

APPENDIX.

BESSEL'S REFRACTION TABLES

MODIFIED

AND

EXPANDED.

Tables I, II, III, IV, V, are constructed from Bessel's Tables, (*Tabulæ Regiomontanae*, page 538, &c.,) on the supposition that the reading of the Thermometer attached to the Barometer is the same as that of the Exterior Thermometer : a supposition which, in an Observatory, can never lead to sensible error. The form of the Tables is altered so as to dispense with multiplication, to require no attention to signs, and to avoid reference to any other book.

The formula for use is

$$\begin{aligned} \text{Log. refraction in seconds} &= \text{B from Table I.} \\ &+ \text{T from Table II.} \\ &+ \text{Z from Table III.} \\ &+ \text{t from Table IV.} \\ &+ \text{b from Table V.} \end{aligned}$$

the three last numbers being taken at the same opening.

EXAMPLE.—To find the Refraction for Zenith Distance $83^{\circ}.22'$, the Barometer reading being 29.63, and the Thermometer $58^{\circ}.1$.

$$\begin{aligned} \text{B from Table I.} &= 0.02749 \\ \text{T from Table II.} &= 0.03410 \\ \text{Z from Table III.} &= 2.59038 \\ \text{t from Table IV.} &= 267 \\ \text{b from Table V.} &= 22 \\ \hline \text{Log. refraction} &= 2.65486 \\ \hline \text{Refraction} &= 451'''.71 \end{aligned}$$

The calculation by the tables of the *Tabulæ Regiomontanae* is as follows :—

$$\begin{aligned} \text{Bessel's log. } B &= + .00049 \\ \text{log. } T &= - .00101 \\ \text{log. } B + \text{log. } T &= - .00052; A = 1.0081; A \times (\text{log. } B + \text{log. } T) = -0.00052 \\ \gamma &= - .00789; \lambda = 1.0821; \lambda \times \text{log. } \gamma = -0.00852 \\ &= -0.00904 \\ \text{log. } a &= 1.72946 \\ &= 1.72042 \\ \text{log. tan. Zen. Dist.} &= 0.93444 \\ \hline \text{Sum} = \text{log. refraction} &= 2.65486 \end{aligned}$$

Tables VI, VII, VIII, IX, are merely an expansion of Bessel's Tables, intended for computing refractions at Zenith Distances greater than 85° , and not exceeding $88^{\circ}.20'$.

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BESSEL'S REFRACTION TABLES.

TABLE I.
Argument—Reading of Barometer in English Inches.

Barom.	B.	Diff.	Barom.	B.	Diff.	Barom.	B.	Diff.	Barom.	B.	Diff.	Barom.	B.	Diff.
in.			in.			in.			in.			in.		
27.90	0.00136	15	28.52	0.01090	15	29.14	0.02025	15	29.76	0.02939	15	30.38	0.03834	14
.91	0.00152	16	.53	0.01106	16	.15	0.02040	15	.77	0.02953	14	.39	0.03849	15
.92	0.00167	15	.54	0.01121	15	.16	0.02054	14	.78	0.02968	15			
.93	0.00183	16	.55	0.01136	15	.17	0.02069	15	.79	0.02982	14	30.40	0.03863	14
.94	0.00198	15	.56	0.01151	15	.18	0.02084	15				.41	0.03877	14
.95	0.00214	16	.57	0.01166	15	.19	0.02099	15	29.80	0.02997	15	.42	0.03892	15
.96	0.00229	15	.58	0.01182	16				.81	0.03012	15	.43	0.03906	14
.97	0.00245	16	.59	0.01197	15	29.20	0.02114	15	.82	0.03026	14	.44	0.03920	14
.98	0.00260	15				.21	0.02129	15	.83	0.03041	15	.45	0.03935	15
.99	0.00276	16	28.60	0.01212	15	.22	0.02144	15	.84	0.03055	14	.46	0.03949	14
			.61	0.01227	15	.23	0.02158	14	.85	0.03070	15	.47	0.03963	14
28.00	0.00291	15	.62	0.01242	15	.24	0.02173	15	.86	0.03085	15	.48	0.03977	14
.01	0.00307	16	.63	0.01258	16	.25	0.02188	15	.87	0.03099	14	.49	0.03992	15
.02	0.00322	15	.64	0.01273	15	.26	0.02203	15	.88	0.03114	15			
.03	0.00338	16	.65	0.01288	15	.27	0.02218	15	.89	0.03128	14	30.50	0.04006	14
.04	0.00353	15	.66	0.01303	15	.28	0.02232	14				.51	0.04020	14
.05	0.00369	16	.67	0.01318	15	.29	0.02247	15	29.90	0.03143	15	.52	0.04034	14
.06	0.00384	15	.68	0.01334	16				.91	0.03158	15	.53	0.04049	15
.07	0.00400	16	.69	0.01349	15	29.30	0.02262	15	.92	0.03172	14	.54	0.04063	14
.08	0.00415	15				.31	0.02277	15	.93	0.03187	15	.55	0.04077	14
.09	0.00431	16	28.70	0.01364	15	.32	0.02292	15	.94	0.03201	14	.56	0.04091	14
			.71	0.01379	15	.33	0.02306	14	.95	0.03216	15	.57	0.04105	14
28.10	0.00446	15	.72	0.01394	15	.34	0.02321	15	.96	0.03230	14	.58	0.04120	15
.11	0.00462	16	.73	0.01409	15	.35	0.02336	15	.97	0.03245	15	.59	0.04134	14
.12	0.00477	15	.74	0.01424	15	.36	0.02351	15	.98	0.03259	14			
.13	0.00493	16	.75	0.01440	16	.37	0.02366	15	.99	0.03274	15	30.60	0.04148	14
.14	0.00508	15	.76	0.01455	15	.38	0.02380	14				.61	0.04162	14
.15	0.00524	16	.77	0.01470	15	.39	0.02395	15	30.00	0.03288	14	.62	0.04176	14
.16	0.00539	15	.78	0.01485	15				.01	0.03302	14	.63	0.04190	14
.17	0.00555	16	.79	0.01500	15	29.40	0.02410	15	.02	0.03317	15	.64	0.04204	14
.18	0.00570	15				.41	0.02425	15	.03	0.03331	14	.65	0.04219	15
.19	0.00586	16	28.80	0.01515	15	.42	0.02440	15	.04	0.03346	15	.66	0.04233	14
			.81	0.01530	15	.43	0.02454	14	.05	0.03360	14	.67	0.04247	14
28.20	0.00601	15	.82	0.01545	15	.44	0.02469	15	.06	0.03374	14	.68	0.04261	14
.21	0.00616	15	.83	0.01560	15	.45	0.02484	15	.07	0.03389	15	.69	0.04275	14
.22	0.00632	16	.84	0.01575	15	.46	0.02499	15	.08	0.03403	14			
.23	0.00647	15	.85	0.01590	15	.47	0.02514	15	.09	0.03418	15	30.70	0.04289	14
.24	0.00662	15	.86	0.01605	15	.48	0.02528	14				.71	0.04303	14
.25	0.00678	16	.87	0.01620	15	.49	0.02543	15	30.10	0.03432	14	.72	0.04317	14
.26	0.00693	15	.88	0.01635	15				.11	0.03446	14	.73	0.04332	15
.27	0.00708	15	.89	0.01650	15	29.50	0.02558	15	.12	0.03461	15	.74	0.04346	14
.28	0.00723	15				.51	0.02573	15	.13	0.03475	14	.75	0.04360	14
.29	0.00739	16	28.90	0.01665	15	.52	0.02587	14	.14	0.03490	15	.76	0.04374	14
			.91	0.01680	15	.53	0.02602	15	.15	0.03504	14	.77	0.04388	14
28.30	0.00754	15	.92	0.01695	15	.54	0.02617	15	.16	0.03518	14	.78	0.04403	15
.31	0.00769	15	.93	0.01710	15	.55	0.02631	14	.17	0.03533	15	.79	0.04417	14
.32	0.00785	16	.94	0.01725	15	.56	0.02646	15	.18	0.03547	14			
.33	0.00800	15	.95	0.01740	15	.57	0.02661	15	.19	0.03562	15	30.80	0.04431	14
.34	0.00815	15	.96	0.01755	15	.58	0.02676	15				.81	0.04445	14
.35	0.00831	16	.97	0.01770	15	.59	0.02690	14	30.20	0.03576	14	.82	0.04459	14
.36	0.00846	15	.98	0.01785	15				.21	0.03590	14	.83	0.04473	14
.37	0.00861	15	.99	0.01800	15	29.60	0.02705	15	.22	0.03605	15	.84	0.04487	14
.38	0.00876	15				.61	0.02720	15	.23	0.03619	14	.85	0.04501	14
.39	0.00892	16	29.00	0.01815	15	.62	0.02734	14	.24	0.03634	15	.86	0.04515	14
			.01	0.01830	15	.63	0.02749	15	.25	0.03648	14	.87	0.04529	14
28.40	0.00907	15	.02	0.01845	15	.64	0.02763	14	.26	0.03662	14	.88	0.04543	14
.41	0.00922	15	.03	0.01860	15	.65	0.02778	15	.27	0.03677	15	.89	0.04557	14
.42	0.00938	16	.04	0.01875	15	.66	0.02793	15	.28	0.03691	14			
.43	0.00953	15	.05	0.01890	15	.67	0.02807	14	.29	0.03706	15	30.90	0.04571	14
.44	0.00968	15	.06	0.01905	15	.68	0.02822	15				.91	0.04585	14
.45	0.00984	16	.07	0.01920	15	.69	0.02836	14	30.30	0.03720	14	.92	0.04599	14
.46	0.00999	15	.08	0.01935	15				.31	0.03734	14	.93	0.04613	14
.47	0.01014	15	.09	0.01950	15	29.70	0.02851	15	.32	0.03749	15	.94	0.04627	14
.48	0.01029	15				.71	0.02866	15	.33	0.03763	14	.95	0.04642	15
.49	0.01045	16	29.10	0.01965	15	.72	0.02880	14	.34	0.03777	14	.96	0.04656	14
			.11	0.01980	15	.73	0.02895	15	.35	0.03792	15	.97	0.04670	14
28.50	0.01060	15	.12	0.01995	15	.74	0.02909	14	.36	0.03806	14	.98	0.04684	14
.51	0.01075	15	.13	0.02010	15	.75	0.02924	15	.37	0.03820	14	.99	0.04698	14
.52	0.01090	15	.14	0.02025	15	.76	0.02939	15	.38	0.03834	14	31.00	0.04712	14

BESSEL'S REFRACTION TABLES.

