp i SPS-Md. 1. Date Sept 18<sup>th</sup> 1872  
 Mendocino Valley

Mean obsd. 2 alt.	76 - 14 - 30	Time by chron.	7 - 27 - 47.3
Index error	9 - 41.25	Chron. slow	4 - 41.78
Corrected 2d alt.	76 - 05 - 08.75	Mean time of obs.	7 - 32 - 29.08
Altitude	38 - 02 - 34.37	Difference of long.	7 - 33 - 40.31
Refraction	- 56.5	Mean time at Gr.	11 - 52 - 04.67
Corrected alt.	38 - 01 - 37.87	Acceleration	
Subtract 1'			
Reduced alt	38 - 00 - 37.87	Sid. int. past Gr. m. n.	
1st correction	- 4 - 54.62	Sid. time at Gr. m. n.	
Apparent alt.	37 - 55 - 43.25	Sid. time of obs.	19 - 25 - 44.98
2d correction	43.38		
3d correction	1 - 13.42	Log. r	9.8724
Latitude	37 - 57 - 40.05	Barometer	9.8837
<i>For error in time</i>	+ 4.48	Ther. attached	9.9997
<i>due to barometer</i>	37 - 57 - 44.53	Ther. detached	9.9955
		Refraction	56.5 1.7518



LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 5749 Bannard

Station Panayonah Wy  
Ank K. S.P. 5-

Date Sept 19 1872

Mean obsd. 2 alt.	76 - 30 - 30	Time by chron.	7 - 52 - 24.6
Index error	11 40	Chron. slow	22 - 43.50
Corrected 2d alt.	76 - 18 - 50	Mean time of obs.	8 - 15 - 08.10
Altitude	38 - 09 - 25	Difference of long.	8 - 16 - 29.43
Refraction	59.3	Mean time at Gr.	11 - 56 - 00.7
Corrected alt.	38 - 08 - 25.7	Acceleration	
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	38 - 07 - 25.7	Sid. time at Gr. m. n.	
1st correction	27 - 28.75	Sid. time of obs.	20 - 12 - 30.13
Apparent alt.	38 - 46 - 01.95	Log. r	1.8703
2d correction	42.6	Barometer	9.9067
3d correction	1 - 13.2	Ther. attached	9.9997
Latitude	37 - 47 - 57.75	Ther. detached	9.9964
	37 - 48 - 55.45	Refraction	1.7731

59.3



## LATITUDE BY POLARIS.

Sextant No. 2831 Chronometer No. 1521  
 Station Sever Pan Date Aug 17<sup>th</sup> 1872

Mean obsd. 2 alt.	78 - 28 - 30	Time by chron.	102 - 43 - 04.4
Index error	7 - 15	Chron. slow <i>fast</i>	2 - 20 - 17.2
Corrected 2d alt.	78 - 21 - 15	Mean time of obs.	8 - 22 - 42.2
Altitude	39 - 10 - 37.5	Difference of long.	8 - 24 - 04.77
Refraction	56.0	Mean time at Gr.	9 - 45 - 54.94
Corrected alt.	39 - 09 - 41.5	Acceleration	
Subtract 1'			
Reduced alt	39 - 08 - 41.5	Sid. int. past Gr. m. n.	
1st correction	21 - 54.84	Sid. time at Gr. m. n.	
Apparent alt.	39 - 30 - 36.39	Sid. time of obs.	18 - 09 - 59.75
2d correction	44.3		
3d correction	1 - 16.48	Log. r	1.8849
Latitude	39 - 32 - 37.17	Barometer	9.9120
<i>Cir. for corrections behind</i>	= - 3.25	Ther. attached	9.9491
<i>annual =</i>		Ther. detached	9.9822
<i>Subtended</i>	39 - 32 - 33.92	Refraction	1.7482

56



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521. Key us

Station Pak Cruise Comm

Date Aug 19 1872

Mean obsd. 2 alt.	78 - 10 - 00	Time by chron.	10 - 40 - 55.2
Index error	7' - 25"	Chron. slow <i>5m 20s</i>	2 - 20 - 54.4
Corrected 2d alt.	78 02 - 35	Mean time of obs.	8 - 20 - 00.8
Altitude	39 - 07 - 17.5	<i>Cor Sid</i> Difference of long.	8 - 21 22.9
Refraction	- 35.9	<i>Sid</i> Mean time at Gr. <i>at place</i>	9 - 53 - 47.81
Corrected alt.	39 00 21.8	Acceleration	
Subtract 1'			
Reduced alt	38 - 59 - 21.8	Sid. int. past Gr. m. n.	
1st correction	+ 20. - 07.36	Sid. time at Gr. m. n.	
Apparent alt.	39 - 19 - 29.16	Sid. time of obs.	18 - 15 - 10.71
2d correction	43.48		
3d correction	1 - 13.18	Log. r	1.8549
Latitude	39 - 21 - 25.79	Barometer	9.9031
	44.13	Ther. attached	9.9991
	39 - 21 - 05.66	Ther. detached	9.9823
		Refraction	1.7394

1st Apparent Altitude  
 39 - 19 - 29.16

56  
 54.5  
 106  
 55.3



## LATITUDE BY POLARIS.

Sextant No. 2831 Chronometer No. 1521, Venus  
 Station Oak Creek Annex Date August 14<sup>th</sup> 1872

Mean obsd. 2 alt.	78 - 10 - 00	Time by chron.	10 - 40 - 55.2
Index error	7 - 25	Chron. slow <i>mark</i>	2 - 20 - 11.23
Corrected 2d alt.	78 02 - 35	Mean time of obs.	8 - 20 - 43.97
Altitude	39 - 07 - 17.5	Difference of long.	8 - 22 - 06.22
Refraction	53.7	Mean time at Gr.	9 - 53 - 47.81
Corrected alt.	39 - 00 - 21.8	Acceleration	
Subtract 1'			
Reduced alt	38 - 59 - 21.8	Sid. int. past Gr. m. n.	
1st correction	+ 19 - 52.28	Sid. time at Gr. m. n.	
Apparent alt.	39 - 19 - 14.88	Sid. time of obs.	18 - 15 - 54.03
2d correction	43.45		
3d correction	1 - 13.18	Log. r	
Latitude	39 - 21 - 10.71	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



## LATITUDE BY POLARIS.

Sextant No.

2831

Chronometer No.

