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Formula for
reduction of transit
observations, drawn
up about 1867.

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The formula for correction of transit observations may be written

$$\begin{aligned}\alpha &= T + \Delta T + b \sec \varphi + c \sec \delta + n(\tan \delta - \tan \varphi) \\ &= T + \Delta T + b \sec \varphi + c(C_0 + \tan \varphi) + (c+n)(N_0 - \tan \varphi) \\ &\quad + c(\sec \delta - \tan \delta - C_0) + (c+n)(\tan \delta - N_0)\end{aligned}$$

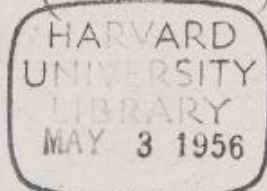
C_0, N_0 being arbitrary constants.

Taking $C_0 = 1$ $N_0 = \tan \varphi$

and putting $m' = b \sec \varphi + c(1 + \tan \varphi)$
 $(= 1.354 b + 1.912 c \text{ for Camb.})$
 $N = \tan \delta - \tan \varphi (= \tan \delta - 0.912 \text{ for Camb.})$

$$C = \sec \delta - \tan \delta - 1 = (\tan(45 - \frac{1}{2} \delta) - 1)$$

$$n' = c + n,$$



we have $\alpha = T + Cc + (\Delta T + m') + Nn'$

The following table gives the values of C , and of N for Cambridge; for argument δ .

For obtaining $\Delta T + m'$ and n' from the Almanac stars;

$$(\Delta T + m') + Nn' = \alpha - (T + Cc)$$

δ	C	N	δ	C	N
- 40°	+ 1.145	- 1.751	- 15	+ 303	- 1.180
	1.097	1.722		280	1.161
	1.050	1.693		257	1.143
	1.006	1.666		235	1.125
	.963	1.639		213	1.106
35	921	1.612	- 10	192	1.088
	881	1.587		171	1.070
	842	1.561		150	1.053
	804	1.537		130	1.035
	767	1.513		111	1.017
30	732	1.489	- 5	091	.999
	698	1.466		072	.982
	664	1.444		054	.964
	632	1.422		036	.947
	600	1.400		+ 018	.929
25	570	1.378	0	000	.912
	540	1.357		- 017	.895
	511	1.336		034	.877
	483	1.316		051	.860
	455	1.296		067	.842
20	428	1.276	+ 5	084	.825
	402	1.256		100	.807
	376	1.237		115	.789
	351	1.218		131	.771
	327	1.199		146	.754
- 15	+ .303	- 1.180	+ 10	- 161	- .736

δ	ϵ	N	δ	ϵ	N
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+ 10	-161	-736	35	-479	-212
	176	718		490	185
	190	699		501	158
	205	681		512	131
	219	663		523	102
15	233	644	40	534	073
	246	625		544	043
	260	606		555	-012
	273	587		565	+021
	287	568		576	054
20	300	548	45	586	088
	313	528		596	124
	325	508		606	160
	338	488		616	199
	351	467		626	238
25	363	446	50	636	280
	375	424		646	323
	387	402		656	368
	399	380		665	415
	411	358		675	464
30	423	335	55	685	516
	434	311		694	571
	446	287		704	628
	457	263		713	688
	468	237		723	752
35	-479	-212	60	+732	+820

δ	C	δ	C	δ	C
60	-732	85	-956	110	-1.176
	741		965		1.185
	751		974		1.194
	760		983		1.203
	769		991		1.213
65	778	90	1000	115	1.222
	787		1.009		1.231
	797		1.017		1.240
	806		1.026		1.249
	815		1.035		1.259
70	824	95	1.044	120	-1.268
	833		1.052		
	842		1.061		For N beyond
	851		1.070		60° we may
	859		1.079		use a table of
75	868	100	1.087		natural tangents.
	877		1.096		
	886		1.105		$\tan \phi = 0.912$
	895		1.114		
	904		1.123		
80	913	105	1.132		
	921		1.141		
	930		1.149		
	939		1.158		
	948		1.167		
85	-956	110	-1.176		

Name	α 1868		C	N
α <u>Andromedae</u>	0	1 31	-40	-35
22 Androm		3 25	-59	+10
(4 <u>Draconis L C</u>)		5 59	-110	
γ <u>Pegasi</u>		6 26	-22	-66
35 <u>Piscium</u>		8 10	-13	-77
δ Androm		10 18	-51	-13
ϵ <u>Beti</u>		12 42	+18	-1.08
ϵ <u>Sculptoris</u>		14 53	+73	-1.48
12 <u>Cassiope</u>		17 32	-74	+90
α <u>Phaeniceis</u>		19 45	+1.30	
BAC 103		21 23	+87	-1.58
12 <u>Beti</u>		23 18	+09	-99
κ <u>Cassiope</u>		25 32	-75	+99
κ <u>Draconis L C</u>		27 50	-1.87	
13 <u>Beti</u>		28 27	+08	-99
BAC 160		30 34	+58	-1.39
(α <u>Cassiope</u>)		33 2	-69	+56
ξ <u>Cassiope</u>		34 42	-63	+27
(β <u>Beti</u>)		36 58	+40	-1.25
<u>21 Cassiope</u>		36 59	-86	+2.64
BAC 205		38 40	+10	-1.01
ζ Androm		40 21	-35	-47
ν Androm		42 32	-54	-06
BAC 237		44 30	-04	-87
20 <u>Beti</u>		46 15	+03	-94
<u>32 Camel. foll. L C</u>		48 11	-1.05	
γ <u>Cassiope</u>		48 45	-73	+82

	α 1868		C	N
<i>h</i> Piscium	0	50	42	-40 -37
α Sculptoris		52	15	+74 -1.49
W O 1371		54	35	-36 -45
<u>ϵ Piscium</u>		56	6	-11 -78
μ Cassiope	0	59	23	-68 +48
β Androm	1	2	21	-48 -21
χ Piscium		4	22	-30 -54
BAC 362		6	8	+78 -1.52
37 beti		7	45	+16 -1.06
39 beti		9	54	+06 -97
<u>Polaris</u>		10	36	-99
ϕ Cassiope		11	48	-71 +66
ξ Androm		14	35	-58 +08
<u>δ' beti</u>		17	26	+17 -1.07
ω Androm		19	45	-58 +08
<u>A Cassiope</u>		21	27	-82 +1.77
A Androm		22	12	-60 +14
<u>η Piscium</u>		24	25	-23 +65
BAC 466		27	1	+1.03 -1.68
ν Persei		29	54	-62 +20
τ Androm		32	48	-53 -08
ν Piscium		34	34	-08 -83
BAC 527		36	11	+84 -1.56
<u>$\omicron$ Piscium</u>		38	26	-14 -76
BAC 544		40	51	-50 -15
χ beti		43	6	+22 -1.11

ζ beti 1 44 57 +21 -1.11

[illegible]

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Correction of micrometer screws
for
differential refraction.

The corrections to $\Delta\alpha$ and $\Delta\delta$
computed in this book are to
 $\Delta\alpha$ & $\Delta\delta$ (Planet - Star)
or (unknown star - known one)

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