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TABLE II.
Argument—Reading of Exterior Thermometer in Degrees of Fahrenheit.

Therm.	T.	Diff.	Therm.	T.	Diff.	Therm.	T.	Diff.	Therm.	T.	Diff.	Therm.	T.	Diff.
5° 0	0° 08295		12° 2	0° 07603	9	19° 4	0° 06919	9	26° 6	0° 06247	9	33° 8	0° 05584	9
1	0° 08285	10	3	0° 07593	10	5	0° 06909	10	7	0° 06238	9	9	0° 05574	10
2	0° 08275	10	4	0° 07584	9	6	0° 06899	10	8	0° 06228	10			
3	0° 08265	10	5	0° 07574	10	7	0° 06890	9	9	0° 06219	9	34° 0	0° 05565	9
4	0° 08256	9	6	0° 07564	10	8	0° 06880	10				1	0° 05556	9
5	0° 08246	10	7	0° 07554	10	9	0° 06871	9	27° 0	0° 06210	9	2	0° 05547	9
6	0° 08236	10	8	0° 07545	9				1	0° 06200	10	3	0° 05538	9
7	0° 08227	9	9	0° 07536	9	20° 0	0° 06861	10	2	0° 06191	9	4	0° 05529	9
8	0° 08217	10				1	0° 06852	9	3	0° 06182	9	5	0° 05519	10
9	0° 08207	10	13° 0	0° 07526	10	2	0° 06843	9	4	0° 06173	9	6	0° 05510	9
			1	0° 07517	9	3	0° 06833	10	5	0° 06163	10	7	0° 05501	9
6° 0	0° 08198	9	2	0° 07507	10	4	0° 06824	9	6	0° 06154	9	8	0° 05492	9
1	0° 08188	10	3	0° 07498	9	5	0° 06815	9	7	0° 06145	9	9	0° 05483	9
2	0° 08178	10	4	0° 07488	10	6	0° 06806	9	8	0° 06135	10			
3	0° 08169	9	5	0° 07478	10	7	0° 06797	9	9	0° 06126	9	35° 0	0° 05473	10
4	0° 08159	10	6	0° 07469	9	8	0° 06788	9				1	0° 05464	9
5	0° 08150	9	7	0° 07459	10	9	0° 06778	10	28° 0	0° 06117	9	2	0° 05455	9
6	0° 08140	10	8	0° 07450	9				1	0° 06108	9	3	0° 05446	9
7	0° 08131	9	9	0° 07440	10	21° 0	0° 06769	9	2	0° 06098	10	4	0° 05437	9
8	0° 08121	10				1	0° 06760	9	3	0° 06089	9	5	0° 05428	9
9	0° 08111	10	14° 0	0° 07430	10	2	0° 06750	10	4	0° 06080	9	6	0° 05419	9
			1	0° 07421	9	3	0° 06741	9	5	0° 06071	9	7	0° 05410	9
7° 0	0° 08102	9	2	0° 07412	9	4	0° 06732	9	6	0° 06062	9	8	0° 05401	9
1	0° 08092	10	3	0° 07402	10	5	0° 06722	10	7	0° 06053	9	9	0° 05392	9
2	0° 08082	10	4	0° 07393	9	6	0° 06713	9	8	0° 06043	10			
3	0° 08073	9	5	0° 07384	9	7	0° 06703	10	9	0° 06034	9	36° 0	0° 05383	9
4	0° 08063	10	6	0° 07374	10	8	0° 06694	9				1	0° 05374	9
5	0° 08053	10	7	0° 07364	10	9	0° 06685	9	29° 0	0° 06025	9	2	0° 05364	10
6	0° 08044	9	8	0° 07354	10				1	0° 06016	9	3	0° 05355	9
7	0° 08034	10	9	0° 07345	9	22° 0	0° 06675	10	2	0° 06006	10	4	0° 05346	9
8	0° 08024	10				1	0° 06666	9	3	0° 05997	9	5	0° 05337	9
9	0° 08015	9	15° 0	0° 07335	10	2	0° 06657	9	4	0° 05988	9	6	0° 05328	9
			1	0° 07326	9	3	0° 06647	10	5	0° 05979	9	7	0° 05319	9
8° 0	0° 08005	10	2	0° 07317	9	4	0° 06638	9	6	0° 05969	10	8	0° 05310	9
1	0° 07995	10	3	0° 07307	10	5	0° 06629	9	7	0° 05960	9	9	0° 05301	9
2	0° 07986	9	4	0° 07298	9	6	0° 06620	9	8	0° 05951	9			
3	0° 07976	10	5	0° 07289	9	7	0° 06610	10	9	0° 05941	10	37° 0	0° 05292	9
4	0° 07966	10	6	0° 07279	10	8	0° 06601	9				1	0° 05283	9
5	0° 07957	9	7	0° 07269	10	9	0° 06592	9	30° 0	0° 05932	9	2	0° 05274	9
6	0° 07948	9	8	0° 07259	9				1	0° 05923	9	3	0° 05264	10
7	0° 07938	10	9	0° 07250	10	23° 0	0° 06582	10	2	0° 05914	9	4	0° 05255	9
8	0° 07928	10				1	0° 06573	9	3	0° 05904	10	5	0° 05246	9
9	0° 07918	10	16° 0	0° 07241	9	2	0° 06564	9	4	0° 05895	9	6	0° 05237	9
			1	0° 07231	10	3	0° 06554	10	5	0° 05886	9	7	0° 05228	9
9° 0	0° 07909	9	2	0° 07222	9	4	0° 06545	9	6	0° 05877	9	8	0° 05219	9
1	0° 07900	9	3	0° 07212	10	5	0° 06535	10	7	0° 05868	9	9	0° 05210	9
2	0° 07890	10	4	0° 07203	9	6	0° 06526	9	8	0° 05859	9			
3	0° 07880	10	5	0° 07193	10	7	0° 06517	9	9	0° 05849	10	38° 0	0° 05201	9
4	0° 07870	10	6	0° 07184	9	8	0° 06507	10				1	0° 05192	9
5	0° 07861	9	7	0° 07174	10	9	0° 06498	9	31° 0	0° 05840	9	2	0° 05183	9
6	0° 07852	9	8	0° 07165	9				1	0° 05831	9	3	0° 05174	9
7	0° 07842	10	9	0° 07155	10	24° 0	0° 06488	10	2	0° 05822	9	4	0° 05164	10
8	0° 07832	10				1	0° 06479	9	3	0° 05813	9	5	0° 05155	9
9	0° 07822	10	17° 0	0° 07146	9	2	0° 06470	9	4	0° 05803	10	6	0° 05146	9
			1	0° 07136	10	3	0° 06461	9	5	0° 05794	9	7	0° 05137	9
10° 0	0° 07813	9	2	0° 07127	9	4	0° 06451	10	6	0° 05785	9	8	0° 05128	9
1	0° 07804	9	3	0° 07118	9	5	0° 06442	9	7	0° 05776	9	9	0° 05119	9
2	0° 07794	10	4	0° 07108	10	6	0° 06433	9	8	0° 05767	9			
3	0° 07784	10	5	0° 07099	9	7	0° 06423	10	9	0° 05757	10	39° 0	0° 05110	9
4	0° 07774	10	6	0° 07089	10	8	0° 06414	9				1	0° 05101	9
5	0° 07765	9	7	0° 07080	9	9	0° 06405	9	32° 0	0° 05748	9	2	0° 05092	9
6	0° 07756	9	8	0° 07071	9				1	0° 05739	9	3	0° 05083	9
7	0° 07746	9	9	0° 07061	10	25° 0	0° 06396	9	2	0° 05729	10	4	0° 05074	9
8	0° 07736	10				1	0° 06386	10	3	0° 05721	8	5	0° 05065	9
9	0° 07727	9	18° 0	0° 07052	9	2	0° 06377	9	4	0° 05712	9	6	0° 05055	10
			1	0° 07043	10	3	0° 06368	9	5	0° 05702	10	7	0° 05046	9
11° 0	0° 07717	10	2	0° 07033	9	4	0° 06358	10	6	0° 05693	9	8	0° 05037	9
1	0° 07708	9	3	0° 07023	10	5	0° 06349	9	7	0° 05684	9	9	0° 05028	9
2	0° 07698	10	4	0° 07014	9	6	0° 06340	9	8	0° 05675	9			
3	0° 07688	10	5	0° 07004	10	7	0° 06331	9	9	0° 05666	9	40° 0	0° 05019	9
4	0° 07679	9	6	0° 06995	9	8	0° 06321	10				1	0° 05010	9
5	0° 07669	10	7	0° 06985	10	9	0° 06312	9	33° 0	0° 05656	10	2	0° 05001	9
6	0° 07660	9	8	0° 06976	9				1	0° 05647	9	3	0° 04992	9
7	0° 07650	10	9	0° 06966	10	26° 0	0° 06303	9	2	0° 05638	9	4	0° 04983	9
8	0° 07640	10				1	0° 06293	10	3	0° 05629	9	5	0° 04974	9
9	0° 07631	9	19° 0	0° 06957	9	2	0° 06284	9	4	0° 05620	9	6	0° 04965	9
			1	0° 06947	10	3	0° 06275	9	5	0° 05611	9	7	0° 04956	9
12° 0	0° 07621	10	2	0° 06938	9	4	0° 06265	10	6	0° 05602	9	8	0° 04947	9
1	0° 07612	9	3	0° 06928	10	5	0° 06256	9	7	0° 05593	9	9	0° 04938	9
2	0° 07603	9	4	0° 06919	9	6	0° 06247	9	8	0° 05584	9	41° 0	0° 04929	9

TABLE II—continued.
Argument—Reading of Exterior Thermometer in Degrees of Fahrenheit.

