Klinkerfuessche Constanten

zur Reduction jeder scheinb. Ort

für die mittleren Sonnen 1882 12h M. Z. Berlin

berechnet von

H. Kobold Dr. phil.

Veröffentlicht von der Sternwarte O Gyalla.

August 1881.

Es ist ein allgemein anerkannter Grundsatz, dass bei Rechnungen, welche ausserordentlich häufig durchgeführt werden müssen, selbst kleine Abkürzungen nützlich werden, weil der Zeitgewinn, der für die einzelne wenig ins Gewicht fällt, bedeutend wird durch die Menge. Aus keiner andern Rücksicht hat ja Gauss die Tafeln für Summen und Differenzlogarithmen construirt, die überall Eingang gefunden haben. Ein ähnliches Streben nach Abkürzung, zugleich aber auch nach grösserer Übersichtlichkeit der Form hat sich bei der Berechnung des scheinbaren Ortes aus dem mittleren geltend gemacht. Die grössere

Uebersichtlichkeit verringert die Irrei-
dung und lässt Fehler leichter vermeiden.

Wie sehr diesen Grundsätzen die
von Professor Klinkerfues vorgeschlagene
Methode gerecht wird, davon hatte der
Verfasser bei vielfachem Gebrauche der für
1880 und 1881 berechneten Tafeln hinrei-
chende Gelegenheit sich zu überzeugen.
Die Rechnung ist so einfach, so sicher
und übersichtlich, dass er sich gern der
Mühe unterzog die im folgenden enthal-
tenen Reductionstafeln für 1883 zu berech-
nen, in der Hoffnung durch ihre Veröffentli-
chung auch anderen Fachgenossen einen
Dienst zu erweisen.

In den Tafeln ist sowohl hinsichtlich der
Bezeichnung als auch der numerischen Da-

the der „Nautical Almanac for the year 1882" zu Grunde gelegt. Die Formeln sind zunächst folgende: Unter Benutzung der Substitutionen

$$2k \sin K = A + D \qquad 2l \cos L = A - D$$
$$2k \cos K = B + 20.0537\,C \qquad 2l \sin L = -B + 20.0537\,C$$

ergeben sich bei Einführung der halben Polardistanz $p/2$ die Reductionen auf den scheinbaren Ort:

$$\Delta\alpha = f + k \operatorname{cotg} p/2 \sin(K+\alpha) + l \operatorname{tg} p/2 \cos(L+\alpha)$$
$$\Delta\delta . \sec\delta = i + k \operatorname{cotg} p/2 \cos(K+\alpha) + l \operatorname{tg} p/2 \sin(L+\alpha)$$

Um den vollen Nutzen der Formeln zu geniessen richte man die Rechnungen nach dem im folgenden Beispiele dargelegten von Prof. Klinkerfues vorgeschlagenen Schema ein:

Berechnung des scheinbaren Ortes von α Cygni Dec. 1-5 1882
Mittlerer Ort 1882.0 $\alpha = 20^h 37^m 24^s.54 = 309°\ 21'\ 8''.1$ $\delta = +44°\ 51'\ 33''.2$ $\log \operatorname{tg} p/2 = 9.6187$

1) $k \operatorname{cotg} p/2 = 1.7285$	3) $\operatorname{tg} p/2 = 9.9441$	$\Delta\alpha = 63''.77 - 30''.11 + 0''.69$	$\Delta\alpha = +1''.62$
3) $\sin(K+\alpha) = 9.7502\,n$	6) $\cos(L+\alpha) = 9.8971$		
4) $\cos(K+\alpha) = 9.9174$	5) $\sin(L+\alpha) = 9.7084$	$\Delta\delta . \sec\delta = +2''.82 + 44''.25 + 0''.54$	$\Delta\delta = +33''.7$
app. $\alpha = 20^h 37^m 26^s.16$		app. $\delta = +44°\ 52'\ 7''.1$	

Ó Gyalla August 1881.

H. Kobold Dr. phil.
Observator.

Januar

12h Berlin	K	d	L	d	log k	d	log l	d	l	z
1	0° 35'	42	239° 51'	79	1.1257	2	0.8879	12	+ 15.33	- 1.63
2	359 53	42	238 32	78	1.1255	2	0.8891	13	15.48	- 1.77
3	359 11	42	237 14	79	1.1253	2	0.8904	13	15.64	- 1.91
4	358 29	42	235 55	78	1.1251	3	0.8917	14	15.80	- 2.05
5	357 47	42	234 37	78	1.1248	3	0.8931	14	15.96	- 2.19
6	357 5	41	233 19	78	1.1255	4	0.8945	15	16.11	- 2.33
7	356 24	42	232 1	78	1.1241	4	0.8960	15	16.27	- 2.47
8	355 42	42	230 43	77	1.1237	4	0.8975	15	16.42	- 2.61
9	355 0	42	229 26	78	1.1233	5	0.8990	16	16.57	- 2.74
10	354 18	41	228 8	77	1.1228	5	0.9006	17	16.73	- 2.88
11	353 37	42	226 51	77	1.1223	6	0.9023	17	16.88	- 3.01
12	353 55	41	225 34	77	1.1217	6	0.9040	18	17.02	- 3.15
13	352 14	42	224 17	77	1.1211	6	0.9058	18	17.18	- 3.28
14	351 32	42	223 0	76	1.1205	7	0.9076	19	17.33	- 3.41
15	350 50	41	221 44	76	1.1891	8	0.9095	19	17.48	- 3.54
16	350 9	42	220 28	76	1.1190	8	0.9114	20	17.63	- 3.67
17	349 27	41	219 12	76	1.1182	8	0.9134	20	17.76	- 3.80
18	348 46	42	217 56	76	1.1174	9	0.9154	21	17.90	- 3.92
19	348 4	41	216 41	75	1.1165	9	0.9175	21	18.04	- 4.05
20	347 23	42	215 26	75	1.1156	10	0.9196	22	18.18	- 4.18
21	346 41	42	214 11	74	1.1146	10	0.9218	22	18.32	- 4.30
22	345 59	42	212 57	74	1.1136	11	0.9240	22	18.46	- 4.42
23	345 18	42	211 43	74	1.1125	12	0.9263	23	18.60	- 4.54
24	344 36	41	210 29	74	1.1113	12	0.9286	23	18.64	- 4.66
25	343 55	42	209 15	73	1.1101	12	0.9309	23	18.87	- 4.78
26	343 13	42	208 2	72	1.1089	13	0.9333	24	19.00	- 4.90
27	342 31	41	206 50	72	1.1076	13	0.9357	24	19.13	- 5.01
28	341 50	42	205 38	72	1.1063	14	0.9382	25	19.26	- 5.12
29	341 8	41	204 26	71	1.1049	14	0.9407	25	19.38	- 5.23
30	340 27	42	203 15	71	1.1035	15	0.9433	26	19.51	- 5.34
31	339 45	42	202 4	71	1.1020	15	0.9459	26	19.64	- 5.45