1521. Noyes

Station

New Haven

Date

Aug 22/70

Mean obsd. 2 alt.	78 - 17 - 00.0	Time by chron.	11 - 16 - 08.8
Index error	7 - 25	Chron. slow	2 - 20 - 00.4
Corrected 2d alt.	78 - 09 - 35	Mean time of obs.	8 - 56 - 08.4
Altitude	39 - 04 - 47.5	Difference of long.	8 - 57 - 36.9
Refraction	54.9	Mean time at Gr.	10 - 05 - 37.4
Corrected alt.	39 - 03 - 52.6	Acceleration	
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	39 - 02 - 52.6	Sid. time at Gr. m. n.	
1st correction	3 - 08.56	Sid. time of obs.	
Apparent alt.	39 - 06 - 01.16		19 - 03 - 14.3
2d correction	47.40	Log. r	1.8560
3d correction	1 - 16.15	Barometer	9.9031
Latitude	39 - 08 - 04.71	Ther. attached	9.9991
		Ther. detached	9.9823
		Refraction	1.7405



LATITUDE BY POLARIS.

Sextant No. 2831  
 Station Chumisoon Mt.

Chronometer No. 1521  
 Date Sept 2nd 1872

Mean obsd. 2 alt.	78°-17'-00	Time by chron.	10-25-31.8
Index error	8-30	Chron. slow <i>fast</i>	2-18-29.6
Corrected 2d alt.	78-08-30	Mean time of obs.	8-08-06.2
Altitude	39-04-15	Difference of long.	8-09-26.37
Refraction	53.8	Mean time at Gr.	10-48-54.38
Corrected alt.	39 03 - 21.2	Acceleration	
Subtract 1'			
Reduced alt	39-02-21.2	Sid. int. past Gr. m. n.	
1st correction	4-57.81	Sid. time at Gr. m. n.	
Apparent alt.	39-07-13.01	Sid. time of obs.	18-58-25.75
2d correction	46.6		
3d correction	1-13.5	Log. r	
Latitude	39-09-13.11	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	



## LATITUDE BY POLARIS.

Sextant No. 2831  
 Station Gunnison W.V.  
 Chronometer No. 7521 Myers  
 Date Sept 30, 1872

Mean obsd. 2 alt.	74-02-00	Time by chron.	11-25-45.5
Index error	8-36	Chron. slow	just
Corrected 2d alt.	78-53-24	Mean time of obs.	9-07-14.9
Altitude	39-25-42	Difference of long.	9-08-43.6
Refraction	58.4	Mean time at Gr.	10-52-57.9
Corrected alt.	39-25-43.1	Acceleration	
Subtract 1'			
Reduced alt	39-24-43.1	Sid. int. past Gr. m. n.	
1st correction	-17-28.33	Sid. time at Gr. m. n.	
Apparent alt.	39-07-14.57	Sid. time of obs.	20-01-41.5
2d correction	45.4		
3d correction	1-07.6	Log. r	1.8506
Latitude	39-09-07.57	Barometer	4.9215
		Ther. attached	4.9994
		Ther. detached	4.9893
		Refraction	1.7708

58.4



## LATITUDE BY POLARIS.

Sextant No. 2831 -

Chronometer No. 1521 - Nipus

Station *Whinnison wh.*Date *Sept 3<sup>d</sup> 1872*

Mean obsd. 2 alt.	79 - 37 - 45	Time by chron.	12 - 18 - 13.9
Index error	8 - 36	Chron. slow	2 - 18 - 30.6
Corrected 2d alt.	79 29 - 09	Mean time of obs.	9 - 59 - 43.3
Altitude	39 - 44 - 34.5	Difference of long.	10 0.1 - 21.5
Refraction	57.0	Mean time at Gr.	10 - 52 - 57.4
Corrected alt.	39 43 - 37.5	Acceleration	
Subtract 1'			
Reduced alt	39 - 42 - 37.5	Sid. int. past Gr. m. n.	
1st correction	35 - 23.81	Sid. time at Gr. m. n.	
Apparent alt.	39 - 07 - 13.69	Sid. time of obs.	20 - 54 - 19.4
2d correction	39.84		
3d correction	1 - 00.62	Log. r	1. 8455
Latitude	39 - 08 - 53.15	Barometer	9.9215
		Ther. attached	9.9994
		Ther. detached	9.9843
		Refraction	1 - 7557



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521, Wigan

Station *Union Bay*Date *Sept 4<sup>th</sup> 1882*

Mean obsd. 2 alt.	78 - 28 - 15.7	Time by chron.	10 - 35 - 15.8
Index error	8 - 33	Chron. slow	2 - 28 - 33.4
Corrected 2d alt.	78 - 19 - 42	Mean time of obs.	8 - 16 - 31.9
Altitude	39 - 09 - 51	<i>Sid. time</i> Difference of long.	8 - 17 - 53.5
Refraction	58.3	<i>Sid. time</i> Mean time at Gr.	= 10 - 56 - 52.49
Corrected alt.	39 - 08 - 52.7	Acceleration	
Subtract 1'			
Reduced alt	39 - 07 - 52.7	Sid. int. past Gr. m. n.	
1st correction	- 1 - 00.8	Sid. time at Gr. m. n.	
Apparent alt.	39° - 06' - 51.9	Sid. time of obs.	19 - 14 - 45.99
2d correction	47.4		
3d correction	1 - 10.52	Log. r	1.8544
Latitude	39 - 08 - 49.82	Barometer	9.9215
		Ther. attached	9.9994
		Ther. detached	9.9893
		Refraction	1 - 7651
			58.3

39 - 04 - 13.11

04 - 07.57

08 - 53.15

08 - 49.82

123.65

120

43.65

39 - 08 - 58.43



LATITUDE BY POLARIS. *Whaler*

Sextant No. 2831

Chronometer No. 1521 *Weyns*Station *Deerport Whf.*Date *Sept 25<sup>th</sup> 1871*

Mean obsd. 2 alt.	78-33-00	Time by chron.	11-54-44.6
Index error	12-40	Chron. slow <i>fast</i>	2-21-36.6
Corrected 2d alt.	78-20-20	Mean time of obs.	9-33-07.0
Altitude	39-10-10	Difference of long.	9-34-41.1
Refraction	54.5	Mean time at Gr.	12-14-40.6
Corrected alt.	39-04-15.5	Acceleration	
Subtract 1			
Reduced alt	39-08-15.5	Sid. int. past Gr. m. n.	
1st correction	-53 20.47	Sid. time at Gr. m. n.	
Apparent alt.	38-14-55.03	Sid. time of obs.	21-54-21.7
2d correction	30.2		
3d correction	59.8	Log. r	1.854.4
Latitude	38-16-25.03	Barometer	9.9048
		Ther. attached	9.9988
		Ther. detached	9.9779
		Refraction	1.736.4