Therm.	T.	Diff.	Therm.	T.	Diff.	Therm.	T.	Diff.	Therm.	T.	Diff.	Therm.	T.	Diff.
41° 0	0° 04929	9	48° 2	0° 04284	9	55° 4	0° 03647	9	62° 6	0° 03019	9	69° 8	0° 02399	8
1	0° 04920	9	3	0° 04275	9	5	0° 03638	9	7	0° 03010	9	9	0° 02390	9
2	0° 04911	9	4	0° 04266	9	6	0° 03630	8	8	0° 03002	8			
3	0° 04902	9	5	0° 04257	9	7	0° 03621	9	9	0° 02993	9	70° 0	0° 02382	8
4	0° 04893	9	6	0° 04248	9	8	0° 03612	9		0° 02984	9	1	0° 02373	9
5	0° 04884	9	7	0° 04240	8	9	0° 03603	9	63° 0	0° 02976	8	2	0° 02365	8
6	0° 04875	9	8	0° 04231	9				1	0° 02967	9	3	0° 02356	9
7	0° 04866	9	9	0° 04222	9	56° 0	0° 03595	8	2	0° 02958	9	4	0° 02348	8
8	0° 04857	9				1	0° 03586	9	3	0° 02949	9	5	0° 02339	9
9	0° 04848	9	49° 0	0° 04213	9	2	0° 03577	9	4	0° 02941	8	6	0° 02330	9
			1	0° 04204	9	3	0° 03568	9	5	0° 02932	9	7	0° 02322	8
42° 0	0° 04839	9	2	0° 04195	9	4	0° 03559	9	6	0° 02923	9	8	0° 02313	9
1	0° 04830	9	3	0° 04186	9	5	0° 03550	9	7	0° 02915	8	9	0° 02305	8
2	0° 04821	9	4	0° 04177	9	6	0° 03541	9	8	0° 02906	9			
3	0° 04812	9	5	0° 04168	9	7	0° 03532	9	9			71° 0	0° 02296	9
4	0° 04803	9	6	0° 04160	8	8	0° 03523	9				1	0° 02288	8
5	0° 04794	9	7	0° 04151	9	9	0° 03514	9	64° 0	0° 02897	9	2	0° 02279	9
6	0° 04785	9	8	0° 04142	9				1	0° 02889	8	3	0° 02271	8
7	0° 04776	9	9	0° 04135	9	57° 0	0° 03505	9	2	0° 02880	9	4	0° 02262	9
8	0° 04767	9				1	0° 03496	9	3	0° 02872	8	5	0° 02254	8
9	0° 04758	9	50° 0	0° 04124	9	2	0° 03488	8	4	0° 02863	9	6	0° 02245	9
			1	0° 04115	9	3	0° 03479	9	5	0° 02854	9	7	0° 02237	8
43° 0	0° 04749	9	2	0° 04106	9	4	0° 03470	9	6	0° 02846	8	8	0° 02228	9
1	0° 04740	9	3	0° 04097	9	5	0° 03462	8	7	0° 02837	9	9	0° 02220	8
2	0° 04731	9	4	0° 04088	9	6	0° 03453	9	8	0° 02829	8			
3	0° 04722	9	5	0° 04079	9	7	0° 03444	9	9	0° 02820	9	72° 0	0° 02211	9
4	0° 04713	9	6	0° 04071	8	8	0° 03436	8				1	0° 02203	8
5	0° 04704	9	7	0° 04062	9	9	0° 03427	9	65° 0	0° 02812	8	2	0° 02194	9
6	0° 04695	9	8	0° 04053	9				1	0° 02803	9	3	0° 02186	8
7	0° 04686	9	9	0° 04044	9	58° 0	0° 03419	8	2	0° 02794	9	4	0° 02177	9
8	0° 04677	9				1	0° 03410	9	3	0° 02785	9	5	0° 02169	8
9	0° 04668	9	51° 0	0° 04035	9	2	0° 03401	9	4	0° 02777	8	6	0° 02160	9
			1	0° 04026	9	3	0° 03393	8	5	0° 02768	9	7	0° 02151	9
44° 0	0° 04659	9	2	0° 04017	9	4	0° 03384	7	6	0° 02759	9	8	0° 02143	8
1	0° 04650	9	3	0° 04009	8	5	0° 03375	9	7	0° 02751	8	9	0° 02134	9
2	0° 04641	9	4	0° 04000	9	6	0° 03367	8	8	0° 02742	9			
3	0° 04632	9	5	0° 03991	9	7	0° 03358	9	9	0° 02733	9	73° 0	0° 02126	8
4	0° 04623	9	6	0° 03982	9	8	0° 03349	9				1	0° 02117	9
5	0° 04614	9	7	0° 03973	9	9	0° 03340	9	66° 0	0° 02725	8	2	0° 02109	8
6	0° 04605	9	8	0° 03965	8				1	0° 02716	9	3	0° 02100	9
7	0° 04596	9	9	0° 03956	9	59° 0	0° 03332	8	2	0° 02707	9	4	0° 02092	8
8	0° 04587	9				1	0° 03323	9	3	0° 02699	8	5	0° 02083	9
9	0° 04578	9	52° 0	0° 03947	9	2	0° 03314	9	4	0° 02690	9	6	0° 02075	8
			1	0° 03938	9	3	0° 03306	8	5	0° 02682	8	7	0° 02066	9
45° 0	0° 04569	9	2	0° 03929	9	4	0° 03297	9	6	0° 02673	9	8	0° 02058	8
1	0° 04560	9	3	0° 03921	8	5	0° 03288	9	7	0° 02664	9	9	0° 02049	9
2	0° 04552	8	4	0° 03912	9	6	0° 03280	8	8	0° 02656	8			
3	0° 04543	9	5	0° 03903	9	7	0° 03271	9	9	0° 02647	9	74° 0	0° 02041	8
4	0° 04534	9	6	0° 03894	9	8	0° 03262	9				1	0° 02032	9
5	0° 04525	9	7	0° 03885	9	9	0° 03254	8	67° 0	0° 02639	8	2	0° 02024	8
6	0° 04516	9	8	0° 03876	9				1	0° 02630	9	3	0° 02015	9
7	0° 04507	9	9	0° 03867	9	60° 0	0° 03245	9	2	0° 02622	8	4	0° 02007	8
8	0° 04498	9				1	0° 03236	9	3	0° 02613	9	5	0° 01998	9
9	0° 04489	9	53° 0	0° 03858	9	2	0° 03228	8	4	0° 02604	9	6	0° 01990	8
			1	0° 03850	8	3	0° 03219	9	5	0° 02596	8	7	0° 01981	9
46° 0	0° 04480	9	2	0° 03841	9	4	0° 03210	9	6	0° 02587	9	8	0° 01973	8
1	0° 04471	9	3	0° 03832	9	5	0° 03201	9	7	0° 02579	8	9	0° 01964	9
2	0° 04462	9	4	0° 03823	9	6	0° 03193	8	8	0° 02570	9			
3	0° 04453	9	5	0° 03814	9	7	0° 03184	9	9	0° 02561	9	75° 0	0° 01956	8
4	0° 04444	9	6	0° 03805	9	8	0° 03175	9				1	0° 01948	8
5	0° 04435	9	7	0° 03797	8	9	0° 03167	8	68° 0	0° 02553	8	2	0° 01939	9
6	0° 04426	9	8	0° 03788	9				1	0° 02544	9	3	0° 01931	8
7	0° 04417	9	9	0° 03779	9	61° 0	0° 03158	9	2	0° 02536	8	4	0° 01922	9
8	0° 04408	9				1	0° 03149	9	3	0° 02527	9	5	0° 01914	8
9	0° 04400	8	54° 0	0° 03770	9	2	0° 03141	8	4	0° 02518	9	6	0° 01906	8
			1	0° 03762	8	3	0° 03132	9	5	0° 02510	8	7	0° 01897	9
47° 0	0° 04391	9	2	0° 03753	9	4	0° 03123	9	6	0° 02501	9	8	0° 01889	8
1	0° 04382	9	3	0° 03744	9	5	0° 03115	8	7	0° 02493	8	9	0° 01881	8
2	0° 04373	9	4	0° 03735	9	6	0° 03106	9	8	0° 02484	9			
3	0° 04364	9	5	0° 03726	9	7	0° 03097	9	9	0° 02475	9	76° 0	0° 01872	9
4	0° 04355	9	6	0° 03718	8	8	0° 03088	9				1	0° 01864	8
5	0° 04346	9	7	0° 03709	9	9	0° 03080	8	69° 0	0° 02467	8	2	0° 01855	9
6	0° 04337	9	8	0° 03700	9				1	0° 02458	9	3	0° 01847	8
7	0° 04328	9	9	0° 03691	9	62° 0	0° 03071	9	2	0° 02450	8	4	0° 01838	9
8	0° 04319	9				1	0° 03062	9	3	0° 02441	9	5	0° 01830	8
9	0° 04311	8	55° 0	0° 03683	8	2	0° 03054	8	4	0° 02433	8	6	0° 01821	9
			1	0° 03674	9	3	0° 03045	9	5	0° 02424	8	7	0° 01813	8
48° 0	0° 04302	9	2	0° 03665	9	4	0° 03036	9	6	0° 02416	8	8	0° 01804	9
1	0° 04293	9	3	0° 03656	9	5	0° 03028	8	7	0° 02407	9	9	0° 01796	8
2	0° 04284	9	4	0° 03647	9	6	0° 03019	9	8	0° 02399	8	77° 0	0° 01787	9

TABLE II.—*continued.*
Argument—Reading of Exterior Thermometer in Degrees of Fahrenheit.