Februar

12h Paert.	K	d	L	d	log k	d	log l	d	J	i
1	339° 31'	42	200° 53	70	1.1005	16	0.9485	27	+19.77	− 5.56
2	338 21	41	199 43	70	1.0989	16	0.9512	27	19.90	5.66
3	337 40	42	148 33	69	1.0973	17	0.9539	27	20.02	5.76
4	336 58	42	197 24	69	1.0956	17	0.9566	28	14	5.86
5	336 16	42	196 15	68	1.0939	18	0.9594	28	26	5.96
6	335 34	42	195 7	68	1.0921	18	0.9622	28	37	− 6.05
7	334 52	43	193 59	67	1.0903	19	0.9650	29	49	6.15
8	334 9	42	192 52	67	1.0884	19	0.9679	29	60	6.24
9	333 27	42	191 45	66	1.0865	20	0.9708	29	72	6.34
10	332 45	42	190 39	66	1.0845	20	0.9738	30	83	6.43
11	332 3	43	189 33	65	1.0825	21	0.9768	30	20.94	− 6.53
12	331 20	42	188 28	65	1.0804	22	0.9797	29	21.05	6.60
13	330 38	43	187 23	65	1.0782	22	0.9827	30	16	6.68
14	329 55	42	186 18	64	1.0760	23	0.9857	30	26	6.76
15	329 12	43	185 14	64	1.0737	23	0.9887	30	36	6.84
16	328 30	43	184 10	63	1.0714	24	0.9917	30	46	− 6.92
17	327 47	43	183 7	63	1.0690	24	0.9948	31	56	7.00
18	327 4	43	182 4	62	1.0666	25	0.9979	31	66	7.07
19	326 21	43	181 2	62	1.0641	25	1.0010	31	76	7.14
20	325 38	44	180 1	61	1.0616	25	1.0042	32	86	7.21
21	324 55	44	179 0	61	1.0590	26	1.0073	31	21.95	− 7.27
22	324 11	43	178 0	60	1.0564	26	1.0105	32	22.05	7.33
23	323 27	44	177 0	60	1.0537	27	1.0136	31	15	7.39
24	322 44	43	176 0	60	1.0509	28	1.0168	32	24	7.45
25	322 0	44	175 1	59	1.0480	29	1.0200	32	33	7.51
26	321 17	44	174 2	59	0.0451	29	1.0231	31	42	− 7.56
27	320 33	44	175 4	58	0.0421	30	1.0263	32	51	7.61
28	319 49	44	172. 6	58	0.0391	30	1.0295	32	59	7.66
				57		31		31		

März.

12h Berlin	K	d	L	d	log k	d	log l	d	J	i
1	319° 5'	44	171° 9'	57	1.0360	31	1.0326	32	4 22.68	− 7.71
2	318 21	45	170 12	56	1.0329	32	1.0358	32	22.77	7.75
3	317 36	44	169 16	56	1.0297	33	1.0390	32	22.86	7.79
4	316 52	45	168 20	55	1.0264	33	1.0422	31	22.95	7.83
5	316 7	44	167 25	55	1.0231	34	1.0453	32	23.04	7.87
6	315 23	45	166 30	54	1.0197	35	1.0485	32	23.13	− 7.91
7	314 38	45	165 36	54	1.0162	36	1.0517	32	23.20	7.94
8	313 53	45	164 42	53	1.0126	36	1.0548	31	23.28	7.97
9	313 8	46	163 49	53	1.0090	36	1.0580	32	23.37	8.00
10	312 22	46	162 56	53	1.0054	36	1.0611	31	23.45	8.02
11	311 36	46	162 3	52	1.0017	37	1.0643	32	23.53	− 8.04
12	310 50	46	161 11	51	0.9979	38	1.0675	32	23.61	8.06
13	309 4	47	160 20	51	0.9940	39	1.0706	31	23.69	8.08
14	309 17	47	159 29	51	0.9900	40	1.0738	32	23.77	8.10
15	308 30	47	158 38	50	0.9859	41	1.0769	31	23.85	8.11
16	307 43	47	157 48	50	0.9818	42	1.0800	31	23.93	− 8.12
17	306 56	47	156 58	50	0.9776	42	1.0831	31	24.01	8.13
18	306 9	47	156 8	49	0.9734	43	1.0861	30	24.09	8.14
19	305 22	48	155 19	48	0.9691	44	1.0892	31	24.17	8.15
20	304 34	48	154 31	48	0.9647	45	1.0922	30	24.25	8.15
21	303 46	49	153 43	48	0.9602	46	1.0953	31	24.33	− 8.14
22	302 57	49	152 55	48	0.9556	47	1.0983	30	24.41	8.13
23	302 8	49	152 8	47	0.9509	47	1.1013	30	24.49	8.12
24	301 19	49	151 21	47	0.9462	48	1.1042	29	24.57	8.11
25	300 30	50	150 34	46	0.9414	48	1.1072	30	24.65	8.10
26	299 40	50	149 48	46	0.9365	49	1.1101	29	24.73	− 8.09
27	298 50	50	149 2	45	0.9315	50	1.1131	30	24.81	8.07
28	297 59	51	148 17	45	0.9264	51	1.1160	29	24.89	8.05
29	297 8	51	147 32	45	0.9212	52	1.1189	29	24.97	8.03
30	296 17	52	146 47	45	0.9160	52	1.1217	28	25.05	8.00
31	295 25	52	146 3	44	0.9107	53	1.1245	28	25.13	− 7.98
				44						

April

12h Ret.	☽ Ste		d	L		d	log k	d	log l	d	f		i
1	294°	33	53	145°	19	44	0.9053	56	1.1274	28	25.	22	− 7.95
2	293	40	53	144	35	43	0.8997	56	1.1302	28		30	7.92
3	292	47	54	143	52	43	0.8941	57	1.1330	28		39	7.89
4	291	53	54	143	9	43	0.8884	59	1.1358	27		48	7.85
5	290	59	54	142	26	43	0.8825	60	1.1385	27		56	7.82
6	290	4	55	141	43	42	0.8765	60	1.1412	27		65	− 7.78
7	289	9	55	141	1	42	0.8705	62	1.1439	27		73	7.74
8	288	13	56	140	19	41	0.8643	62	1.1466	27		82	7.70
9	287	16	57	139	38	41	0.8581	63	1.1493	27		90	7.65
10	286	19	57	138	57	41	0.8518	65	1.1519	26	25.	99	7.60
11	285	21	58	138	16	40	0.8453	66	1.1545	26	26.	08	− 7.55
12	284	22	59	137	36	40	0.8387	67	1.1571	26		17	7.50
13	283	23	60	136	56	40	0.8320	69	1.1596	25		27	7.44
14	282	23	61	136	16	40	0.8251	70	1.1621	25		36	7.38
15	281	22	61	135	36	40	0.8181	71	1.1646	24		45	7.32
16	280	20	62	134	56	40	0.8110	73	1.1670	24		55	− 7.25
17	279	18	64	134	17	39	0.8037	74	1.1693	23		65	7.19
18	278	14	65	133	38	39	0.7963	74	1.1716	23		75	7.12
19	277	9	66	133	0	38	0.7889	76	1.1739	23		85	7.06
20	276	3	68	132	21	39	0.7813	77	1.1762	23	26.	95	7.99
21	274	55	69	131	43	38	0.7736	78	1.1785	23	27.	05	− 6.91
22	273	46	69	131	5	38	0.7658	80	1.1808	23		15	6.84
23	272	37	71	130	28	38	0.7578	81	1.1830	22		25	6.77
24	271	26	72	129	50	38	0.7497	83	1.1852	22		36	6.69
25	270	14	74	129	13	37	0.7414	84	1.1874	22		46	6.61
26	269	0	75	128	36	37	0.7330	86	1.1895	21		57	− 6.53
27	267	45	77	128	0	36	0.7244	87	1.1916	21		68	6.45
28	266	28	79	127	33	37	0.7157	88	1.1937	21		79	6.37
29	265	9	80	126	47	36	0.7069	89	1.1958	21	27.	90	6.28
30	264	48	82	126	11	36	0.6980	91	1.1979	20	28.	02	6.19
			84										

Mai.