54.5



1-14.07

69

Hutin

## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1531

Station

Bunker

Date

Sept 28

Mean obsd. 2 alt.	78-44-15	Time by chron.	12-15-15.59
Index error	12-40	Chron. slow	2-21-36.6
Corrected 2d alt.	78-31-35	Mean time of obs.	9-53-39.0
Altitude	39-15-47.5	Difference of long.	9-53-16.52
Refraction	34.3	Mean time at Gr.	12-19-40.6
Corrected alt.	39-14-53.2	Acceleration	
Subtract 1'			
Reduced alt	39-13-53.2	Sid. int. past Gr. m. n.	
1st correction	-58-42.75	Sid. time at Gr. m.-n.	
Apparent alt.	38-15-10.45	Sid. time of obs.	22-14-57.12
2d correction	23.2		
3d correction	57.1	Log. r	
Latitude	38-16-30.95	Barometer	9.9048
		Ther. attached	9.9988
		Ther. detached	9.9779
		Refraction	



*M. M. M.*

LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521

Station Beemer

Date Sept 28 1872

Mean obsd. 2 alt.	78 - 49 - 30	Time by chron.	12 - 28 - 46.3
Index error	12 - 40	Chron. slow	2 - 21 - 36.6
Corrected 2d alt.	78 36 - 50	Mean time of obs.	10 - 07 - 08.7
Altitude	39 - 18 - 25	Difference of long.	10 - 08 - 46.4
Refraction	54.2	Mean time at Gr.	12 - 19 - 40.0
Corrected alt.	39 17 - 30.8	Acceleration	
Subtract 1'			
Reduced alt	39 - 16 - 30.8	Sid. int. past Gr. m. n.	
1st correction	- 02 - 00.11	Sid. time at Gr. m. n.	
Apparent alt.	38 - 14 - 30.69	Sid. time of obs.	22 - 28 - 29.0
2d correction	19.88		
3d correction	1 - 02.85	Log. r	
Latitude	38 - 15 - 53.42	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	

38 - 15 - 53.42  
 38 - 16 - 22.50  
 38 - 16 - 32.45  
 53.42  
 38 - 16 - 25.90  
 38 - 16 - 33.22  
 61.21  
 38 - 16 - 30.61

*Polaris*  
*Circ. Alt.*



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521

Station Minersville W.V.

Date Sept 28

Mean obsd. 2 alt.	77-56-45	Time by chron.	10-57-10.47
Index error	11-30	Chron. slow	2-22-44.7
Corrected 2d alt.	77-45-15	Mean time of obs.	8-34-25.77
Altitude	38-52-37.5	Difference of long.	8-35-50.3
Refraction	1-07.14	Mean time at Gr. <sup>sun</sup> <sub>my m</sub> <sup>at place</sup>	= 12-31-30.37
Corrected alt.	38-50-36.1	Acceleration	
Subtract 1'			
Reduced alt	38-50-36.1	Sid. int. past Gr. m. n.	
1st correction	39-32.53	Sid. time at Gr. m. n.	
Apparent alt.	38-10-03.57	Sid. time of obs.	21-07-20.7
2d correction	39.5		
3d correction	1-11.76	Log. r	1.8626
Latitude	38-12-54.83	Barometer	9.9294
	38-40.6	Ther. attached	9.9997
	38-12-54.6	Ther. detached	9.9946
		Refraction	1.7863

1-07.14



## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1570

Station Sulphur Springs

Date Oct. 2<sup>nd</sup> 1872

Mean obsd. 2 alt.	77 - 04 - 31.5	Time by chron.	4 - 11 - 33.1
Index error	11 - 45	Chron. slow	3 - 32 - 27.07
Corrected 2d alt.	76 - 57 - 30	Mean time of obs.	7 - 44 - 00.17
Altitude	38 - 28 - 45	Difference of long.	7 - 45 - 16.39
Refraction	1 - 01.3	Mean time at Gr.	12 - 47 - 16.91
Corrected alt.	38 - 27 - 43.7	Acceleration	
Subtract 1'			
Reduced alt	38 - 26 - 43.7	Sid. int. past Gr. m. n.	
1st correction	28 - 13.25	Sid. time at Gr. m. n.	
Apparent alt.	37 - 58 - 30.45	Sid. time of obs.	20 - 32 - 33.30
2d correction	41.8		
3d correction	1 10.25	Log. r	1.8678
Latitude	38 - 00 - 22.50	Barometer	9.9244
	38 - 01 - 47.07	Ther. attached	9.9445
	2 - 09.57	Ther. detached	9.9410
	38 - 01 - 04.28	Refraction	1.7877
	2 - 09.57		
	38 - 01 - 04.28		



LATITUDE BY POLARIS.

Sextant No. 2831 <sup>M</sup> Humphreys  
 Station Antelope Springs  
 Chronometer No. 1521 <sup>M</sup> Myers  
 Date Oct 6<sup>th</sup> 1892

Mean obsd. 2 alt.	76-55-15	Time by chron.	7-43-00.4
Index error	11-20	Chron. slow	2-59.5
Corrected 2d alt.	76-43-55	Mean time of obs.	7-46-00.4
Altitude	38-21-57.5	Difference of long.	7-47-16.9
Refraction	59.4	Mean time at Gr.	43-03-03.11
Corrected alt.	38-20-57.6	Acceleration	
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	39-19-57.6	Sid. time at Gr. m. n.	20-50-20.01
1st correction	-34-06.4	Sid. time of obs.	
Apparent alt.	38-45-51.2		
2d correction	38.33		
3d correction	1-09.31	Log. r	1.8678
Latitude	38-47-48.84	Barometer	4.9155
		Ther. attached	4.9997
		Ther. detached	4.9946
		Refraction	1.7776

59.4



## LATITUDE BY POLARIS.

Sextant No. 2831  
 Station Antelope Spr. W.I.  
 Chronometer No. 1521  
 Date Oct 6<sup>th</sup> 1872

Mean obsd. 2 alt.	76-55-15	Time by chron.	7-48-57.32
Index error	11-30	Chron. slow	5-22.8
Corrected 2d alt.	76-43-45	Mean time of obs.	7-49-14.1
Altitude	38-21-52.5	Difference of long.	7-50-31.0
Refraction	59.4	Mean time at Gr. <sup>air place</sup>	13-03-03.11
Corrected alt.	38-20-52.6	Acceleration	
Subtract 1'			
Reduced alt	38-19-52.6	Sid. int. past Gr. m. n.	
1st correction	-38-13.72	Sid. time at Gr. m. n.	
Apparent alt.	38-44-38.88	Sid. time of obs.	20-53-48.22
2d correction	38.33		
3d correction	1.04.31	Log. r	
Latitude	38-46-26.52	Barometer	
		Ther. attached	
		Ther. detached	
		Refraction	59.4