Therm.	T.	Diff.	Therm.	T.	Diff.	Therm.	T.	Diff.	Therm.	T.	Diff.	Therm.	T.	Diff.
77° 0	0° 01787	9	80° 6	0° 01485	8	84° 1	0° 01192	8	87° 8	0° 00883	9	91° 4	0° 00586	9
1	01779	8	7	01476	9	2	01184	8	9	00875	8	5	00578	8
2	01770	9	8	01468	8	3	01175	8				6	00570	8
3	01762	8	9	01459	9	4	01167	8	88° 0	00867	8	7	00562	8
4	01753	9				5	01158	9	1	00859	8	8	00554	8
5	01745	8	81° 0	01451	8	6	01150	8	2	00850	9	9	00545	9
6	01736	9	1	01443	8	7	01142	8	3	00842	8			
7	01728	8	2	01434	9	8	01133	9	4	00834	8	92° 0	00537	8
8	01719	9	3	01426	8	9	01125	8	5	00826	8	1	00529	8
9	01711	8	4	01418	8				6	00818	8	2	00521	8
			5	01410	8	85° 0	01116	9	7	00809	9	3	00512	9
78° 0	01703	8	6	01401	9	1	01108	8	8	00801	8	4	00504	8
1	01694	9	7	01393	8	2	01100	8	9	00793	8	5	00496	8
2	01686	8	8	01385	8	3	01092	8				6	00487	9
3	01677	9	9	01376	9	4	01083	9	89° 0	00785	8	7	00479	8
4	01669	8				5	01075	8	1	00777	8	8	00471	8
5	01661	8	82° 0	01368	8	6	01067	8	2	00768	9	9	00463	8
6	01652	9	1	01360	8	7	01058	9	3	00760	8			
7	01644	8	2	01351	9	8	01050	8	4	00752	8	93° 0	00454	9
8	01635	9	3	01343	8	9	01042	8	5	00743	9	1	00446	8
9	01627	8	4	01334	9				6	00735	8	2	00438	8
			5	01326	8	86° 0	01034	8	7	00727	8	3	00430	8
79° 0	01619	8	6	01317	9	1	01025	9	8	00718	9	4	00422	8
1	01610	9	7	01309	8	2	01017	8	9	00710	8	5	00413	9
2	01602	8	8	01300	9	3	01009	8				6	00405	8
3	01594	8	9	01292	8	4	01000	9	90° 0	00702	8	7	00397	8
4	01585	9				5	00992	8	1	00694	8	8	00389	8
5	01577	8	83° 0	01283	9	6	00984	8	2	00685	9	9	00381	8
6	01568	9	1	01275	8	7	00975	9	3	00677	8			
7	01560	8	2	01267	8	8	00967	8	4	00669	8	94° 0	00372	9
8	01552	8	3	01258	9	9	00959	8	5	00660	9	1	00364	8
9	01543	9	4	01250	8				6	00652	8	2	00356	8
			5	01242	8	87° 0	00951	8	7	00644	8	3	00348	8
80° 0	01535	8	6	01233	9	1	00942	9	8	00636	8	4	00340	8
1	01527	8	7	01225	8	2	00934	8	9	00627	9	5	00331	9
2	01518	9	8	01217	8	3	00925	9				6	00323	8
3	01510	8	9	01209	8	4	00917	8	91° 0	00619	8	7	00315	8
4	01501	9				5	00909	8	1	00611	8	8	00307	8
5	01493	8	84° 0	01200	9	6	00900	9	2	00603	8	9	00299	8
6	01485	8	1	01192	8	7	00892	8	3	00595	8			
						8	00883	9	4	00586	9	95° 0	00290	9

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BESSEL'S REFRACTION TABLES.

TABLE III.

Argument—Apparent Zenith Distance.

Zen. Dist.	Z.	Diff. for 1'	Zen. Dist.	Z.	Diff. for 1'	Zen. Dist.	Z.	Diff. for 1'	Zen. Dist.	Z.	Diff. for 1'	Zen. Dist.	Z.	Diff. for 1'
0. 0	8° 8' 54.30		5. 40	0° 688' 20	131	15. 30	1° 13' 45.0	49	25. 20	1° 36' 67.0	32° 8	35. 10	1° 53' 92.1	26° 8
5	8° 8' 54.30		50	0° 700' 00	127	40	1° 13' 94.0	49	30	1° 36' 99.4	32° 4	20	1° 54' 188	26° 7
10	9° 1' 55.30	4771				50	1° 14' 42.0	48	40	1° 37' 31.8	32° 4	30	1° 54' 45.6	26° 8
15	9° 33' 14.0	3010	6. 0	0° 71' 32.0	123				50	1° 37' 64.1	32° 3	40	1° 54' 72.3	26° 7
20	9° 45' 6.30	2218	10	0° 72' 52.0	120	16. 0	1° 14' 90.0	48				50	1° 54' 98.8	26° 5
25	9° 55' 32.0	1761	20	0° 73' 68.0	116	10	1° 15' 38.0	47	26. 0	1° 37' 96.2	32° 1			
30	10° 6' 32.40	1462	30	0° 74' 82.0	114	20	1° 15' 85.0	47	10	1° 38' 28.2	32° 0	36. 0	1° 55' 25.4	26° 6
35	10° 6' 99.40	1250	40	0° 75' 93.0	111	30	1° 16' 31.0	46	20	1° 38' 60.0	31° 8	10	1° 55' 52.0	26° 6
40	10° 7' 57.40	1091	50	0° 77' 01.0	108	40	1° 16' 77.0	46	30	1° 38' 91.7	31° 7	20	1° 55' 78.3	26° 3
45	10° 8' 08.50	969				50	1° 17' 23.0	46	40	1° 39' 23.2	31° 5	30	1° 56' 04.8	26° 5
50	10° 8' 54.30	872	7. 0	0° 78' 07.0	106				50	1° 39' 54.7	31° 5	40	1° 56' 31.2	26° 4
55	10° 8' 57.0	792	10	0° 79' 10.0	103	17. 0	1° 17' 69.0	46				50	1° 56' 57.4	26° 2
			20	0° 80' 11.0	101	10	1° 18' 14.0	45	27. 0	1° 39' 86.0	31° 3			
1. 0	9° 9' 33.50	726	30	0° 81' 10.0	99	20	1° 18' 58.0	44	10	1° 40' 17.0	31° 0	37. 0	1° 56' 83.7	26° 3
5	9° 9' 68.30	669	40	0° 82' 06.0	96	30	1° 19' 02.0	44	20	1° 40' 48.1	31° 1	10	1° 57' 10.0	26° 3
10	9° 10' 00.40	619	50	0° 83' 01.0	95	40	1° 19' 46.0	44	30	1° 40' 79.0	30° 9	20	1° 57' 36.1	26° 1
15	9° 10' 30.20	581				50	1° 19' 90.0	44	40	1° 41' 09.7	30° 7	30	1° 57' 62.3	26° 2
20	9° 10' 58.50	546	8. 0	0° 83' 94.0	93				50	1° 41' 40.4	30° 7	40	1° 57' 88.4	26° 1
25	9° 10' 58.40	511	10	0° 84' 84.0	90	18. 0	1° 20' 33.0	43				50	1° 58' 14.4	26° 0
30	9° 10' 96.0	483	20	0° 85' 73.0	88	10	1° 20' 76.0	43	28. 0	1° 41' 70.8	30° 4			
35	9° 13' 31.0	458	30	0° 86' 61.0	85	20	1° 21' 18.0	42	10	1° 42' 01.3	30° 5	38. 0	1° 58' 40.5	26° 1
40	9° 15' 54.0	435	40	0° 87' 46.0	85	30	1° 21' 60.0	42	20	1° 42' 31.6	30° 3	10	1° 58' 66.5	26° 0
45	9° 17' 06.0	414	50	0° 88' 30.0	84	40	1° 22' 02.0	42	30	1° 42' 61.7	30° 1	20	1° 58' 92.4	25° 9
50	9° 19' 08.0	396				50	1° 22' 44.0	42	40	1° 42' 91.8	30° 1	30	1° 59' 18.4	26° 0
55	9° 21' 62.0	378	9. 0	0° 89' 13.0	83				50	1° 43' 21.7	29° 9	40	1° 59' 44.3	25° 9
			10	0° 89' 94.0	81	19. 0	1° 22' 85.0	41				50	1° 59' 70.0	25° 7
2. 0	9° 23' 46.0	362	20	0° 90' 73.0	79	10	1° 23' 26.0	41	29. 0	1° 43' 51.5	29° 8			
5	9° 25' 24.0	348	30	0° 91' 52.0	79	20	1° 23' 66.0	40	10	1° 43' 81.3	29° 8	39. 0	1° 59' 95.9	25° 9
10	9° 26' 94.0	334	40	0° 92' 28.0	76	30	1° 24' 06.0	40	20	1° 44' 10.9	29° 6	10	1° 60' 21.6	25° 7
15	9° 28' 58.0	323	50	0° 93' 04.0	76	40	1° 24' 46.0	40	30	1° 44' 40.4	29° 5	20	1° 60' 47.4	25° 8
20	9° 30' 17.0	311				50	1° 24' 86.0	40	40	1° 44' 69.7	29° 3	30	1° 60' 73.0	25° 6
25	9° 31' 09.0	300	10. 0	0° 93' 79.0	75				50	1° 44' 99.1	29° 4	40	1° 60' 98.8	25° 8
30	9° 33' 17.0	290	10	0° 94' 52.0	73	20. 0	1° 25' 26.0	40				50	1° 61' 24.4	25° 6
35	9° 34' 59.0	280	20	0° 95' 24.0	72	10	1° 25' 50.0	39	30. 0	1° 45' 28.3	29° 2			
40	9° 35' 97.0	272	30	0° 95' 59.0	71	20	1° 26' 04.0	39	10	1° 45' 57.4	29° 1	40. 0	1° 61' 50.0	25° 6
45	9° 37' 31.0	264	40	0° 96' 65.0	70	30	1° 26' 42.0	38	20	1° 45' 86.5	29° 1	10	1° 61' 75.7	25° 7
50	9° 38' 61.0	256	50	0° 97' 34.0	69	40	1° 26' 81.0	39	30	1° 46' 15.4	28° 9	20	1° 62' 01.2	25° 5
55	9° 39' 87.0	249				50	1° 27' 19.0	38	40	1° 46' 44.1	28° 7	30	1° 62' 26.8	25° 6
			11. 0	0° 98' 02.0	68				50	1° 46' 72.9	28° 8	40	1° 62' 52.4	25° 6
3. 0	9° 41' 10.0	242	10	0° 98' 69.0	67	21. 0	1° 27' 57.0	38				50	1° 62' 77.8	25° 4
5	9° 42' 29.0	235	20	0° 99' 35.0	66	10	1° 27' 94.0	37	31. 0	1° 47' 01.5	28° 6			
10	9° 43' 45.0	229	30	1° 00' 00.0	65	20	1° 28' 32.0	38	10	1° 47' 30.1	28° 6	41. 0	1° 63' 03.3	25° 5
15	9° 44' 58.0	223	40	1° 00' 64.0	64	30	1° 28' 69.0	37	20	1° 47' 58.5	28° 4	10	1° 63' 28.7	25° 4
20	9° 45' 68.0	218	50	1° 01' 28.0	64	40	1° 29' 06.0	37	30	1° 47' 86.9	28° 4	20	1° 63' 54.2	25° 5
25	9° 46' 76.0	213				50	1° 29' 42.0	36	40	1° 48' 15.2	28° 3	30	1° 63' 79.6	25° 4
30	9° 47' 81.0	207	12. 0	1° 01' 90.0	62				50	1° 48' 43.3	28° 1	40	1° 64' 05.0	25° 4
35	9° 48' 83.0	202	10	1° 02' 52.0	62	22. 0	1° 29' 79.0	37				50	1° 64' 30.4	25° 4
40	9° 49' 83.0	198	20	1° 03' 13.0	61	10	1° 30' 15.0	36	32. 0	1° 48' 71.5	28° 2			
45	9° 50' 81.0	194	30	1° 03' 73.0	60	20	1° 30' 51.0	36	10	1° 48' 99.6	28° 1	42. 0	1° 64' 55.8	25° 4
50	9° 51' 77.0	189	40	1° 04' 32.0	59	30	1° 30' 87.0	36	20	1° 49' 27.5	27° 9	10	1° 64' 81.1	25° 3
55	9° 52' 70.0	185	50	1° 04' 91.0	59	40	1° 31' 23.0	36	30	1° 49' 55.4	27° 9	20	1° 65' 06.5	25° 4
						50	1° 31' 58.0	35	40	1° 49' 83.2	27° 8	30	1° 65' 31.7	25° 2
4. 0	9° 53' 62.0	182	13. 0	1° 05' 49.0	58				50	1° 50' 11.0	27° 8	40	1° 65' 57.1	25° 4
5	9° 54' 52.0	178	10	1° 06' 06.0	57	23. 0	1° 31' 93.0	35				50	1° 65' 82.3	25° 2
10	9° 55' 40.0	174	20	1° 06' 63.0	57	10	1° 32' 28.0	35	33. 0	1° 50' 38.6	27° 6			
15	9° 56' 26.0	171	30	1° 07' 19.0	56	20	1° 32' 63.0	35	10	1° 50' 66.2	27° 6	43. 0	1° 66' 07.7	25° 4
20	9° 57' 11.0	168	40	1° 07' 74.0	55	30	1° 32' 98.0	35	20	1° 50' 93.6	27° 4	10	1° 66' 32.9	25° 2
25	9° 57' 94.0	164	50	1° 08' 29.0	55	40	1° 33' 32.0	34	30	1° 51' 21.1	27° 5	20	1° 66' 58.2	25° 3
30	9° 58' 75.0	162				50	1° 33' 66.0	34	40	1° 51' 48.5	27° 4	30	1° 66' 83.4	25° 2
35	9° 59' 56.0	159	14. 0	1° 08' 83.0	54				50	1° 51' 75.8	27° 3	40	1° 67' 08.6	25° 2
40	9° 60' 34.0	155	10	1° 09' 36.0	53	24. 0	1° 34' 00.0	34				50	1° 67' 33.9	25° 3
45	9° 61' 11.0	153	20	1° 09' 89.0	53	10	1° 34' 34.0	34	34. 0	1° 52' 03.1	27° 3			
50	9° 61' 87.0	151	30	1° 10' 42.0	53	20	1° 34' 68.0	34	10	1° 52' 30.3	27° 2	44. 0	1° 67' 59.1	25° 2
55	9° 62' 62.0	148	40	1° 10' 94.0	52	30	1° 35' 02.0	34	20	1° 52' 57.3	27° 0	10	1° 67' 84.4	25° 3
			50	1° 11' 45.0	52	40	1° 35' 35.0	33	30	1° 52' 84.4	27° 1	20	1° 68' 09.5	25° 1
5. 0	9° 63' 35.0	145				50	1° 35' 68.0	33	40	1° 53' 11.5	27° 1	30	1° 68' 34.8	25° 3
10	9° 64' 78.0	143	15. 0	1° 11' 96.0	51				50	1° 53' 38.4	26° 9	40	1° 68' 60.0	25° 2
20	9° 66' 17.0	139	10	1° 12' 46.0	50	25. 0	1° 36' 01.0	33				50	1° 68' 85.2	25° 2
30	9° 67' 51.0	134	20	1° 12' 96.0	50	10	1° 36' 34.0	33	35. 0	1° 53' 65.3	26° 9			
40	9° 68' 82.0	131	30	1° 13' 45.0	49	20	1° 36' 67.0	33	10	1° 53' 92.1	26° 8	45. 0	1° 69' 10.4	25° 2