124 Berlin	K	d		L	d		log k	d		log l	d		J		ΔJ
1	262°	34'	86	125°	35'	36	0.6889	92		1.1999	20		+28.	13	−6. 10
2	260	58	87	124	59	35	0.6797	93		1.2019	19			25	6. 01
3	259	31	90	124	24	35	0.6704	95		1.2038	19			36	5. 92
4	258	1	91	123	49	35	0.6609	94		1.2057	18			48	5. 83
5	256	30	95	123	14	35	0.6513	98		1.2075	18			60	5. 73
6	254	55	98	122	39	35	0.6415	99		1.2093	18			72	− 5. 63
7	253	17	101	122	4	35	0.6316	100		1.2111	18			84	5. 53
8	251	36	104	121	29	34	0.6216	100		1.2129	17		28.	96	5. 42
9	249	52	106	120	55	34	0.6116	101		1.2146	17		29.	09	5. 32
10	248	6	110	120	21	34	0.6015	102		1.2163	17			21	5. 21
11	246	16	116	119	47	34	0.5913	102		1.2180	17			34	− 5. 11
12	244	20	120	119	13	33	0.5811	102		1.2197	16			46	5. 00
13	242	20	123	118	40	34	0.5709	103		1.2213	16			62	4. 90
14	240	17	128	118	6	33	0.5606	102		1.2229	15			77	4. 80
15	238	9	132	117	33	33	0.5504	101		1.2244	15			85	4. 78
16	235	57	137	117	0	33	0.5403	101		1.2259	15		29.	98	− 4. 60
17	233	40	142	116	27	33	0.5302	99		1.2274	15		30	11	4. 45
18	231	18	147	115	54	33	0.5203	97		1.2289	14			25	4. 34
19	228	51	152	115	21	33	0.5106	95		1.2303	14			39	4. 22
20	226	19	158	114	48	33	0.5011	93		1.2317	13			53	4. 10
21	223	41	163	114	16	33	0.4918	88		1.2330	13			67	− 3. 98
22	220	58	168	113	43	32	0.4830	82		1.2343	13			81	3. 86
23	218	10	174	113	11	33	0.4748	77		1.2356	13		30	95	3. 74
24	215	16	179	112	38	32	0.4671	72		1.2369	12		31.	09	3. 61
25	212	17	184	112	6	32	0.4599	66		1.2382	12			24	3. 49
26	209	13	189	111	34	32	0.4533	59		1.2394	11			38	− 3. 36
27	206	4	192	111	2	32	0.4474	52		1.2405	11			53	3. 24
28	202	52	196	110	30	31	0.4422	42		1.2416	10			67	3. 11
29	199	36	198	109	59	31	0.4380	30		1.2426	11			82	2. 99
30	196	18	200	109	28	31	0.4350	21		1.2437	10		31.	96	2. 87
31	192	58	201	108	57	31	0.4328	11		1.2447	10		32	11	2. 74

Juni

18 h MZ-zeit	N	d	L	d	log k	d	log l	d	J	i
1	139° 37'	201	108° 26'	31	0.4317	9	1.2457	9	+ 32. 26	– 2. 61
2	136 16	202	107 55	31	0.4315	9	1.2466	9	41	2.48
3	132 54	202	107 24	31	0.4324	18	1.2475	9	50	2.35
4	129 32	201	106 53	31	0.4342	28	1.2484	8	71	2.22
5	126 11	199	106 22	31	0.4370	37	1.2492	9	32. 86	2.09
6	122 52	195	105 51	31	0.4407	48	1.2500	8	33. 01	– 1. 96
7	119 37	191	105 20	30	0.4455	56	1.2508	7	17	1. 83
8	116 26	188	104 50	31	0.4511	64	1.2515	7	32	1. 70
9	113 18	183	104 19	30	0.4575	72	1.2522	7	47	1. 56
10	110 15	177	103 49	30	0.4647	80	1.2529	6	63	1. 43
11	107 18	171	103 19	30	0.4727	87	1.2535	6	79	– 1. 30
12	104 26	166	102 49	31	0.4814	90	1.2541	6	33. 94	1. 16
13	101 40	162	102 18	30	0.4904	94	1.2547	5	34. 10	1. 03
14	98 58	156	101 48	30	0.4998	98	1.2552	5	25	0. 89
15	96 22	151	101 18	30	0.5096	102	1.2557	4	41	0. 76
16	93 51	146	100 48	29	0.5198	103	1.2561	4	56	– 0. 62
17	91 25	140	100 19	30	0.5301	104	1.2565	4	72	0. 49
18	89 5	134	99 49	29	0.5405	106	1.2569	4	34. 88	0. 35
19	86 51	130	99 20	30	0.5511	106	1.2573	3	35. 04	0. 21
20	84 41	125	98 50	30	0.5617	107	1.2576	3	20	– 0. 08
21	82 36	121	98 21	29	0.5724	108	1.2579	3	35	+ 0. 06
22	80 35	117	97 51	30	0.5832	109	1.2582	2	51	0. 20
23	78 38	113	97 22	29	0.5941	110	1.2584	1	66	0. 33
24	76 45	110	96 52	30	0.6051	109	1.2585	1	82	0. 47
25	74 55	106	96 23	29	0.6160	109	1.2586	1	35. 98	0. 60
26	73 9	102	95 53	30	0.6269	107	1.2587	0	36. 14	+ 0. 73
27	71 27	98	95 24	29	0.6376	106	1.2587	0	30	0. 86
28	69 49	95	94 54	30	0.6482	105	1.2587	1	45	1. 00
29	68 14	92	94 24	29	0.6587	104	1.2586	0	60	1. 13
30	66 42	89	93 55	29	0.6691	103	1.2586		+ 36. 76	+ 1. 27