*all proc. done*







*Approx.*

## LATITUDE BY POLARIS.

Sextant No. 2831

Chronometer No. 1521

Station *Jms. St. Pine Valley N.T.*

Date

*Oct 12<sup>th</sup> 1872*

Mean obsd. 2 alt.	<i>76-07-15</i>	Time by chron.	<i>7-18-04.85</i>
Index error	<i>11-10</i>	Chron. slow	<i>4-45.38</i>
Corrected 2d alt.	<i>75-56-05</i>	Mean time of obs.	<i>7-22-50.23</i>
Altitude	<i>37-58-02.5</i>	Difference of long.	<i>7-24-02.87</i>
Refraction	<i>1-02.7</i>	Mean time at Gr.	<i>13-26-42.44</i>
Corrected alt.	<i>37-57-59.8</i>	Acceleration	
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	<i>37-56-54.8</i>	Sid. time at Gr. m. n.	
1st correction	<i>34-14.55</i>	Sid. time of obs.	<i>20-50-45.31</i>
Apparent alt.	<i>37-22-40.25</i>	Log. r	<i>1.8745</i>
2d correction	<i>37.49</i>	Barometer	<i>9.9322</i>
3d correction	<i>1-10.11</i>	Ther. attached	<i>9.9495</i>
Latitude	<i>37-23-32.85</i>	Ther. detached	<i>9.9910</i>
	<i>97</i>	Refraction	<i>1.7972</i>
	<i>37-23-33.82</i>		

*1-02.7*



# LATITUDE BY POLARIS.

77  
S. H. K. W.

Sextant No.

Chronometer No.

Station

Fillmore

Date

Sept 3d 1872

Mean obsd. 2 alt.	77-36-00	Time by chron.	10-57-14
Index error	20	Chron. slow	3-05-07.2
Corrected 2d alt.	77-35-40	Mean time of obs.	7-52-06.8
Altitude	38-47-50	Difference of long.	7-53-24.3
Refraction	48.7	Mean time at Gr.	16-52-56.37
*Corrected alt.	38-47-01.3	Acceleration	
Subtract 1'			
Reduced alt	38-46-01.3	Sid. int. past Gr. m. n.	
1st correction	- 9 17.1	Sid. time at Gr. m. n.	
Apparent alt.	38-55-18.1	Sid. time of obs.	18-46-20.67
2d correction	36.4		
3d correction	1-20.74	Log. r	1.8605
Latitude	38-57-10.24	Barometer	9.4034
	- 3	Ther. attached	9.9322
	38-57-14.94	Ther. detached	9.9410
		Refraction	1.6876

48.7



L. M. W. P. U.

## LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

Dune Pine (E. M. Sweet)

Date

Oct 2nd 1892

Mean obsd. 2 alt.	76-12-00	Time by chron.	7-05-00.2
Index error	1-5-0	Chron. slow	9-26.1
Corrected 2d alt.	76-10-10	Mean time of obs.	7-14-26.3
Altitude	38-05-05	Difference of long.	7-15-37.7
Refraction	55.6	Mean time at Gr.	12-47-16.25
Corrected alt.	38-04-09.4	Acceleration	
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	38-03-09.4	Sid. time at Gr. m. n.	
1st correction	18-03.6	Sid. time of obs.	20-02-53.9
Apparent alt.	38-45-05.8	Log. r	1.8717
2d correction		Barometer	9.8921
3d correction		Ther. attached	9.9440
Latitude		Ther. detached	9.9822
		Refraction	1.7450

55.6



*S. S. Taylor*

LATITUDE BY POLARIS.

Sextant No.

Station *Fairfield*

Chronometer No.

Date *August 1 1878*

Mean obsd. 2 alt.	<i>79 - 48 - 00</i>	Time by chron.	<i>17 - 14 - 37.6</i>
Index error	<i>00</i>	Chron. <i>slow</i>	<i>3 - 54 - 03.71</i>
Corrected 2d alt.	<i>79 - 48 - 00</i>	Mean time of obs.	<i>8 - 15 - 33.89</i>
Altitude	<i>39 - 54 - 00</i>	Difference of long.	<i>8 - 16 - 55.08</i>
Refraction	<i>56.46</i>	Mean time at Gr.	<i>8 42 49.05</i>
Corrected alt.	<i>39 - 53 - 03.54</i>	Acceleration	
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	<i>39 - 52 - 03.54</i>	Sid. time at Gr. m. n.	
1st correction		Sid. time of obs.	<i>16 - 59 - 44.13</i>
Apparent alt.		Log. r	<i>1.8436</i>
2d correction		Barometer	<i>9.9277</i>
3d correction		Ther. attached	<i>9.4440</i>
Latitude		Ther. detached	<i>9.9814</i>
		Refraction	<i>1.7517</i>

*24*

*56.46*



St. Anjou

## LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

San Pedro

Date

Aug 2

Mean obsd. 2 alt.	79 - 50 - 30	Time by chron.	11 - 55 - 40.9
Index error	00	Chron. slow	2 - 24 - 56.1
Corrected 2d alt.	79 - 50 - 30	Mean time of obs.	9 - 25 - 44.8
Altitude	39 - 55 - 15	Difference of long.	19 - 27 - 17.7
Refraction	56.5	Mean time at Gr.	8 - 46 - 46.11
Corrected alt.	39 - 54 - 18.5	Acceleration	
Subtract 1'			
Reduced alt	39 - 53 - 18.5	Sid. int. past Gr. m. n.	
1st correction	20 - 30.76	Sid. time at Gr. m. n.	
Apparent alt.	39 - 13 - 49.26	Sid. time of obs.	18 - 14 - 03.5
2d correction	42.00		
3d correction	1 - 11.12	Log. r	1.8436
Latitude	40 - 15 - 42.38	Barometer	9.9277
	40 - 16 - 56.64	Ther. attached	9.9990
	199.07	Ther. detached	9.9814
	40 - 15 - 54.53	Refraction	1.7577

Checked by [Signature] 5/2/2 [Signature]