BESSEL'S REFRACTION TABLES.

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TABLE III.— <i>cont'd.</i>			TABLE IV.																		
Arg.—App. Zen. Dist.			Arguments—Apparent Zenith Distance and Reading of Thermometer.																		
Zen. Dist.	Z.	Diff for 1'	THERMOMETER.																		
			5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°
t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
45. 0	1.69097	25.2	14	13	13	12	11	10	9	9	8	7	6	6	5	4	3	3	2	1	0
10	.69349	25.2	14	13	13	12	11	10	9	9	8	7	6	6	5	4	3	3	2	1	0
20	.69601	25.2	14	13	13	12	11	10	9	9	8	7	6	6	5	4	3	3	2	1	0
30	.69853	25.2	14	13	13	12	11	10	9	9	8	7	6	6	5	4	3	3	2	1	0
40	.70105	25.2	15	14	13	12	12	11	10	9	8	7	6	6	5	4	3	3	2	1	0
50	.70356	25.1	15	14	13	12	12	11	10	9	8	7	7	6	5	4	3	3	2	1	0
46. 0	.70608	25.2	15	14	13	12	12	11	10	9	8	7	7	6	5	4	3	3	2	1	0
10	.70860	25.2	15	14	13	12	12	11	10	9	8	7	7	6	5	4	3	3	2	1	0
20	.71113	25.3	15	14	13	12	12	11	10	9	8	7	7	6	5	4	3	3	2	1	0
30	.71365	25.2	15	14	13	12	12	11	10	9	8	7	7	6	5	4	3	3	2	1	0
40	.71617	25.2	15	14	13	12	12	11	10	9	8	7	7	6	5	4	3	3	2	1	0
50	.71870	25.3	15	14	13	12	12	11	10	9	8	7	7	6	5	4	3	3	2	1	0
47. 0	.72122	25.2	15	14	13	12	12	11	10	9	8	7	7	6	5	4	3	3	2	1	0
10	.72375	25.3	15	14	13	12	12	11	10	9	8	7	7	6	5	4	3	3	2	1	0
20	.72628	25.3	15	14	13	12	12	11	10	9	8	7	7	6	5	4	3	3	2	1	0
30	.72881	25.3	15	14	13	12	12	11	10	9	8	7	7	6	5	4	3	3	2	1	0
40	.73133	25.2	16	14	14	13	12	11	10	9	8	7	7	6	5	4	3	3	2	1	0
50	.73387	25.4	16	15	14	13	12	11	10	10	9	8	7	6	5	4	4	3	2	1	0
48. 0	.73640	25.3	16	15	14	13	12	11	10	10	9	8	7	6	5	4	4	3	2	1	0
10	.73893	25.3	16	15	14	13	12	11	10	10	9	8	7	6	5	4	4	3	2	1	0
20	.74147	25.4	16	15	14	13	12	11	10	10	9	8	7	6	5	4	4	3	2	1	0
30	.74400	25.3	16	15	14	13	12	11	10	10	9	8	7	6	5	4	4	3	2	1	0
40	.74654	25.4	17	16	15	14	12	12	11	10	9	8	7	6	6	5	4	3	2	1	0
50	.74909	25.5	17	16	15	14	13	12	11	10	9	8	7	6	6	5	4	3	2	1	0
49. 0	.75163	25.4	17	16	15	14	13	12	11	10	9	8	7	6	6	5	4	3	2	1	0
10	.75417	25.4	17	16	15	14	13	12	11	10	9	8	7	6	6	5	4	3	2	1	0
20	.75671	25.4	17	16	15	14	13	12	11	10	9	8	7	6	6	5	4	3	2	1	0
30	.75926	25.5	17	16	15	14	13	12	11	10	9	8	7	6	6	5	4	3	2	1	0
40	.76181	25.5	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
50	.76436	25.5	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
50. 0	.76692	25.6	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
10	.76947	25.5	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
20	.77203	25.6	19	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
30	.77460	25.7	19	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
40	.77716	25.6	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
50	.77973	25.7	20	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
51. 0	.78230	25.7	20	19	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
10	.78488	25.8	20	19	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
20	.78745	25.7	20	19	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
30	.79003	25.8	20	19	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
40	.79262	25.9	21	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
50	.79521	25.9	21	19	18	17	16	15	13	12	11	10	9	8	7	6	5	4	3	2	1
52. 0	.79780	25.9	21	19	18	17	16	15	13	12	11	10	9	8	7	6	5	4	3	2	1
10	.80040	26.0	21	19	18	17	16	15	13	12	11	10	9	8	7	6	5	4	3	2	1
20	.80299	25.9	21	19	18	17	16	15	13	12	11	10	9	8	7	6	5	4	3	2	1
30	.80559	26.0	21	20	19	18	16	15	13	13	12	10	9	8	7	6	5	4	3	2	1
40	.80820	26.1	21	20	19	18	16	15	14	13	12	11	9	8	7	6	5	4	3	2	1
50	.81081	26.1	21	20	19	18	16	15	14	13	12	11	9	8	7	6	5	4	3	2	1
53. 0	.81343	26.2	21	20	19	18	16	15	14	13	12	11	9	8	7	6	5	4	3	2	1
10	.81605	26.2	22	20	19	18	16	15	14	13	12	11	9	8	7	6	5	4	3	2	1
20	.81866	26.1	22	21	19	18	17	15	14	13	12	11	9	8	7	6	5	4	3	2	1
30	.82129	26.3	22	21	20	18	17	16	14	13	12	11	9	8	7	6	5	4	3	2	1
40	.82393	26.4	22	21	20	19	17	16	15	14	13	11	10	9	8	6	5	4	3	2	1
50	.82655	26.2	23	22	20	19	17	16	15	14	13	11	10	9	8	6	5	4	3	2	1
54. 0	.82920	26.5	23	22	20	19	18	16	15	14	13	11	10	9	8	6	5	4	3	2	1
10	.83185	26.5	23	22	20	19	18	16	15	14	13	11	10	9	8	6	5	4	3	2	1
20	.83449	26.4	23	22	21	20	18	16	15	14	13	11	10	9	8	6	5	4	3	2	1
30	.83715	26.6	23	22	21	20	18	17	15	14	13	11	10	9	8	6	5	4	3	2	1
40	.83982	26.7	24	23	21	20	19	17	16	15	13	12	11	9	8	7	6	4	3	2	1
50	.84248	26.6	24	23	22	20	19	17	16	15	13	12	11	9	8	7	6	4	3	2	1
55. 0	.84515	26.7	24	23	22	20	19	17	16	15	13	12	11	9	8	7	6	4	3	2	1
10	.84782	26.7	25	23	22	20	19	17	16	15	13	12	11	9	8	7	6	4	3	2	1
20	.85051	26.9	25	24	23	21	20	18	17	15	13	12	11	9	8	7	6	4	3	2	1
30	.85320	26.9	26	24	23	21	20	18	17	15	14	13	11	9	8	7	6	4	3	2	1
40	.85589	26.9	26	24	23	21	20	18	17	16	14	13	12	10	9	8	6	5	3	2	1
50	.85859	27.0	27	25	24	22	21	19	18	16	14	13	12	10	9	8	6	5	3	2	1
56. 0	.86129	27.0	27	25	24																

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BESSEL'S REFRACTION TABLES.