Juli

Nr. Bez.	K	d	L	d	log k	d	log l	d	g	i
1	115° 13'	89	93° 27'	29	0.6794	102	1.2585	1	+ 36.92	+1.40
2	113 46	87	92 58	29	0.6896	101	1.2584	1	37.07	1.54
3	112 22	84	92 29	29	0.6997	99	1.2583	2	23	1.67
4	111 0	82	92 0	29	0.7096	98	1.2581	2	38	1.80
5	109 40	80	91 31	29	0.7194	97	1.2577	2	54	1.93
6	108 22	78	91 3	28	0.7291	96	1.2575	3	69	+ 2.07
7	107 6	76	90 34	29	0.7387	94	1.2572	4	84	2.20
8	105 52	74	90 5	29	0.7481	93	1.2568	4	37.99	2.33
9	104 40	72	89 36	29	0.7574	91	1.2564	5	38.14	2.46
10	103 29	71	89 8	28	0.7665	90	1.2559	5	29	2.59
11	102 20	69	88 39	29	0.7755	88	1.2554	5	43	+ 2.72
12	101 13	67	88 10	29	0.7843	87	1.2549	6	58	2.84
13	100 7	66	87 41	29	0.7930	87	1.2543	6	73	2.97
14	99 3	64	87 13	28	0.8017	85	1.2537	6	38.88	3.09
15	98 0	63	86 44	29	0.8102	84	1.2531	7	39.03	3.22
16	96 58	62	86 16	28	0.8186	82	1.2524	7	17	+ 3.34
17	95 57	61	85 48	28	0.8268	81	1.2517	8	32	3.46
18	94 57	60	85 20	28	0.8349	80	1.2509	8	46	3.59
19	93 58	59	84 51	29	0.8429	79	1.2501	8	60	3.71
20	93 1	57	84 23	28	0.8508	77	1.2493	9	74	3.83
21	92 5	56	83 54	29	0.8585	77	1.2484	10	39.87	+ 3.95
22	91 10	55	83 26	28	0.8662	76	1.2474	10	40.01	4.07
23	90 16	54	82 58	28	0.8738	74	1.2464	10	15	4.18
24	89 22	53	82 30	28	0.8812	73	1.2454	11	29	4.30
25	88 29	52	82 2	28	0.8885	73	1.2443	11	43	4.41
26	87 37	51	81 34	28	0.8958	72	1.2432	11	56	+ 4.53
27	86 46	51	81 6	28	0.9030	70	1.2421	12	69	4.64
28	85 55	50	80 38	28	0.9100	69	1.2409	12	82	4.76
29	85 5	50	80 10	28	0.9169	69	1.2397	12	40.96	4.86
30	84 15	49	79 42	28	0.9238	68	1.2384	13	41.09	4.97
31	83 26	48	79 14	28	0.9306	67	1.2371	14	22	+ 5.08

August

12h Berlin	Φ	d	L	d	log r	d	log Δ	d	ψ	i
1	82° 38	47	78° 46'	28	0.9373	66	1.2357	14	41. 35	+ 5.43
2	81 51	47	78 18	28	0.9439	64	1.2343	15	47	5.29
3	81 4	46	77 50	28	0.9503	64	1.2328	15	59	5.39
4	80 18	46	77 22	28	0.9567	63	1.2313	16	71	5.49
5	79 32	45	76 54	27	0.9630	62	1.2298	16	83	5.59
6	78 47	45	76 27	28	0.9692	62	1.2282	17	41. 94	+ 5.68
7	78 2	44	75 59	28	0.9754	61	1.2265	17	42. 06	5.78
8	77 18	44	75 31	28	0.9815	60	1.2248	17	18	5.87
9	76 34	43	75 3	27	0.9875	59	1.2231	18	30	5.97
10	75 51	43	74 36	28	0.9934	59	1.2213	18	41	6.06
11	75 8	43	74 8	28	0.9993	58	1.2195	19	53	+ 6.15
12	74 25	42	73 40	27	1.0051	57	1.2176	19	64	6.24
13	73 43	42	73 13	28	1.0108	56	1.2157	20	75	6.33
14	73 1	41	72 45	27	1.0164	56	1.2137	20	86	6.41
15	72 20	41	72 18	27	1.0220	55	1.2117	21	42. 97	6.50
16	71 39	40	71 51	28	1.0275	54	1.2096	22	43. 08	+ 6.58
17	70 59	40	71 23	27	1.0329	54	1.2074	22	18	6.66
18	70 19	40	70 56	27	1.0383	53	1.2052	23	29	6.73
19	69 39	40	70 29	27	1.0436	52	1.1929	23	39	6.81
20	68 59	39	70 2	28	1.0488	52	1.1906	24	49	+ 6.88
21	68 20	39	69 34	27	1.0540	51	1.1882	24	59	6.96
22	67 41	38	69 7	27	1.0591	50	1.1858	25	69	7.03
23	67 3	38	68 40	27	1.0641	50	1.1833	25	79	7.10
24	66 25	38	68 13	27	1.0691	49	1.1808	26	89	+ 7.16
25	65 47	38	67 46	27	1.0740	49	1.1782	27	43. 99	7.22
26	65 9	37	67 19	27	1.0789	48	1.1755	27	44. 08	7.28
27	64 32	37	66 52	27	1.0837	48	1.1728	28	18	7.34
28	63 55	37	66 25	27	1.0885	47	1.1700	28	27	7.40
29	63 18	37	65 58	27	1.0932	47	1.1672	29	36	+ 7.46
30	62 41	36	65 31	26	1.0979	46	1.1643	30	45	7.51
31	62 5	36	65 5	27	1.1025	45	1.1613	30	44. 54	+ 7.56

September.

12h Berl.	K	d	L	d	log k	d	log l	d	f	e
1	61° 29	36	64° 38	29	1.1070	45	1.1683	31	+44.63	+7.61
2	60 53	36	64 11	26	1.1115	45	1.1652	32	72	7.66
3	60 17	35	63 45	26	1.1160	44	1.1620	32	80	7.70
4	59 42	36	63 19	27	1.1204	44	1.1588	33	89	7.75
5	59 6	35	62 52	26	1.1248	43	1.1555	34	44.97	7.79
6	58 31	34	62 26	26	1.1291	42	1.1521	34	45.05	+7.83
7	57 57	34	62 0	26	1.1333	42	1.1487	35	14	7.87
8	57 23	34	61 34	26	1.1375	41	1.1452	36	29	7.91
9	56 49	34	61 8	26	1.1416	41	1.1416	36	30	7.95
10	56 16	34	60 42	26	1.1457	41	1.1380	36	39	7.99
11	55 42	34	60 16	25	1.1498	41	1.1343	37	47	+8.00
12	55 8	34	59 51	26	1.1538	40	1.1305	38	55	8.02
13	54 35	33	59 25	25	1.1578	40	1.1266	39	63	8.04
14	54 2	33	59 0	26	1.1617	39	1.1227	39	71	8.06
15	53 29	33	58 34	25	1.1656	39	1.1186	41	79	8.07
16	52 56	33	58 9	25	1.1694	38	1.1145	41	87	+8.09
17	52 23	33	57 44	25	1.1732	38	1.1103	42	45.94	8.10
18	51 50	33	57 19	25	1.1769	37	1.1060	43	46.02	8.12
19	51 17	32	56 54	25	1.1806	37	1.1016	44	10	8.12
20	50 45	32	56 29	25	1.1843	36	1.0971	45	18	8.13
21	50 13	32	56 4	25	1.1879	36	1.0925	46	26	+8.14
22	49 41	32	55 40	24	1.1915	35	1.0879	46	33	8.14
23	49 9	31	55 16	24	1.1950	35	1.0832	47	41	8.14
24	48 38	31	54 52	24	1.1985	34	1.0784	48	49	8.13
25	48 7	31	54 28	23	1.2019	34	1.0735	49	57	8.13
26	47 36	31	54 5	24	1.2053	34	1.0686	50	65	+8.12
27	47 5	31	53 41	23	1.2087	33	1.0636	51	72	8.11
28	46 34	31	53 18	23	1.2120	33	1.0585	52	80	8.10
29	46 3	31	52 55	23	1.2153	32	1.0533	53	88	8.09
30	45 32	30	52 32	23	1.2185	32	1.0480	53	46.96	+8.07

October.