*St. John*  
LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

*Fursts Station*

Date

*Aug 4<sup>th</sup> 1872*

Mean obsd. 2 alt.	<i>80-41-30</i>	Time by chron.	<i>1-17-48.1</i>
Index error	<i>00</i>	Chron. <i>slow</i>	<i>2-37-04.4</i>
Corrected 2d alt.	<i>80-41-30</i>	Mean time of obs.	<i>10-40-43.7</i>
Altitude	<i>40-20-40</i>	Difference of long.	<i>1-38.6</i>
Refraction	<i>55.8</i>	Mean time at Gr.	<i>6.6</i>
Corrected alt.	<i>40 19-49.2</i>	Acceleration	<i>1</i>
Subtract 1'			
Reduced alt	<i>40-18-44.2</i>	Sid. int. past <del>Gr.</del> m. n.	<i>10-42-29.0</i>
1st correction	<i>8-59.01</i>	Sid. time at <del>Gr.</del> m. n.	<i>8-54-39.74</i>
Apparent alt.	<i>40-09-50.19</i>	Sid. time of obs.	<i>19-37-08.74</i>
2d correction	<i>46.4</i>		
3d correction	<i>1-02.37</i>	Log. r	<i>1.8364</i>
Latitude	<i>40-11-38.96</i>	Barometer	<i>9.9277</i>
	<i>+ 3.37</i>	Ther. attached	<i>9.9940</i>
<i>Lat. Fursts Stat =</i>	<i>40-11-42.33</i>	Ther. detached	<i>9.4831</i>
		Refraction	<i>1.7467</i>

Error of Chron. with the above

Latitude *2<sup>n</sup>-36-53.95*diff. *-10.42**.0167**214**668**167**334**3<sup>n</sup> 57.38*



## LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

Date

Mean obsd. 2 alt.	79-46-00	Time by chron.	12-39-05.6
Index error	- 01	Chron. slow <i>fast</i>	3-01-40.38
Corrected 2d alt.	79-46-00	Mean time of obs.	9-37-20.27
Altitude	39-53-00	Difference of long.	9-38-55.2
Refraction	56.5	Mean time at Gr.	8-58-36.29
Corrected alt.	39-52-03.5	Acceleration	
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	39-52-03.5	Sid. time at Gr. m. n.	
1st correction	19-18.68	Sid. time of obs.	18-17-31.49
Apparent alt.	40-10-22.88	Log. r	1.8438
2d correction	42.00	Barometer	9.9277
3d correction	1-21.7	Ther. attached	9.9440
Latitude	40-12-05.98	Ther. detached	9.9874
		Refraction	1.7509



## LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

Date

Indian Spring

July 5<sup>th</sup> 1872

Mean obsd. 2 alt.	79-46-00	Time by chron.	12-39-00.6
Index error	00	Chron. slow <del>fast</del>	2-45-03.54
Corrected 2d alt.	79-46-00	Mean time of obs.	9-53-57.01
Altitude	39-53 <del>00.5</del>	Difference of long.	9-53-34.68
Refraction	56.5	Mean time at Gr.	8-58-36.24
Corrected alt.	39-52-13.5	Acceleration	
Subtract 1'			
Reduced alt	39-57-03.5	Sid. int. past Gr. m. n.	
1st correction	6-22.48	Sid. time at Gr. m. n.	
Apparent alt.	39-57-26.48	Sid. time of obs.	18-54-10.87
2d correction	48.70		
3d correction	1-06.40	Log. r	
Latitude	39-59-21.58	Barometer	
Cor. for semi-diameter	+ 7.14	Ther. attached	
	39-59-28.72	Ther. detached	
		Refraction	

Sun bore hung



## LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

Date

*Fink*  
~~American Spring~~

Aug. 8<sup>th</sup> 1892

Mean obsd. 2 alt.	78-56-30	Time by chron.	11-43-46.3
Index error	00	Chron. slow <i>fast</i>	2-53-21.95
Corrected 2d alt.	78-56-30	Mean time of obs.	8-50-24.35
Altitude	39-28-15	Difference of long.	8-57-57.17
Refraction	55.5	Mean time at Gr.	9-10-25.96
Corrected alt.	39-27-19.5	Acceleration	
Subtract 1'		Sid. int. past Gr. m. n.	
Reduced alt	39-26-19.5	Sid. time at Gr. m. n.	
1st correction	24-33.26	Sid. time of obs.	18-02-17.13
Apparent alt.	39-50-52.76	Log. r	1.8447
2d correction	43.3	Barometer	9.9173
3d correction	1-16.30	Ther. attached	9.9984
Latitude	39-52-12.36	Ther. detached	9.9988
	11.27	Refraction	1.7447
	39-52-01.09		

55.5



Sh. Tuxen

LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station Fresh Spring

Date Aug 9<sup>th</sup> 1872

Mean obsd. 2 alt.	78 - 40 - 00	Time by chron.	11 - 15 - 47.1
Index error	00	Chron. slow <i>fast</i>	2 - 52 - 20.32
Corrected 2d alt.	78 - 40 - 00	Mean time of obs.	8 - 23 - 26.78
Altitude	39 - 20 - 00	Difference of long.	1 - 18.898
Refraction	54.3	Mean time at Gr.	3 77
Corrected alt.	39 - 19 - 05.7	Acceleration	07
Subtract 1'			8 - 24 49.47
Reduced alt	39 - 18 - 05.7	<i>Sid. Time</i> Sid. int. past Gr. m. n.	9 - 14 - 22.57
1st correction	32 - 17.3	Sid. time at Gr. m. n.	
Apparent alt.	39 - 50 - 23.0	Sid. time of obs.	17 - 39 - 11.98
2d correction	41.74		
3d correction	1 - 18.14	Log. r	1.85284
Latitude	39 - 52 - 22.88	Barometer	9.9828
	39 - 52 - 07.04	Ther. attached	9.9796
	- 23.97	Ther. detached	9.9990
	39 - 52 - 11.98	Refraction	1.7348

543



LATITUDE BY POLARIS. *Smith*

Sextant No.

Chronometer No.

