	°	′	″	
obsd. alt.	60	18	30	
index cor.		+ 3	50	
	60	22	20	
Dip		— 5	49	
	60	16	31	
refraction		— 0	33	
parallax		+	4	
true alt. of L.L.	60	16	2	
semidiameter		+15	52	
true alt. of centre	60	31	54	
Z. D.	29	28	6	
Declin.	17	50	28	N
Lat.	47	18	34	N

	°	′	″	
obsd. alt.	40	2	0	
ind. cor.		— 3	0	
	39	59	0	
refraction		— 1	9	
parallax		+	7	
true alt. of L.L.	39	58	58	
semidiameter		+16	3	
true alt. centre	40	15	1	
Z. D.	49	44	59	
Declin.	5	2	16	S
Lat.	44	42	43	N

To find the Latitude by a Meridian Altitude of a Star at its upper transit.(*b*)

Rule.—(1) From table II take out the declination of the star with its proper sign N. or S., according as the declination is north or south.

(2) Correct the observed altitude for index error, dip, (if necessary) and refraction by table IV; subtract the altitude thus corrected from 90° and thus obtain the zenith distance, which must be marked N. or S. according as the zenith is north or south from the star.

(3) If the zenith distance and the declination have the same sign, add them together; but if they have contrary signs, subtract the less from the greater. The sum or remainder, as the case may be, will be the latitude of the place North.

Examples.—Required the latitude by meridian altitude in the following cases:

	Star.	*Alt.* ° ′ ″	*Index cor.* ′ ″	*height of eye in feet.*	*Position of zenith from star.*
(1)	Pollux	68 20 40	+ 5 20	44	N
(2)	Sirius	27 29 24	— 4 0	30	S
(3)	γ Urs. Maj.	84 20 15	— 5 19	..	S

(1)

	°	′	″	
obs.° alt.	68	20	40	
ind. corr.		+ 5	20	
	68	26	0	
dip		— 6	32	
	68	19	28	
refr.		— 0	23	
	68	19	5	
Z. D.	21	40	55	N
declin.	28	19	59	N
Lat.	50	0	54	N

(2)

	°	′	′	
	27	29	24	
ind. corr.		— 4	0	
	27	25	24	
dip		— 5	24	
	27	20	0	
refr.		— 1	52	
	27	18	8	
Z. D.	62	41	52	N
declin.	16	32	32	S
Lat.	46	9	20	N

(3)

	°	′	″	
	84	20	15	
ind. corr.		— 5	19	
	84	15	6	
refr.		— 0	6	
	84	15	0	
Z. D.	5	45	0	S
declin.	54	24	22	N
Lat.	48	39	22	N

To find the Latitude by the Meridian Altitude of a Circumpolar Star at its lower transit.

The time at which the lower transit takes place, is found by adding 11h. 58m. 2s. to the time of the preceding upper transit.

Rule.—Correct the observed altitude of the star as in the preceding case, and add to it the polar distance of the star, or, what comes to the same thing, add 90° to the altitude, and subtract the star's declination. The result will be the latitude.

Example.—The observed alt. of α Ursæ Majoris under the pole and taken with a theodolite was 22° 26′ 0″, and the index correction was 0; find the latitude.

	°	′	″
obsd. alt.	22	26	0
refr.		— 2	20
	22	23	40
	90		
	112	23	40
Declin.	62	26	29
Lat.	49	57	11

(*b*) Stars suitable for the purpose, with the times of their transit, may be found by tables II and III.