Nr. Berlin	K	d	L	d	log k.	d	log l.	d	f	i
1	45° 21'	30	52° 10'	22	1.2317	32	1.0419	56	+47.04	+8.05
2	44 32	31	51 48	22	1.2349	31	1.0363	58	12	8.03
3	44 1	30	51 26	22	1.2380	31	1.0305	59	20	8.00
4	43 31	30	51 4	21	1.2411	30	1.0246	60	28	7.97
5	43 1	30	50 42	21	1.2441	30	1.0186	62	36	7.94
6	42 31	30	50 21	21	1.2471	30	1.0124	63	44	+7.91
7	42 1	29	50 0	20	1.2501	29	1.0061	65	53	7.88
8	41 33	30	49 40	20	1.2530	29	0.9996	66	61	7.84
9	41 2	30	49 20	20	1.2559	29	0.9930	67	69	7.80
10	40 32	29	49 0	19	1.2588	28	0.9863	69	78	7.76
11	39 3	29	48 41	19	1.2616	28	0.9794	69	86	+7.71
12	39 34	29	48 22	18	1.2644	28	0.9725	71	+47.94	7.67
13	39 5	29	48 4	18	1.2672	27	0.9654	73	+48.03	7.62
14	38 36	29	47 46	17	1.2699	27	0.9581	73	12	7.57
15	38 7	29	47 29	17	1.2726	26	0.9508	75	21	7.52
16	37 38	29	47 12	16	1.2752	26	0.9430	78	30	+7.46
17	37 9	29	46 56	15	1.2778	26	0.9352	78	39	7.40
18	36 40	29	46 41	15	1.2804	25	0.9272	80	48	7.34
19	36 11	28	46 26	14	1.2829	25	0.9190	82	57	7.28
20	35 43	29	46 12	13	1.2854	24	0.9106	84	67	7.22
21	35 14	28	45 59	13	1.2878	24	0.9020	86	76	+7.15
22	34 46	28	45 46	12	1.2902	24	0.8932	88	86	7.08
23	34 18	28	45 34	11	1.2926	23	0.8842	90	+48.95	7.01
24	33 50	28	45 23	10	1.2949	23	0.8750	92	+49.05	6.94
25	33 22	27	45 13	8	1.2972	23	0.8656	94	15	6.86
26	32 55	28	45 5	7	1.2995	23	0.8559	97	26	+6.78
27	32 27	28	44 58	7	1.3018	22	0.8460	99	36	6.71
28	31 59	28	44 51	5	1.3040	22	0.8358	102	46	6.63
29	31 31	27	44 46	3	1.3062	21	0.8254	104	56	6.55
30	31 4	28	44 43	2	1.3083	21	0.8147	107	67	6.46
31	30 36	28	44 41	0	1.3004	20	0.8037	110	87	+6.37

November.

12h Berl.	K	d	L	d	log k	d	log l	d	g	i
1	30° 8'	27	44° 41'	1	1.3024	20	0.7924	116	+49.88	+ 6.28
2	29 41	27	44 42	3	1.3044	20	0.7808	119	49.99	6.19
3	29 14	27	44 45	5	1.3064	20	0.7689	123	50.10	6.09
4	28 46	28	44 50	8	1.3084	20	0.7566	126	22	6.00
5	28 19	27	44 58	10	1.3103	19	0.7440	130	33	5.91
6	27 52	27	45 8	14	1.3122	19	0.7310	130	45	+ 5.81
7	27 25	27	45 22	17	1.3140	18	0.7176	134	56	5.70
8	26 57	28	45 39	19	1.3158	18	0.7038	138	68	5.60
9	26 30	27	45 58	21	1.3176	18	0.6896	142	50.80	5.50
10	26 3	27	46 21	23	1.3193	17	0.6750	146	50.93	5.40
11	25 37	26	46 48	27	1.3210	17	0.6599	149	51.05	+ 5.29
12	25 10	27	47 20	32	1.3226	16	0.6445	154	17	5.28
13	24 43	27	47 57	37	1.3242	16	0.6286	159	30	5.07
14	24 16	26	48 39	42	1.3258	16	0.6123	163	42	4.95
15	23 50	27	49 28	49	1.3274	15	0.5955	168	55	4.84
16	23 23	26	50 24	56	1.3289	15	0.5787	171	68	+ 4.72
17	22 57	26	51 27	63	1.3304	14	0.5609	175	80	4.60
18	22 30	27	52 38	71	1.3318	14	0.5427	182	52.93	4.48
19	22 4	26	53 58	80	1.3332	14	0.5241	186	53.07	4.36
20	21 37	27	55 29	91	1.3346	13	0.5053	188	21	4.24
21	21 11	26	57 11	102	1.3359	13	0.4863	190	35	+ 4.12
22	20 45	26	59 6	115	1.3372	13	0.4670	192	48	3.99
23	20 19	26	61 15	129	1.3385	12	0.4479	191	62	3.87
24	19 53	26	63 44	139	1.3397	12	0.4288	189	76	3.74
25	19 27	27	66. 39	155	1.3409	12	0.4099	182	52.90	3.61
26	18 0	26	69 16	177	1.3421	11	0.3917	173	53.04	+ 3.48
27	18 34	26	72 31	195	1.3432	11	0.3744	165	18	3.35
28	18 8	26	76 5	214	1.3443	11	0.3589	136	33	3.22
29	17 42	26	79 58	233	1.3453	10	0.3453	106	48	3.09
30	17. 16	26	84 9	251	1.3463	10	0.3347	93	63	+ 2.95
		26		264		9				

December.

12h Berlin	K		d	L		d	log k	d	log l	d	F	i
1	16°	57′		88°	33′		1.3472		0.3254		+ 53. 77	+ 2.82
			26			271		9		52		
2	16	25		93	4		1.3481		0.3202		53. 92	2.68
			26			274		9		34		
3	15	59		97	40		1.3490		0.3168		54. 07	2.55
			26			276		9		19		
4	15	33		102	16		1.3499		0.3187		22	2.41
			25			273		8		53		
5	15	8		106	49		1.3507		0.3240		37	2.28
			26			268		8		82		
6	14	42		111	17		1.3515		0.3322		52	+ 2.14
			26			256		7		109		
7	14	16		115	32		1.3522		0.3431		67	2.00
			26			235		7		134		
8	13	50		119	27		1.3529		0.3565		82	1.86
			25			218		7		155		
9	13	25		123	5		1.3536		0.3720		54. 98	1.72
			25			204		6		170		
10	13	0		126	29		1.3542		0.3890		55. 13	1.58
			26			187		6		184		
11	12	34		129	36		1.3548		0.4074		28	+ 1.43
			26			167		6		180		
12	12	8		132	23		1.3554		0.4263		44	1.29
			25			150		5		193		
13	11	43		134	53		1.3559		0.4456		60	1.15
			26			135		5		199		
14	11	17		137	8		1.3564		0.4655		75	1.00
			26			121		5		200		
15	10	52		139	9		1.3569		0.4855		55. 91	0.86
			25			107		4		197		
16	10	27		140	56		1.3573		0.5052		56. 07	+ 0.71
			25			94		3		194		
17	10	2		142	30		1.3576		0.5246		23	0.57
			25			83		3		192		
18	9	37		143	53		1.3579		0.5438		39	0.42
			26			74		3		190		
19	9	11		145	7		1.3582		0.5628		54	0.28
			25			67		3		182		
20	8	46		146	14		1.3585		0.5810		70	+ 0.13
			25			59		2		178		
21	8	21		147	13		1.3587		0.5988		56. 85	– 0.02
			25			52		1		174		
22	7	56		148	5		1.3588		0.6162		57. 01	– 0.16
			25			46		1		169		
23	7	31		148	51		1.3589		0.6331		17	– 0.30
			25			39		0		165		
24	7	6		149	30		1.3590		0.6496		32	– 0.45
			25			33		0		161		
25	6	41		150	3		1.3591		0.6657		48	– 0.59
			25			29		0		157		
26	6	16		150	32		1.3591		0.6814		64	– 0.73
			24			24		0		153		
27	5	52		150	56		1.3591		0.6967		80	– 0.87
			25			21		0		148		
28	5	27		151	17		1.3590		0.7115		57. 95	– 1.02
			25			19		1		144		
29	5	2		151	36		1.3589		0.7259		58. 11	– 1.16
			25			16		1		140		
30	4	37		151	52		1.3587		0.7399		27	– 1.31
			25			14		2		136		
31	4	12		152	6		1.3587		0.7535		58. 43	– 1.45