Station *Newport*

Date *Aug 12<sup>th</sup> 1872*

Mean obsd. 2 alt.	<i>79-56-30</i>	Time by chron.	<i>12-27-32.4</i>
Index error	<i>15</i>	Chron. slow <i>fast</i>	<i>2-59-48.3</i>
Corrected 2d alt.	<i>79-56-15</i>	Mean time of obs.	<i>9-27-44.1</i>
Altitude	<i>39-58-07.5</i>	<i>acceleration</i> Difference of long.	<i>1-28.71</i>
Refraction	<i>55.1</i>	Mean time at Gr.	<i>4.43</i>
Corrected alt.	<i>39-57-12.4</i>	Acceleration	<i>12</i>
Subtract 1'			
Reduced alt	<i>39-58-12.4</i>	Sid. int. past <del>Gr.</del> m. n. at <i>Merid</i>	<i>9-29-17.36</i>
1st correction	<i>5-54.3</i>	Sid. time at Gr. m. n.	<i>9-26-12.67</i>
Apparent alt.	<i>40-04-06.7</i>	Sid. time of obs.	<i>18-55-30.03</i>
2d correction	<i>48.04</i>		
3d correction	<i>1-09.54</i>	Log. r	<i>1.8293</i>
Latitude	<i>40-06-04.28</i>	Barometer	<i>9.9208</i>
<i>Correct for error</i>	<i>+2.57</i>	Ther. attached	<i>9.9995</i>
<i>Time due, Simons det.</i>	<i>40-06-01.71</i>	Ther. detached	<i>9.9910</i>
<i>assumed</i>		Refraction	<i>1.7406</i>

*55.1*



*St. Louis*  
LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

*Piement NW*

Date

*Aug 16*

Mean obsd. 2 alt.	<i>78 - 12 - 30</i>	Time by chron.	<i>11 - 34 - 28.8</i>
Index error	<i>- 21</i>	Chron. slow <i>fast</i>	<i>3 - 08 - 43.98</i>
Corrected 2d alt.	<i>78 - 12 - 10</i>	Mean time of obs.	<i>8 - 25 - 44.88</i>
Altitude	<i>39 - 06 - 05</i>	Difference of long.	<i>1 - 18.85</i>
Refraction	<i>54.4</i>	Mean time at Gr.	<i>4.11</i> <i>.12</i>
Corrected alt.	<i>39 - 05 - 10.1</i>	Acceleration <i>Sid. int. 8 - 27 - 07.90</i>	<i>8 - 27 - 07.90</i>
Subtract 1'		<i>since m. n.</i> <i>Sid. time m. n. 9 - 41 - 59.37</i>	<i>9 - 41 - 59.37</i>
Reduced alt	<i>39 - 04 - 10.1</i>	Sid. int. past Gr. m. n.	
1st correction	<i>+ 22 - 13.04</i>	Sid. time at Gr. m. n.	
Apparent alt.	<i>39 - 26 - 23.14</i>	Sid. time of obs.	<i>18 - 09 - 07.20</i>
2d correction	<i>44.3</i>	Log. r	<i>1.8562</i>
3d correction	<i>1 - 15.35</i>	Barometer	<i>9.9067</i>
Latitude	<i>39 - 28 - 22.79</i>	Ther. attached	<i>9.9988</i>
		Ther. detached	<i>9.9762</i>
		Refraction	<i>1.7379</i>

*54.4*



## LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

Punnett Hill

Date

Aug 17 1882

Mean obsd. 2 alt.	78-01-30	Time by chron.	11-12-50.2
Index error	20	Chron. slow	Just
Corrected 2d alt.	78-01-10	Mean time of obs.	8-04-11.8
Altitude	39-00-35	Difference of long.	1-18.85
Refraction	55.9	Mean time at Gr.	66
Corrected alt.	38-59-39.1	Acceleration	8-05-30.54
Subtract 1'		Sid. int. past Gr. m. n.	9-45-55.42
Reduced alt	38-58-39.1	Sid. time at Gr. m. n.	6
1st correction	28-13.97	Sid. time of obs.	17-51-26.46
Apparent alt.	39-26-53.07	Log. r	1.8574
2d correction	42.00	Barometer	9 9120
3d correction	1-26.44	Ther. attached	9 9987
Latitude	39-29-01.51	Ther. detached	9 9796
	28-22.79	Refraction	1.7477
	57-24.30		
	39-28-42.15		

55.9

Dist Punnett



## LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

Snake Valley Mt

Date

Aug 21<sup>st</sup> 1842

Mean obsd. 2 alt.	77-26-00	Time by chron.	11-29-14.4
Index error	20	Chron. slow	3-09-57.90
Corrected 2d alt.	77-28-40	Mean time of obs.	8-19-16.9
Altitude	38-42-50	Difference of long.	1-18.85
Refraction	55.5	Mean time at Gr.	3-12-5
Corrected alt.	38-41-54.5	Acceleration	
Subtract 1'			8-20-38.02
Reduced alt	38-40-54.5	Sid. int. past Gr. m. n.	
1st correction	17-41.64	Sid. time at Gr. m. n.	10-07-42.05
Apparent alt.	38-58-36.14	Sid. time of obs.	18-22-10.07
2d correction	42.06		
3d correction	1-15.84	•Log. r	1.8621
Latitude	39-00-34.09	Barometer	9.9067
		Ther. attached	9.9918
		Ther. detached	9.9835
		Refraction	1.7441

55.5



*Stinson*

LATITUDE BY POLARIS.

Sextant No. *Whit's prism*

Chronometer No.

Station *Snake Valley, Utah*

Date *Aug 2<sup>nd</sup> July 1872*

Mean obsd. 2 alt.	<i>77 - 31 - 15</i>	Time by chron.	<i>11 - 31 - 59.5</i>
Index error	<i>20</i>	Chron. slow	<i>3 - 04 - 54.4</i>
Corrected 2d alt.	<i>77 - 30 - 55</i>	Mean time of obs.	<i>8 - 22 - 00.1</i>
Altitude	<i>38 - 45 - 27.5</i>	Difference of long.	<i>1 - 18.85</i>
Refraction	<i>55.3</i>	Mean time at Gr.	<i>3.61</i>
Corrected alt.	<i>38 - 44 - 32.2</i>	Acceleration	
Subtract 1'			
Reduced alt	<i>38 - 43 - 32.2</i>	Sid. int. <del>at</del> <i>post</i> Gr. m. n.	<i>8 - 23 - 12.56</i>
1st correction	<i>18 - 21.15</i>	Sid. time <del>at</del> <i>at</i> Gr. m. n. <i>at</i>	<i>10 - 05 - 38.6</i>
Apparent alt.	<i>38 - 58 - 53.35</i>	Sid. time of obs.	<i>18 - 28 - 51.16</i>
2d correction	<i>43.05</i>		
3d correction	<i>1 - 14.88</i>	Log. r	<i>1.814</i>
Latitude	<i>39 - 00 - 51.28</i>	Barometer	<i>9.9018</i>
	<i>39 - 00 - 34.04</i>	Ther. attached	<i>9.9918</i>
	<i>85.37</i>	Ther. detached	<i>9.9835</i>
	<i>39 - 00 - 42.68</i>	Refraction	<i>1.7428</i>

*Sut Snake Valley*

*53.3*



*Andrew*  
LATITUDE BY POLARIS.