TABLE III.—*contd.*

Arg.—App. Zen. Dist.

TABLE IV.—*continued.*

Arguments—Apparent Zenith Distance and Reading of Thermometer.

Zen. Dist.	Z.	Diff. for 1'	THERMOMETER.																		
			5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°
			t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
56. 40	1.87218	27.3	28	26	25	23	22	20	19	17	16	14	13	11	10	8	7	5	4	2	1
50	1.87492	27.4	29	27	26	24	22	21	19	18	16	14	13	11	10	8	7	5	4	2	1
57. 0	1.87766	27.4	29	27	26	24	22	21	19	18	16	14	13	11	10	8	7	5	4	2	1
10	1.88041	27.5	29	27	26	24	22	21	19	18	16	14	13	11	10	8	7	5	4	2	1
20	1.88318	27.7	30	28	27	25	23	22	20	18	16	14	13	11	10	8	7	5	4	2	1
30	1.88594	27.6	30	28	27	25	23	22	20	18	16	15	13	11	10	8	7	5	4	2	1
40	1.88871	27.7	31	29	27	25	23	22	20	19	17	15	14	12	11	9	7	6	4	3	1
50	1.89149	27.8	32	29	28	26	24	23	21	19	17	16	14	12	11	9	7	6	4	3	1
58. 0	1.89428	27.9	32	30	28	26	24	23	21	19	17	16	14	12	11	9	7	6	4	3	1
10	1.89708	28.0	32	30	28	26	24	23	21	19	17	16	14	12	11	9	7	6	4	3	1
20	1.89988	28.0	33	31	29	27	25	23	21	19	18	16	14	12	11	9	7	6	4	3	1
30	1.90269	28.1	33	31	29	27	25	24	22	20	18	16	14	12	11	9	7	6	4	3	1
40	1.90551	28.2	33	31	29	27	25	24	22	20	18	17	15	13	11	10	8	6	4	3	1
50	1.90834	28.3	34	32	30	28	26	24	22	20	19	17	15	13	11	10	8	6	4	3	1
59. 0	1.91118	28.4	34	32	30	28	26	24	22	20	19	17	15	13	11	10	8	6	4	3	1
10	1.91402	28.4	34	32	30	28	26	24	22	20	19	17	15	13	11	10	8	6	4	3	1
20	1.91688	28.6	35	33	31	29	27	25	23	21	19	17	15	13	11	10	8	6	4	3	1
30	1.91974	28.6	35	33	31	29	27	25	23	21	19	17	15	13	11	10	8	6	4	3	1
40	1.92262	28.8	35	33	31	29	27	25	23	21	20	18	16	14	12	10	8	7	5	3	1
50	1.92550	28.8	36	34	32	30	28	26	24	22	20	18	16	14	12	10	8	7	5	3	1
60. 0	1.92839	28.9	36	34	32	30	28	26	24	22	20	18	16	14	12	10	8	7	5	3	1
10	1.93129	29.0	36	34	32	30	28	26	24	22	20	18	16	14	12	10	8	7	5	3	1
20	1.93420	29.1	37	35	33	31	29	27	24	22	20	18	16	14	12	10	8	7	5	3	1
30	1.93712	29.2	37	35	33	31	29	27	25	23	21	19	17	15	13	11	9	7	5	3	1
40	1.94005	29.3	38	35	33	31	29	27	25	23	21	19	17	15	13	11	9	7	5	3	1
50	1.94298	29.3	39	36	34	32	30	28	25	23	21	19	17	15	13	11	9	7	5	3	1
61. 0	1.94593	29.5	39	36	34	32	30	28	25	23	21	19	17	15	13	11	9	7	5	3	1
10	1.94889	29.6	40	37	35	32	30	28	26	24	21	19	17	15	13	11	9	7	5	3	1
20	1.95186	29.7	40	37	35	33	31	29	26	24	22	20	18	15	13	11	9	7	5	3	1
30	1.95484	29.8	41	38	36	33	31	29	26	24	22	20	18	16	13	11	9	7	5	3	1
40	1.95782	29.8	42	39	37	34	32	29	27	25	22	20	18	16	14	12	10	8	6	3	1
50	1.96082	30.0	42	39	37	34	32	30	27	25	23	21	19	16	14	12	10	8	6	3	1
62. 0	1.96384	30.2	43	40	38	35	33	30	28	26	23	21	19	16	14	12	10	8	6	3	1
10	1.96687	30.3	43	40	38	35	33	30	28	26	23	21	19	16	14	12	10	8	6	3	1
20	1.96991	30.4	44	41	39	36	34	31	28	26	23	21	19	17	14	12	10	8	6	3	1
30	1.97295	30.4	44	41	39	36	34	31	29	27	24	22	19	17	14	12	10	8	6	3	1
40	1.97601	30.6	45	42	39	37	34	32	29	27	24	22	20	17	15	13	11	8	6	4	1
50	1.97909	30.8	45	42	40	37	35	32	30	28	25	23	20	18	15	13	11	8	6	4	1
63. 0	1.98217	30.8	46	43	40	38	35	33	30	28	25	23	20	18	15	13	11	8	6	4	1
10	1.98527	31.0	47	44	41	38	35	33	30	28	25	23	20	18	15	13	11	8	6	4	1
20	1.98839	31.2	47	44	41	39	36	33	31	29	26	24	21	18	16	13	11	8	6	4	1
30	1.99150	31.1	48	45	42	39	36	34	31	29	26	24	21	18	16	13	11	9	6	4	1
40	1.99464	31.4	49	46	43	40	37	34	32	29	26	24	21	19	16	14	11	9	6	4	1
50	1.99779	31.5	49	46	43	40	37	34	32	30	27	25	22	19	17	14	11	9	6	4	1
64. 0	2.00096	31.7	50	47	44	41	38	35	33	30	27	25	22	19	17	14	11	9	6	4	1
10	2.00413	31.7	51	48	44	41	38	35	33	30	27	25	22	19	17	14	11	9	6	4	1
20	2.00733	32.0	51	48	45	42	39	36	33	30	27	25	22	19	17	14	11	9	6	4	1
30	2.01053	32.0	52	49	45	42	39	36	34	31	28	25	23	20	17	14	11	9	6	4	1
40	2.01375	32.2	53	50	46	43	40	37	34	31	28	26	23	20	18	15	12	10	7	4	2
50	2.01700	32.5	53	50	46	43	40	37	35	32	29	26	24	21	18	15	12	10	7	4	2
65. 0	2.02025	32.5	54	51	47	44	41	38	35	32	29	26	24	21	18	15	12	10	7	4	2
10	2.02351	32.6	55	51	48	45	42	38	36	33	29	26	24	21	18	15	12	10	7	4	2
20	2.02680	32.9	55	52	48	45	42	39	36	33	30	27	25	22	19	16	13	10	7	4	2
30	2.03009	32.9	56	53	49	46	43	40	37	34	30	27	25	22	19	16	13	10	7	4	2
40	2.03340	33.1	57	54	50	47	44	40	38	35	31	28	25	22	19	16	13	11	8	5	2
50	2.03674	33.4	58	55	51	48	45	41	38	35	31	28	25	22	20	17	14	11	8	5	2
66. 0	2.04009	33.5	59	56	52	49	46	42	39	36	32	29	26	23	20	17	14	11	8	5	2
10	2.04345	33.6	60	57	53	49	47	43	40	36	33	29	26	23	20	17	14	11	8	5	2
20	2.04682	33.7	61	58	54	50	47	43	40	37	33	30	27	24	21	18	14	11	8	5	2
30	2.05022	34.0	62	59	55	51	48	44	41	37	34	30	27	24	21	18	14	11	8	5	2
40	2.05363	34.1	63	60	56	52	49	45	42	38	35	31	28	24	21	18	15	12	8	5	2
50	2.05708	34.5	64	61	57	53	50	46	42	38	35	31	28	25	22	19	15	12	8	5	2
67. 0	2.06053	34.5	65	62	58	54	50	47	43	39	36	32	29	25	22	19	15	12	8	5	2
10	2.06400	34.7	66	63	59	55															

BESSEL'S REFRACTION TABLES.

{11}

TABLE III.—*contd.*

Arg.—App. Zen. Dist.

TABLE IV.—*continued.*

Arguments—Apparent Zenith Distance and Reading of Thermometer.