Decl.	log tg p/2	d	cos δ	Decl.	log tg p/2	d	cos δ	Decl.	log tg p/2	d	cos δ
0 0	0.0000	13	1.0000	6 0	9.9544	12	0.9945	12 0	9.9084	13	0.9788
10	9.9987	12	1.0000	10	9.9532	13	0.9942	10	9.9071	13	0.9775
20	9.9975	13	0.9999	20	9.9519	13	0.9939	20	9.9058	13	0.9769
30	9.9962	13	0.9999	30	9.9506	12	0.9936	30	9.9045	13	0.9763
40	9.9949	12	0.9999	40	9.9494	13	0.9932	40	9.9032	13	0.9757
50	9.9937	13	0.9999	50	9.9481	13	0.9929	50	9.9019	13	0.9750
1 0	9.9924	12	0.9999	7 0	9.9468	13	0.9926	13 0	9.9006	13	0.9744
10	9.9912	13	0.9998	10	9.9455	12	0.9922	10	9.8993	13	0.9737
20	9.9899	13	0.9997	20	9.9443	13	0.9918	20	9.8980	13	0.9730
30	9.9886	12	0.9997	30	9.9430	13	0.9914	30	9.8967	13	0.9724
40	9.9874	13	0.9996	40	9.9417	13	0.9911	40	9.8954	13	0.9717
50	9.9861	13	0.9995	50	9.9404	13	0.9907	50	9.8941	13	0.9710
2 0	9.9848	12	0.9994	8 0	9.9392	13	0.9903	14 0	9.8928	13	0.9703
10	9.9836	13	0.9993	10	9.9379	13	0.9899	10	9.8915	13	0.9696
20	9.9823	13	0.9992	20	9.9366	13	0.9894	20	9.8902	13	0.9689
30	9.9810	12	0.9991	30	9.9353	12	0.9890	30	9.8889	13	0.9682
40	9.9798	13	0.9989	40	9.9341	13	0.9886	40	9.8876	13	0.9674
50	9.9785	13	0.9988	50	9.9328	13	0.9881	50	9.8863	13	0.9667
3 0	9.9772	12	0.9986	9 0	9.9315	13	0.9877	15 0	9.8850	13	0.9659
10	9.9760	13	0.9985	10	9.9302	13	0.9872	10	9.8837	13	0.9652
20	9.9747	12	0.9983	20	9.9289	12	0.9868	20	9.8824	13	0.9644
30	9.9735	13	0.9981	30	9.9277	13	0.9863	30	9.8811	13	0.9636
40	9.9722	13	0.9980	40	9.9264	13	0.9858	40	9.8797	13	0.9629
50	9.9709	12	0.9978	50	9.9251	13	0.9853	50	9.8784	13	0.9621
4 0	9.9697	13	0.9976	10 0	9.9238	13	0.9848	16 0	9.8771	13	0.9613
10	9.9684	13	0.9974	10	9.9225	13	0.9843	10	9.8758	13	0.9605
20	9.9671	12	0.9971	20	9.9212	12	0.9838	20	9.8745	13	0.9596
30	9.9659	13	0.9969	30	9.9200	13	0.9833	30	9.8732	13	0.9588
40	9.9646	13	0.9967	40	9.9187	13	0.9827	40	9.8718	13	0.9580
50	9.9633	12	0.9964	50	9.9174	13	0.9822	50	9.8705	13	0.9572
5 0	9.9621	13	0.9962	11 0	9.9161	13	0.9816	17 0	9.8692	13	0.9563
10	9.9608	13	0.9959	10	9.9148	13	0.9811	10	9.8679	13	0.9555
20	9.9595	13	0.9957	20	9.9135	13	0.9805	20	9.8666	13	0.9546
30	9.9582	12	0.9954	30	9.9122	12	0.9799	30	9.8652	13	0.9537
40	9.9570	13	0.9951	40	9.9110	13	0.9793	40	9.8639	13	0.9528
50	9.9557	13	0.9948	50	9.9097	13	0.9788	50	9.8626	13	0.9520

* für negative Declinationen hat man den angegebenen Werth von log tg p/2 von 1 zu subtrahiren

$$\log \operatorname{tg} \frac{90^\circ + \delta}{2} = 1 - \log \operatorname{tg} \frac{90^\circ - \delta}{2}$$