Sextant No. *283*

Chronometer No.

Station *Wilmington*Date *Sept 7<sup>th</sup> 1892*

Mean obsd. 2 alt.	<i>78-01-30</i>	Time by chron.	<i>11-39-42.7</i>
Index error	<i>-20</i>	Chron. slow	<i>3-11-57.1</i>
Corrected 2d alt.	<i>78-01-10</i>	Mean time of obs.	<i>8-27-45.6</i>
Altitude	<i>39-00-35</i>	Difference of long.	<i>1-18.55-</i> <i>4.44</i>
Refraction	<i>35.42</i>	Mean time at Gr.	<i>12</i>
Corrected alt.	<i>38-59-39.58</i>	Acceleration	
Subtract 1'			
Reduced alt	<i>38-58-39.58</i>	Sid. int. <sup>past</sup> Gr. m. n. or <sub>mean</sub>	<i>8-29-09.01</i>
1st correction	<i>-9-13.99</i>	Sid. time at Gr. m. n.	<i>11-08-42.42</i>
Apparent alt.	<i>38-49-25.59</i>	Sid. time of obs.	<i>19-37-51.43</i>
2d correction	<i>46.68</i>		
3d correction	<i>1-10.48</i>	Log. r	<i>1.8374</i>
Latitude	<i>38-51-22.05</i>	Barometer	<i>9.9049</i>
<i>Cor. for Gr. in time</i>	<i>= -1.93</i>	Ther. attached	<i>9.9441</i>
	<i>38-57-20.12</i>	Ther. detached	<i>9.9822</i>
		Refraction	<i>1.7436</i>

*55.42*



*Shydney*

LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

*Gluesc rock Spring*

Date

*Sept 11<sup>th</sup> 1877*

Mean obsd. 2 alt.	<i>77 - 20 - 00</i>	Time by chron.	<i>11 - 04 - 23.5</i>
Index error	<i>- 20</i>	Chron. slow	<i>3 - 22 - 28.17</i>
Corrected 2d alt.	<i>77 - 19 - 40</i>	Mean time of obs.	<i>7 - 41 - 53.39</i>
Altitude	<i>38 - 39 - 50</i>	Difference of long.	<i>1 - 08.49</i>
Refraction	<i>57.5</i>	Mean time at Gr.	<i>6.72</i>
Corrected alt.	<i>38 - 38 - 52.5</i>	Acceleration	<i>.15</i>
Subtract 1'			
Reduced alt	<i>38 - 37 - 52.5</i>	Sid. int. past Gr. m. n.	<i>7 43 - 11.10</i>
1st correction	<i>+ 2 - 34.6</i>	Sid. time at Gr. m. n.	<i>11 - 24 - 24.82</i>
Apparent alt.	<i>38 - 40 - 27.6</i>	Sid. time of obs.	<i>19 - 07 - 36.01</i>
2d correction	<i>46.6</i>		
3d correction	<i>1 - 14.94</i>	Log, r	<i>1, 8626</i>
Latitude	<i>38 - 42 - 28.64</i>	Barometer	<i>9.9067</i>
<i>add for S. in h</i>	<i>+ 4.95</i>	Ther. attached	<i>9.9995</i>
<i>Subtends</i>	<i>38 - 42 - 33.59</i>	Ther. detached	<i>9.9910</i>
		Refraction	<i>1.7598</i>

*57.5*



*St. Louis Obsid*

LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station *New King Spring W.V.*

Date *Sept 15<sup>th</sup> 1892*

Mean obsd. 2 alt.	<i>76-52-00</i>	Time by chron.	<i>11-15-00.1</i>
Index error	<i>- 20</i>	Chron. slow	<i>2-26-35.7</i>
Corrected 2d alt.	<i>76-51-40</i>	Mean time of obs.	<i>7-48-24.4</i>
Altitude	<i>38-25-50</i>	Difference of long.	<i>1-08.44</i>
Refraction	<i>1-00.08</i>	Mean time at Gr.	<i>7.88</i>
Corrected alt.	<i>38-24-49.42</i>	Acceleration	<i>.06</i>
Subtract 1'			
Reduced alt	<i>38-23-44.92</i>	Sid. int. <i>best</i> past Gr. m. n. <i>at</i>	<i>7-49-41.33</i>
1st correction	<i>- 6-24.51</i>	Sid. time at Gr. m. n. "	<i>11-40-15.35</i>
Apparent alt.	<i>38-17-20.41</i>	Sid. time of obs.	<i>19-29-56.68</i>
2d correction	<i>46.20</i>		<i>.993</i>
3d correction	<i>1-12.62</i>	Log. r	<i>1.8446</i>
Latitude	<i>38-19-24.23</i>	Barometer	<i>9.9254</i>
		Ther. attached	<i>9.4457</i>
		Ther. detached	<i>9.9910</i>
		Refraction	<i>1.7787</i>

*60.08*



LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

Pana Point

Date

Oct 27 1882

General average Pana Settlement

Mean obsd. 2 alt.	74-58-19	Time by chron.	6-45-18
Index error	-1-10	Chron. slow	9-18.81
Corrected 2d alt.	74-57-09	Mean time of obs.	6-54-36.81
Altitude	37-28-34.5	Difference of long.	59.14
Refraction	1-00.33	Mean time at Gr.	8.84
Corrected alt.	37-27-34.17	Acceleration	9
Subtract 1'			
Reduced alt	37-26-34.17	Sid. int. past Gr. m. n.	6-53-44.91
1st correction	-15-13.91	Sid. time at Gr. m. n.	12-59-05.19
Apparent alt.	37-11-10.26	Sid. time of obs.	19-54-50.50
2d correction	44.2		
3d correction	1-13.64	Log. r	1.8808
Latitude	37-13-08.10	Barometer	9.9111
<i>index error of sextant with wrong side</i>	1-10	Ther. attached	9.9445
	37-14-18.10	Ther. detached	9.9846
	37-13-56.28	Refraction	1.0805
	-24.38		