Zen. Dist.		Z.	Diff. for 1'	THERMOMETER.																		
				5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°
				t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
68. 10	2°08523	35.9	74	69	65	61	57	53	49	45	40	36	32	28	24	21	17	13	9	6	2	2
20	08884	36.1	75	70	66	62	57	53	49	45	41	37	33	29	25	22	17	13	9	6	2	2
30	09247	36.3	76	71	67	63	58	54	50	46	42	37	33	29	25	22	18	13	9	6	2	2
40	09613	36.6	77	73	68	64	59	55	51	47	43	38	34	30	26	22	18	14	10	6	2	2
50	09981	36.8	78	74	69	65	60	56	51	47	43	38	34	30	26	23	18	14	10	6	2	2
69. 0	10351	37.0	80	75	70	66	61	57	52	48	44	39	35	31	27	23	18	14	10	6	2	2
10	10723	37.2	81	76	71	67	62	58	53	49	45	40	36	31	27	23	18	14	10	6	2	2
20	11097	37.4	82	77	72	68	63	58	54	49	45	40	36	32	27	23	19	14	10	6	2	2
30	11474	37.7	84	79	74	69	64	59	55	50	46	41	37	32	28	24	19	15	10	6	3	3
40	11854	38.0	85	80	75	70	65	60	56	51	47	42	38	33	28	24	19	15	11	7	3	3
50	12236	38.2	86	81	76	71	66	61	57	52	47	42	38	33	29	25	20	16	11	7	3	3
70. 0	12620	38.4	88	82	77	72	67	62	58	53	48	43	39	34	29	25	20	16	11	7	3	3
10	13007	38.7	90	84	78	73	68	63	59	54	49	44	40	35	30	25	20	16	11	7	3	3
20	13395	38.8	91	85	80	75	70	65	60	55	50	44	40	35	30	26	21	17	11	7	3	3
30	13787	39.2	93	87	81	76	71	66	61	56	51	45	41	36	31	26	21	17	12	7	3	3
40	14181	39.4	95	89	83	78	72	67	62	57	52	46	42	37	32	27	22	17	12	8	3	3
50	14579	39.8	96	90	84	79	74	69	63	58	53	47	42	37	32	27	22	18	12	8	3	3
71. 0	14979	40.0	98	92	86	81	75	70	64	59	54	48	43	38	33	28	23	18	13	8	3	3
10	15382	40.3	100	94	87	82	76	71	65	60	55	49	44	39	34	28	23	18	13	8	3	3
20	15787	40.5	102	95	89	84	78	72	66	61	56	50	44	39	34	29	23	18	13	8	3	3
30	16196	40.9	104	97	91	85	79	74	68	62	57	51	45	40	35	29	24	19	13	8	3	3
40	16608	41.2	106	99	93	87	81	75	69	63	58	52	46	41	36	30	24	19	14	9	3	3
50	17023	41.5	108	101	95	89	82	76	70	64	59	53	47	41	36	30	25	19	14	9	3	3
72. 0	17441	41.8	110	103	97	91	84	78	72	66	60	54	48	42	37	31	25	20	14	9	3	3
10	17863	42.2	112	105	99	92	85	79	73	67	61	55	49	43	38	32	25	20	14	9	3	3
20	18287	42.4	114	107	101	94	87	81	75	68	62	56	50	44	38	32	26	20	15	9	3	3
30	18714	42.7	116	109	103	96	89	83	76	70	63	57	51	45	39	33	26	21	15	9	4	3
40	19145	43.1	118	111	105	98	91	85	78	71	64	58	52	46	40	34	27	21	15	10	4	3
50	19580	43.5	120	114	107	100	93	86	79	72	65	59	53	47	40	34	27	22	16	10	4	3
73. 0	20019	43.9	123	116	109	102	95	88	81	74	67	61	54	48	41	35	28	22	16	10	4	3
10	20460	44.1	125	118	111	104	96	90	83	75	68	62	55	48	41	36	28	23	16	10	4	3
20	20905	44.5	128	120	113	106	98	91	84	77	70	63	56	49	42	36	29	23	16	10	4	3
30	21353	44.8	130	123	115	108	100	92	86	78	71	64	57	50	43	37	30	23	17	10	4	3
40	21806	45.3	133	125	117	110	102	94	88	80	73	65	58	51	44	38	30	24	17	11	4	3
50	22263	45.7	135	128	120	112	104	96	89	81	74	66	59	52	45	38	31	25	17	11	4	3
74. 0	22723	46.0	138	130	122	114	106	98	91	83	76	68	61	53	46	39	32	25	18	11	4	3
10	23186	46.3	140	133	124	116	108	100	93	85	77	69	62	54	47	40	32	25	18	11	4	3
20	23655	46.9	143	135	127	118	110	102	94	86	79	71	63	55	48	40	33	26	18	11	4	3
30	24127	47.2	146	138	129	121	113	104	96	88	80	72	64	56	49	41	34	26	19	11	4	3
40	24604	47.7	149	141	132	123	115	106	98	90	82	74	65	57	50	42	34	27	19	12	4	3
50	25086	48.2	152	143	134	126	117	108	100	92	83	75	66	59	51	43	35	27	20	12	5	3
75. 0	25573	48.7	155	146	137	128	120	111	102	94	85	77	68	60	52	44	36	28	20	12	5	3
10	26059	48.8	156	147	138	129	120	111	102	94	85	77	68	60	52	44	36	28	20	12	5	3
20	26549	49.2	157	148	139	130	121	112	103	95	86	78	69	61	53	45	36	28	20	12	5	3
30	27038	49.5	158	149	140	131	122	113	104	95	86	78	69	61	53	45	36	28	20	12	5	3
40	27528	49.7	159	150	141	132	123	114	105	96	87	79	70	61	53	45	37	28	20	12	5	3
50	28018	49.8	161	152	142	133	124	115	106	97	88	80	71	62	54	45	37	29	21	13	5	3
28	28509	50.2	162	153	143	134	125	116	107	98	89	80	71	62	54	45	37	29	21	13	5	3
32	29050	50.5	163	154	144	135	126	117	108	99	90	81	72	63	55	46	38	30	21	13	5	3
36	29591	50.8	164	155	145	136	126	117	108	99	90	81	72	64	55	46	38	30	21	13	5	3
40	30132	51.0	165	156	146	137	127	118	109	100	91	82	73	64	56	47	39	30	22	13	5	3
44	30673	51.3	166	157	147	138	128	119	110	101	92	83	74	65	56	47	39	30	22	13	5	3
48	31214	51.6	167	158	148	139	129	120	111	102	93	84	75	66	57	48	39	31	22	13	5	3
52	31755	51.9	168	159	149	140	131	121	112	103	94	85	76	67	57	48	39	31	22	13	5	3
56	32296	52.2	169	160	150	141	131	121	112	103	94	85	76	67	57	48	39	31	22	13	5	3
76. 0	32837	52.5	170	161	151	142	132	122	113	104	94	85	76	67	57	48	39	31	22	13	5	3
4	28590	52.8	171	162	152	143	133	123	114	105	95	86	77	68	58	49	40	31	23	14	5	3
8	28998	53.0	172	163	153	144	134	124	115	106	96	87	78	69	59	50	41	32	23	14	5	3
12	29406	53.2	173	164	154	145	135	125	116	107	97	88	79	70	60	51	42	33	24	14	5	3
16	29815	53.5	174	165	155	146	136	126	117	107	97	88	79	70	60	51	42	33	24	14	5	3
20	30223	53.8	175	166	156	147	137	127	118	108	98	89	80	70	60	51	42	33	24	14	5	3
24	30631	54.0	176	167	157	148	138	128	118	108	98	89	79	69	59	50	41	32	23	14	5	3
28	31039	54.3	177	168	158	149	139	129	119	109	99	89	79	69	59	50	41	32	23	14	5	3
32	31447	54.5	178	169	159	150	140	130	120	110	100	90	80	70	60	51	42	33	24	14	5	3
36	31855	54.8	179	170	160	151	141	131	121	111	101	91	81	71	61	51	42	33	24	14	5	3
40	32263	55.0	180	171	161	152	142	132	122	112	102	92	82	72	62	52	43	33	24	15	6	3
44	32671	55.3	181	172	162	153	143	133	123	113												

BESSEL'S REFRACTION TABLES.

TABLE III.—*contd.*

Arg.—App. Zen. Dist.

TABLE IV.—*continued.*

Arguments—Apparent Zenith Distance and Reading of Thermometer.