Decl.	log tg ½	d	cos c	Decl.	log tg ½	d	cos c	Decl.	log tg ½	d	cos c
18 0	9.8613	14	0.9511	24 0	9.8125	14	0.9136	30 0	9.7614	14	0.8660
10	9.8599	13	0.9502	10	9.8111	14	0.9124	10	9.7600	15	0.8646
20	9.8586	13	0.9492	20	9.8097	13	0.9112	20	9.7585	14	0.8631
30	9.8573	14	0.9483	30	9.8084	14	0.9100	30	9.7571	15	0.8616
40	9.8559	13	0.9474	40	9.8070	14	0.9088	40	9.7556	15	0.8602
50	9.8546	14	0.9465	50	9.8056	14	0.9075	50	9.7541	15	0.8587
19 0	9.8533	13	0.9455	25 0	9.8042	14	0.9063	31 0	9.7526	15	0.8572
10	9.8519	14	0.9446	10	9.8028	14	0.9051	10	9.7512	14	0.8557
20	9.8506	13	0.9436	20	9.8014	14	0.9039	20	9.7497	16	0.8542
30	9.8493	13	0.9426	30	9.8000	14	0.9026	30	9.7483	14	0.8526
40	9.8479	14	0.9417	40	9.7986	14	0.9013	40	9.7467	16	0.8511
50	9.8466	13	0.9407	50	9.7972	14	0.9001	50	9.7452	15	0.8496
20 0	9.8452	14	0.9397	26 0	9.7958	14	0.8988	32 0	9.7438	14	0.8481
10	9.8439	13	0.9387	10	9.7944	14	0.8975	10	9.7423	15	0.8465
20	9.8425	14	0.9377	20	9.7930	14	0.8962	20	9.7408	15	0.8450
30	9.8412	13	0.9367	30	9.7916	14	0.8949	30	9.7393	15	0.8434
40	9.8398	14	0.9357	40	9.7902	14	0.8936	40	9.7378	15	0.8418
50	9.8385	13	0.9346	50	9.7887	15	0.8923	50	9.7363	15	0.8403
21 0	9.8371	13	0.9336	27 0	9.7873	14	0.8910	33 0	9.7348	15	0.8387
10	9.8358	14	0.9326	10	9.7859	14	0.8897	10	9.7333	16	0.8371
20	9.8344	13	0.9315	20	9.7845	14	0.8884	20	9.7317	15	0.8355
30	9.8331	14	0.9304	30	9.7831	14	0.8870	30	9.7302	15	0.8339
40	9.8317	14	0.9294	40	9.7816	15	0.8857	40	9.7287	15	0.8323
50	9.8303	13	0.9283	50	9.7802	14	0.8843	50	9.7272	15	0.8307
22 0	9.8290	14	0.9272	28 0	9.7788	14	0.8830	34 0	9.7257	16	0.8290
10	9.8276	13	0.9261	10	9.7773	14	0.8816	10	9.7241	15	0.8274
20	9.8263	14	0.9250	20	9.7759	14	0.8802	20	9.7226	15	0.8258
30	9.8249	14	0.9239	30	9.7745	15	0.8788	30	9.7211	15	0.8241
40	9.8235	14	0.9228	40	9.7730	14	0.8774	40	9.7196	15	0.8225
50	9.8222	13	0.9216	50	9.7716	15	0.8760	50	9.7180	16	0.8208
23 0	9.8208	14	0.9205	29 0	9.7701	14	0.8746	35 0	9.7165	15	0.8192
10	9.8194	14	0.9194	10	9.7687	14	0.8732	10	9.7149	16	0.8175
20	9.8180	14	0.9182	20	9.7673	15	0.8718	20	9.7134	15	0.8158
30	9.8167	13	0.9171	30	9.7658	14	0.8704	30	9.7118	16	0.8141
40	9.8153	14	0.9159	40	9.7644	15	0.8689	40	9.7103	15	0.8124
50	9.8139	14	0.9147	50	9.7629	15	0.8675	50	9.7087	16	0.8107

Decl.	log tg ½	d	cos δ	Decl.	log tg ½	d	cos δ	Decl.	log tg ½	d	cos δ
36 0	9.7072	16	0.8092	42 0	9.6486	17	0.7431	48 0	9.5842	19	0.6691
10	9.7056	16	0.8073	10	9.6469	17	0.7412	10	9.5823	19	0.6670
20	9.7040	15	0.8056	20	9.6452	17	0.7392	20	9.5804	19	0.6648
30	9.7025	16	0.8039	30	9.6435	17	0.7373	30	9.5785	19	0.6626
40	9.7009	16	0.8021	40	9.6417	18	0.7353	40	9.5766	19	0.6604
50	9.6993	16	0.8004	50	9.6400	17	0.7333	50	9.5747	20	0.6582
37 0	9.6977	15	0.7986	43 0	9.6383	17	0.7314	49 0	9.5727	19	0.6561
1	9.6962	16	0.7969	10	9.6366	17	0.7294	10	9.5708	19	0.6539
20	9.6946	16	0.7951	20	9.6348	18	0.7274	20	9.5689	20	0.6517
30	9.6930	16	0.7934	30	9.6331	17	0.7254	30	9.5669	19	0.6495
40	9.6914	16	0.7916	40	9.6314	17	0.7234	40	9.5650	20	0.6472
50	9.6898	16	0.7898	50	9.6296	18	0.7214	50	9.5630	19	0.6450
38 0	9.6882	16	0.7880	44 0	9.6279	17	0.7193	50 0	9.5611	20	0.6428
10	9.6866	16	0.7862	10	9.6261	18	0.7175	10	9.5591	20	0.6406
20	9.6850	16	0.7844	20	9.6243	18	0.7153	20	9.5571	20	0.6383
30	9.6834	17	0.7826	30	9.6226	17	0.7133	30	9.5551	20	0.6361
40	9.6817	16	0.7808	40	9.6201	18	0.7113	40	9.5531	19	0.6338
50	9.6801	16	0.7790	50	9.6190	18	0.7092	50	9.5512	21	0.6316
39 0	9.6785	16	0.7772	45 0	9.6172	18	0.7071	51 0	9.5491	20	0.6293
10	9.6769	16	0.7753	10	9.6154	18	0.7051	10	9.5471	20	0.6271
20	9.6752	17	0.7735	20	9.6136	18	0.7030	20	9.5451	20	0.6248
30	9.6736	16	0.7716	30	9.6118	18	0.7009	30	9.5431	20	0.6225
40	9.6720	17	0.7700	40	9.6100	18	0.6988	40	9.5411	20	0.6202
50	9.6703	16	0.7679	50	9.6082	18	0.6968	50	9.5390	20	0.6180
40 0	9.6687	16	0.7660	46 0	9.6064	18	0.6947	52 0	9.5370	21	0.6157
10	9.6670	17	0.7642	10	9.6046	18	0.6926	10	9.5349	20	0.6134
20	9.6654	16	0.7623	20	9.6028	18	0.6905	20	9.5329	21	0.6111
30	9.6637	17	0.7604	30	9.6009	19	0.6884	30	9.5308	21	0.6088
40	9.6620	17	0.7585	40	9.5991	18	0.6862	40	9.5287	21	0.6065
50	9.6604	16	0.7566	50	9.5972	19	0.6841	50	9.5266	21	0.6041
41 0	9.6587	17	0.7547	47 0	9.5954	18	0.6820	53 0	9.5245	21	0.6018
10	9.6570	17	0.7528	10	9.5935	19	0.6799	10	9.5224	21	0.5995
20	9.6553	17	0.7509	20	9.5917	18	0.6777	20	9.5203	21	0.5972
30	9.6537	16	0.7489	30	9.5898	19	0.6756	30	9.5182	21	0.5948
40	9.6520	17	0.7470	40	9.5879	18	0.6734	40	9.5161	22	0.5926
50	9.6503	17	0.7451	50	9.5861	18	0.6713	50	9.5139		0.5903