1-00.33

Sub - 37-14-12.19



## LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

Date

Mean obsd. 2 alt.	77 - 21 - 00	Time by chron.	13 - 19 - 42.24
Index error	- 55	Chron. slow <i>JK</i>	3 - 16 - 12.72
Corrected 2d alt.	77 - 20 - 05	Mean time of obs.	10 - 03 - 29.02
Altitude	38 - 40 - 02.5	Difference of long.	1 - 38.56
Refraction	06.38	Mean time at Gr.	0.493
Corrected alt.	38 - 39 - 06.12	Acceleration	.009
Subtract 1'			
Reduced alt	38 - 38 - 06.12	Sid. int. past Gr. m. n.	10 - 05 - 08.60
1st correction	1 12.24.13	Sid. time at Gr. m. n.	13 - 14 52.12
Apparent alt.	37 - 25 - 41.99	Sid. time of obs.	23 - 20 - 00.77
2d correction	10.00		
3d correction		Log. r	1.8626
Latitude		Barometer	9.8895
		Ther. attached	9.9444
		Ther. detached	9.9441
		Refraction	1.7511

06.38



## LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station *Omyonuk*Date *Sept 19/1892*

Mean obsd. 2 alt.	<i>76 - 39 - 45</i>	Time by chron.	<i>7 - 52 - 24.6</i>
Index error	<i>11 - 40</i>	Chron. slow	<i>3 - 49.84</i>
Corrected 2d alt.	<i>76 - 19 - 05</i>	Mean time of obs.	<i>7 - 56 - 14.49</i>
Altitude	<i>38 - 04 - 32.8</i>	Difference of long.	<i>1 - 08 94</i>
Refraction	<i>34.3</i>	Mean time at Gr.	<i>9.14</i>
Corrected alt.	<i>38 - 08 - 33.2</i>	Acceleration	<i>4</i>
Subtract 1'			
Reduced alt	<i>38 - 07 - 33.2</i>	Sid. int. past Gr. m. n.	<i>7 - 57 - 32.71</i>
1st correction	<i>14 - 46.91</i>	Sid. time at Gr. m. n.	<i>11 - 56 - 00.71</i>
Apparent alt.	<i>37 - 52 - 46.29</i>	Sid. time of obs.	<i>19 - 53 - 33.42</i>
2d correction	<i>46.08</i>		
3d correction	<i>1 - 13.2</i>	Log. r	
Latitude	<i>37 - 54 - 45.57</i>	Barometer	
<i>Cor. for error in Time</i>	<i>- 00.60</i>	Ther. attached	
<i>True time in vessel</i>	<i>37 - 54 - 44.97</i>	Ther. detached	
		Refraction	



*St. Louis, Mo. 97*

LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station *Adamsville*

Date *Sept 18<sup>th</sup> 1872*

Mean obsd. 2 alt.	<i>77 - 17 - 12.0</i>	Time by chron.	<i>11 - 50 - 25.8</i>
Index error	<i>20.0</i>	Chron. slow <i>fast</i>	<i>3 - 26 - 00.0</i>
Corrected 2d alt.	<i>77 - 16 - 52.8</i>	Mean time of obs.	<i>8 - 24 - 35.8</i>
Altitude	<i>38 - 3.8 - 26.25</i>	Difference of long.	<i>1 - 22.8</i>
Refraction	<i>57.5</i>	Mean time at Gr.	
Corrected alt.	<i>38 - 37 - 28.76</i>	Acceleration	
Subtract 1'			
Reduced alt	<i>38 - 36 - 28.75</i>	Sid. int. past <del>Gr.</del> m. n.	<i>8 - 25 - 58.7</i>
1st correction	<i>23 - 18.62</i>	Sid. time at <del>Gr.</del> m. n.	<i>11 - 52 - 04.84</i>
Apparent alt.	<i>38 - 13 - 10.13</i>	Sid. time of obs.	<i>20 - 18 - 03.50</i>
2d correction	<i>42.84</i>		
3d correction	<i>1 - 14.03</i>	Log. r	<i>1.8632</i>
Latitude	<i>38 - 15 - 07.00</i>	Barometer	<i>9.4061</i>
		Ther. attached	<i>9.9445</i>
		Ther. detached	<i>9.4410</i>
		Refraction	<i>1.7598</i>



Stydzia, Obraz

## LATITUDE BY POLARIS.

Sextant No.

Chronometer No.

Station

Bunur River District

Date

Sept. 12<sup>th</sup>

Mean obsd. 2 alt.	77-17-00	Time by chron.	11-28-08
Index error	-20	Chron. slow <i>fast</i>	3-26-30
Corrected 2d alt.	77-16-40	Mean time of obs.	8-01-38
Altitude	38-38-20	Difference of long.	1-19.11
Refraction	57.8	Mean time at Gr.	
Corrected alt.	38-37-27.8	Acceleration	
Subtract 1'			
Reduced alt	38-36-27.8	Sid. int. past Gr. m. n.	8-02-57.1
1st correction	6.55.32	Sid. time at Gr. m. n.	11-28-25.35
Apparent alt.	38-29-27.18	Sid. time of obs.	19-31-22.45
2d correction	46.60		
3d correction	1-12.15	Log. r	1.8626
Latitude	38-31-25.93	Barometer	9.9067
		Ther. attached	9.9967
		Ther. detached	9.9910
		Refraction	1.7268

57.8



Pervo = 40-13-47.84  
 Sp. Falls = 40-05-10.84  
 Santayim mts = 39-58-36.06  
 Pipe Spr. mts. = 36-51-36.34  
 Kanab = 37-02-25.43  
 Panna = 37-10-42.97  
 Hd. Ft. Sumner = 37-30-05.28  
 Break in Riv. = 37-41-05.56  
 Old Pat. Valley = 37-39-29.02  
 Can. S. of " = 37-37-37.96  
 Camp near Sp. mts = 37-30-39.39  
 Mouth of Panna Riv. = 36-50-25.16  
 Ute Quarry = 37-05-26.97  
 Manns Creek = 37-03-23.18  
 Shark Creek = 36-59-27.16  
 Shields ranch = 37-09-17.76. 1/2 mile to the North of here  
 Logansville =  
 Pipe Springs =  
 Skimpack = 37-16-14.79  
 Hd. Cottonwood Can. = 37-25-50.8  
 1<sup>st</sup> Camp near Mouth of Panna = 36-58-34.24

Salina = 38-57-10.56  
 Gunnison Valley = 38-51-06.68  
 Hd. Cross " = 38-42-35.20  
 2<sup>nd</sup> Camp " = 38-38-28.36  
 3 " " = 38-19-58.56  
 Canon E. Ft. Sumner = 38-10-54.7  
 Crockerille = 38-09-51.94