Decl	log tg ½	d	cos d	Decl.	log tg ½	d.	cos d	Decl	log tg ½	d	cos d.
54. 0	9. 5118	22	0.5878	60 0	9.4281	26	0.5000	66 0	9.3275	31	0.4067
10	9. 5096	21	0.5857	10	9.4265	25	0.4975	10	9.3244	32	0.4041
20	9. 5075	22	0.5831	20	9.4230	26	0.4950	20	9.3212	31	0.4014
30	9. 5053	22	0.5807	30	9.4204	26	0.4924	30	9.3181	32	0.3988
40	9. 5031	23	0.5783	40	9.4178	25	0.4899	40	9.3149	33	0.3961
50	9. 5009	23	0.5760	50	9.4153	26	0.4874	50	0.3117	32	0.3934
55 0	9. 4987	22	0.5736	61 0	9.4127	26	0.4848	67 0	9.3085	33	0.3907
10	9. 4965	23	0.5713	10	9.4100	27	0.4822	10	9.3052	34	388 4
20	9. 4943	24	0.5688	20	9.4074	26	0.4797	20	9.3020	33	0.3854
30	9. 4921	23	0.5664	30	9.4048	26	0.4772	30	9.2987	34	0.3827
40	9. 4898	23	0.5640	40	9.4021	27	0.4746	40	9.2953	34	0.3800
50	9. 4876	22	0.5616	50	9.3995	26	0.4720	50	9.2920	33	0.3773
56 0	9. 4853	23	0.5593	62 0	9.3968	27	0.4695	63 0	9.2887	33	0.3746
10	9. 4831	23	0.5568	10	9.3941	27	0.4669	10	9.2853	34	0.3719
20	9. 4808	23	0.5544	20	9.3914	28	0.4643	20	9.2819	35	0.3693
30	9. 4785	23	0.5520	30	9.3886	27	0.4618	30	9.2784	34	0.3666
40	9. 4762	23	0.5496	40	9.3859	27	0.4592	40	9.2750	35	0.3638
50	9. 4739	23	0.5471	50	9.3831	28	0.4566	50	9.2715	35	0.3611
57 0	9. 4716	23	0.5446	63 0	9.3804	27	0.4540	69 0	9.2680	36	0.3584
10	9. 4693	24	0.5422	10	9.3776	28	0.4514	10	9.2644	36	0.3557
20	9. 4669	23	0.5397	20	9.3748	28	0.4488	20	9.2609	35	0.3529
30	9. 4646	24	0.5373	30	9.3719	29	0.4463	30	9.2573	36	0.3502
40	9. 4622	24	0.5348	40	9.3691	28	0.4436	40	9.2536	37	0.3475
50	9. 4599	24	0.5324	50	9.3662	29	0.4410	50	9.2500	36	0.3448
58 0	9. 4575	24	0.5299	64 0	9.3634	29	0.4384	70 0	9.2463	37	0.3420
10	9. 4551	24	0.5275	10	9.3606	29	0.4358	10	9.2426	37	0.3393
20	9. 4527	24	0.5250	20	9.3576	30	0.4331	20	9.2389	38	0.3366
30	9. 4503	24	0.5226	30	9.3546	29	0.4305	30	9.2351	38	0.3338
40	9. 4479	25	0.5200	40	9.3517	30	0.4279	40	9.2313	38	0.3311
50	9. 4454	24	0.5175	50	9.3488	30	0.4253	50	9.2275	38	0.3283
59 0	9. 4430	25	0.5150	65 0	9.3458	29	0.4226	71 0	9.2236	39	0.3256
10	9. 4406	24	0.5125	10	9.3428	30	0.4200	10	9.2197	39	0.3228
20	9. 4381	25	0.5101	20	9.3397	31	0.4173	20	9.2158	40	0.3201
30	9. 4356	25	0.5075	30	9.3367	30	0.4147	30	9.2118	40	0.3173
40	9. 4331	25	0.5050	40	9.3337	31	0.4120	40	9.2078	40	0.3145
50	9. 4306	25	0.5025	50	9.3306		0.4094	50	9.2038		0.3118

Decl	log tg $\frac{p}{2}$	d	cosd	Decl	log tg $\frac{p}{2}$	d	cosd	Decl	log tg $\frac{p}{2}$	d	cosd
72 0	9.1997	41	0.3090	78 0	9.0216	61	0.2079	84 0	8.7194	123	0.1045
10	9.1956	41	0.3063	10	9.0855	62	0.2051	10	8.7071	126	0.1016
20	9.1915	42	0.3035	20	9.0093	63	0.2022	20	8.6945	130	0.0987
30	9.1873	42	0.3007	30	9.0030	64	0.1994	30	8.6815	133	0.0959
40	9.1831	43	0.2979	40	8.9966	65	0.1965	40	8.6682	139	0.0930
50	9.1788	43	0.2952	50	8.9901	66	0.1937	50	8.6543	142	0.0901
73 0	9.1745	43	0.2924	79 0	8.9836	67	0.1908	85 0	8.6404	147	0.0872
10	9.1702	44	0.2896	10	8.9769	68	0.1880	10	8.6254	153	0.0843
20	9.1658	45	0.2868	20	8.9701	69	0.1851	20	8.6101	158	0.0814
30	9.1613	44	0.2840	30	8.9633	70	0.1822	30	8.5943	164	0.0786
40	9.1569	45	0.2812	40	8.9563	71	0.1794	40	8.5779	171	0.0756
50	9.1524	46	0.2784	50	8.9492	72	0.1765	50	8.5608	177	0.0723
74 0	9.1478	46	0.2756	80 0	8.9420	74	0.1738	86 0	8.5431	185	0.0698
10	9.1432	47	0.2728	10	8.9346	77	0.1708	10	8.5246	193	0.0669
20	9.1385	47	0.2700	20	8.9272	76	0.1679	20	8.5053	202	0.0640
30	9.1338	47	0.2672	30	8.9196	78	0.1650	30	8.4851	213	0.0611
40	9.1291	48	0.2644	40	8.9118	78	0.1622	40	8.4638	223	0.0581
50	9.1243	48	0.2613	50	8.9040	80	0.1593	50	8.4416	233	0.0552
75 0	9.1194	49	0.2588	81 0	8.8960	82	0.1564	87 0	8.4181	249	0.0523
10	9.1145	49	0.2560	10	8.8878	83	0.1536	10	8.3972	263	0.0494
20	9.1096	51	0.2532	20	8.8795	84	0.1507	20	8.3669	281	0.0465
30	9.1045	50	0.2504	30	8.8711	87	0.1478	30	8.3389	300	0.0436
40	9.0995	52	0.2476	40	8.8624	86	0.1449	40	8.3089	322	0.0407
50	9.0943	52	0.2447	50	8.8536	90	0.1421	50	8.2767	349	0.0378
76 0	9.0891	52	0.2419	82 0	8.8446	91	0.1392	88 0	8.2419	378	0.0349
10	9.0839	52	0.2391	10	8.8355	94	0.1363	10	8.2041	414	0.0320
20	9.0786	53	0.2363	20	8.8261	95	0.1334	20	8.1627	457	0.0291
30	9.0732	54	0.2335	30	8.8161	99	0.1305	30	8.1170	512	0.0260
40	9.0678	54	0.2306	40	8.8067	100	0.1275	40	8.0658	580	0.0233
50	9.0623	56	0.2278	50	8.7958	102	0.1248	50	8.0078	666	0.0205
77 0	9.0567	57	0.2250	83 0	8.7865	105	0.1219	89 0	7.9409	792	0.0175
10	9.0510	57	0.2221	10	8.7760	108	0.1190	10	7.8617	969	0.0145
20	9.0453	57	0.2193	20	8.7652	110	0.1161	20	7.7648	1250	0.0116
30	9.0395	58	0.2164	30	8.7542	113	0.1132	30	7.6398	1761	0.0087
40	9.0336	59	0.2136	40	8.7429	116	0.1103	40	7.4637	3010	0.0058
50	9.0277	59	0.2108	50	8.7313	119	0.1074	50	7.1627		0.0029