		THERMOMETER.																							
Zen. Dist.	Z.	Diff. for 1'	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°				
			t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t				
77. 0	2° 31' 78.4	55°.5	200	188	177	165	154	143	132	121	110	99	89	77	67	56	46	36	26	16	6				
2	3189.4	55°.0	201	189	178	166	155	144	133	122	111	99	89	77	67	56	46	36	26	16	6				
4	3200.5	55°.0	202	190	178	166	155	144	133	122	110	100	90	78	67	56	46	36	26	16	6				
6	3211.5	55°.5	203	191	179	167	156	145	134	123	111	100	90	78	68	57	47	37	26	16	6				
8	3222.6	55°.5	204	192	180	168	157	145	134	123	112	101	91	79	68	58	47	37	26	16	6				
10	3233.7	55°.5	205	193	181	169	158	146	135	124	112	101	91	79	68	58	47	37	26	16	6				
12. 0	3244.8	55°.5	205	193	181	169	159	147	136	124	113	101	91	79	68	58	47	37	26	16	6				
14	3256.0	56°.0	206	194	182	170	159	147	136	125	113	102	92	80	69	58	47	37	26	16	6				
16	3267.2	56°.0	207	195	183	171	160	148	137	125	114	102	92	80	69	59	48	38	27	17	6				
18	3278.4	56°.0	208	196	184	172	160	148	137	126	114	103	93	81	70	59	48	38	27	17	6				
20	3289.6	56°.0	209	197	185	173	161	149	138	126	115	104	93	81	70	59	48	38	27	17	6				
22	3300.9	56°.5	210	198	186	174	162	150	139	127	115	105	93	81	70	59	48	38	27	17	6				
24	3312.2	56°.5	212	200	187	175	163	151	139	127	116	105	94	82	71	60	49	38	27	17	6				
26	3323.5	57°.0	213	201	189	176	164	152	140	128	117	106	94	82	71	60	49	39	28	17	6				
28	3334.9	57°.0	214	202	190	177	165	153	141	129	118	107	95	83	72	61	50	39	28	17	6				
30	3346.2	57°.0	216	203	191	178	166	154	142	130	119	107	95	83	72	61	50	39	28	17	6				
32	3357.6	57°.0	217	204	192	179	167	155	143	131	120	108	95	84	72	61	50	39	28	17	6				
34	3369.0	57°.0	219	206	193	180	168	156	144	132	120	108	96	84	73	62	50	39	28	17	6				
36	3380.5	57°.5	220	207	194	181	169	157	145	132	121	109	97	85	73	62	51	40	29	18	7				
38	3391.9	57°.0	221	208	196	183	171	158	146	133	121	109	98	85	74	63	51	40	29	18	7				
40	3403.4	57°.5	223	210	197	184	172	159	147	134	122	110	99	86	74	63	51	40	29	18	7				
42	3414.9	57°.5	224	211	198	185	173	160	147	135	123	111	99	87	74	63	51	40	29	18	7				
44	3426.4	58°.0	226	212	199	186	174	161	148	136	124	111	100	87	75	64	52	40	29	18	7				
46	3438.0		227	214	201	188	175	162	149	137	124	112	101	88	75	64	52	41	29	18	7				
48	3449.5	57°.5	229	215	202	189	176	163	150	138	125	113	101	88	76	65	53	41	30	18	7				
50	3461.1	58°.0	230	216	203	190	177	164	151	139	126	114	102	89	76	65	53	41	30	18	7				
52	3472.7	58°.0	231	217	204	191	178	165	152	140	127	115	103	90	77	66	53	41	30	18	7				
54	3484.4	58°.5	233	219	205	192	179	166	153	140	127	115	103	90	78	66	54	41	30	18	7				
56	3496.1	58°.5	234	220	207	194	180	167	154	141	128	116	104	91	78	67	54	42	30	19	7				
58	3507.8	58°.5	236	222	208	195	181	168	155	142	129	116	104	91	79	67	55	42	31	19	7				
78. 0	3519.6	59°.0	237	223	209	196	182	169	156	143	130	117	105	92	80	68	55	42	31	19	7				
2	3531.4	59°.0	238	224	210	197	183	170	157	144	131	118	106	93	80	68	55	42	31	19	7				
4	3543.2	59°.0	240	226	212	198	184	171	158	144	132	119	106	93	81	69	55	43	31	19	7				
6	3555.0	59°.0	241	227	213	200	186	172	159	145	132	119	107	94	81	69	56	43	31	19	7				
8	3566.9	59°.5	243	229	215	201	187	173	160	146	133	120	107	94	82	70	56	44	31	19	7				
10	3578.8	59°.5	244	230	216	202	188	174	161	147	134	121	108	95	82	70	56	44	31	19	7				
12	3590.7	59°.5	246	231	217	203	189	175	162	148	135	122	109	96	83	70	56	44	31	19	7				
14	3602.7	60°.0	247	233	219	204	190	176	163	149	136	123	109	96	83	71	57	44	32	19	7				
16	3614.7	60°.0	249	234	220	206	192	178	164	150	136	123	110	97	84	71	57	44	32	20	7				
18	3626.7	60°.0	250	236	222	207	193	179	165	151	137	124	110	97	84	72	58	45	33	20	7				
20	3638.7	60°.5	252	237	223	208	194	180	166	152	138	125	111	98	85	72	58	45	33	20	7				
22	3650.8	60°.5	254	239	224	209	195	181	167	153	139	126	112	99	86	72	58	45	33	20	7				
24	3662.9	60°.5	255	240	226	211	196	182	168	154	140	127	113	99	86	73	59	46	33	20	7				
26	3675.1	61°.0	257	242	227	212	198	183	169	155	141	127	113	100	87	73	59	46	34	20	8				
28	3687.2	60°.5	258	243	229	214	199	184	170	156	142	128	114	100	87	74	60	47	34	20	8				
30	3699.4	61°.0	260	245	230	215	200	185	171	157	143	129	115	101	88	74	60	47	34	20	8				
32	3711.6	61°.0	261	246	231	216	201	186	172	158	144	130	116	102	88	74	60	47	34	20	8				
34	3723.8	61°.5	263	248	233	217	202	187	173	159	145	131	116	102	89	75	61	47	34	20	8				
36	3736.1	61°.5	265	249	234	219	204	189	174	160	145	131	117	103	89	75	61	48	35	21	8				
38	3748.4	61°.5	266	251	236	220	205	190	175	161	146	132	117	103	90	76	62	48	35	21	8				
40	3760.7	62°.0	268	252	237	221	206	191	176	162	147	133	118	104	90	76	62	48	35	21	8				
42	3773.1	62°.0	269	253	238	222	207	192	177	163	148	134	119	105	91	76	62	48	35	21	8				
44	3785.5	62°.0	271	255	239	223	208	193	178	164	149	134	119	105	91	77	62	48	35	21	8				
46	3797.9	62°.0	272	256	241	225	210	194	179	164	149	135	120	106	92	77	63	49	35	21	8				
48	3810.3	62°.0	274	258	242	226	211	195	180	165	150	135	120	106	92	78	63	49	35	22	8				
50	3822.8	62°.5	275	259	243	227	212	196	181	166	151	136	121	107	93	78	63	49	35	22	8				
52	3835.3	63°.0	277	260	244	228	213	197	182	167	152	137	122	108	93	79	63	49	35	22	8				
54	3847.9	63°.0	278	262	246	230	214	198	183	168	153	138	123	108	94	79	64	50	35	22	8				
56	3860.5	63°.0	280	263	247	234	216	200	184	169	153	138	123	109	94	80	64	50	36	22	8				
58	3873.1	63°.0	281	265	249	233	217	201	185	170	154	139	124	109	95	80	65	51	36	22	8				
79. 0	3885.8	63°.5	283	266	250	231	218	202	186	171	155	140	125	110	95	81	65	51	36	22	8				
2	3898.5	63°.5	285	268	251	235	219	203	187	172	156	141	126	111	96	82	65	51	36	22	8				
4	3911.2	63°.5	286	269	253	236	220	204	188	173	157	142	126	111	96	82	66	51	37	23	9				
6	3923.9	64°.0	288	271	254	238	221	205	189	173	158	142	127	112	97	82	66	52	37	23	9				
8	3936.7	64°.0	289	272	256	239	222	206	190	174	159	143	127	112	97	83	67	52	38	23	9				
10	3949.5	64°.0	291	274	257	240	223	207	191	175	160	144	128	113	98	83	67	52	38	23	9				
12	3962.4	64°.5	292	275	258	241	225	208	192	176	161	145	129	114	99	83	67	52	38	23	9				
			5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°				

TABLE V.

Arguments—Apparent Zenith Distance and Reading of Barometer.

Zen. Dist.	BAROMETER.															
	in. 28°0	in. 28°2	in. 28°4	in. 28°6	in. 28°8	in. 29°0	in. 29°2	in. 29°4	in. 29°6	in. 29°8	in. 30°0	in. 30°2	in. 30°4	in. 30°6	in. 30°8	in. 31°0
	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
77. 0	1	2	2	3	4	5	6	6	7	8	9	9	10	11	12	12
2	1	2	2	3	4	5	6	6	7	8	9	9	10	11	12	12
4	1	2	2	3	4	5	6	6	7	8	9	9	10	11	12	12
6	1	2	2	3	4	5	6	6	7	8	9	9	10	11	12	12
8	1	2	2	3	4	5	6	6	7	8	9	9	10	11	12	12
10	1	2	2	3	4	5	6	6	7	8	9	9	10	11	12	12
12	1	2	2	3	4	5	6	6	7	8	9	9	10	11	12	12
14	1	2	2	3	4	5	6	6	7	8	9	9	10	11	12	12
16	1	2	2	3	4	5	6	7	7	8	9	9	10	11	12	13
18	1	2	2	3	4	5	6	7	7	8	9	10	10	11	12	13
20	1	2	2	3	4	5	6	7	7	8	9	10	10	11	12	13
22	1	2	2	3	4	5	6	7	7	8	9	10	10	11	12	13
24	1	2	2	3	4	5	6	7	7	8	9	10	10	11	12	13
26	1	2	2	3	4	5	6	7	7	8	9	10	10	11	12	13
28	1	2	2	3	4	5	6	7	7	8	9	10	10	11	12	13
30	1	2	2	3	4	5	6	7	7	8	9	10	10	11	12	13
32	1	2	2	3	4	5	6	7	7	8	9	10	10	11	12	13
34	1	2	2	3	4	5	6	7	7	8	9	10	10	11	12	13
36	1	2	3	3	4	5	6	7	8	8	9	10	11	12	12	13
38	1	2	3	3	4	5	6	7	8	8	9	10	11	12	12	13
40	1	2	3	3	4	5	6	7	8	8	9	10	11	12	12	13
42	1	2	3	3	4	5	6	7	8	8	9	10	11	12	12	13
44	1	2	3	3	4	5	6	7	8	8	9	10	11	12	12	13
46	1	2	3	3	4	5	6	7	8	8	9	10	11	12	12	14
48	1	2	3	4	4	5	6	7	8	9	10	10	11	12	13	14
50	1	2	3	4	4	5	6	7	8	9	10	10	11	12	13	14
52	1	2	3	4	4	5	6	7	8	9	10	10	11	12	13	14
54	1	2	3	4	4	5	6	7	8	9	10	10	11	12	13	14
56	1	2	3	4	5	5	6	7	8	9	10	11	12	12	13	14
58	1	2	3	4	5	5	6	7	8	9	10	11	12	12	13	14
78. 0	1	2	3	4	5	5	6	7	8	9	10	11	12	12	13	14
2	1	2	3	4	5	5	6	7	8	9	10	11	12	12	13	14
4	1	2	3	4	5	5	6	7	8	9	10	11	12	12	13	14
6	1	2	3	4	5	5	6	7	8	9	10	11	12	12	13	14
8	1	2	3	4	5	5	6	7	8	9	10	11	12	12	13	14
10	1	2	3	4	5	5	6	7	8	9	10	11	12	12	13	14
12	1	2	3	4	5	5	6	7	8	9	10	11	12	12	13	14
14	1	2	3	4	5	5	6	7	8	9	10	11	12	12	13	14
16	1	2	3	4	5	5	6	7	8	9	10	11	12	13	14	15
18	1	2	3	4	5	6	7	7	8	9	10	11	12	13	14	15
20	1	2	3	4	5	6	7	7	8	9	10	11	12	13	14	15
22	1	2	3	4	5	6	7	7	8	9	10	11	12	13	14	15
24	1	2	3	4	5	6	7	7	8	9	10	11	12	13	14	15
26	1	2	3	4	5	6	7	8	9	10	11	11	12	13	14	15
28	1	2	3	4	5	6	7	8	9	10	11	11	12	13	14	15
30	1	2	3	4	5	6	7	8	9	10	11	11	12	13	14	15
32	1	2	3	4	5	6	7	8	9	10	11	11	12	13	14	15
34	1	2	3	4	5	6	7	8	9	10	11	11	12	13	14	15
36	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
38	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
40	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
42	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
44	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
46	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
48	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
50	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
52	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
54	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
56	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	17
58	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	17
79. 0	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	17
2	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	17
4	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	17
6	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17
8	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17
10	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17
12	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17

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BESSEL'S REFRACTION TABLES.

TABLE III.—*contd.*

Arg.—App. Zen. Dist.

TABLE IV.—*continued.*

Arguments—Apparent Zenith Distance and Reading of Thermometer.

THERMOMETER.																					
Zen. Dist.	Z.	Diff for 1'	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°
			t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
79. 12	2°39624	64°.5	292	275	258	241	225	208	192	176	161	145	129	114	99	83	67	52	38	23	9
14	°39753	64°.5	294	277	260	243	226	209	193	177	162	146	130	114	99	84	68	53	38	23	9
16	°39882	64°.5	295	278	261	244	228	211	194	178	162	146	130	115	100	84	68	53	39	24	9
18	°40011	64°.5	297	280	263	246	229	212	195	179	163	147	131	115	100	85	69	54	39	24	9
20	°40141	65°.0	298	281	264	247	230	213	196	180	164	148	132	116	101	85	69	54	39	24	9
22	°40271	65°.0	300	282	265	248	231	214	197	181	165	149	133	117	101	85	70	54	39	24	9
24	°40401	65°.0	301	284	267	249	233	215	198	182	166	150	133	117	102	86	70	55	39	24	9
26	°40532	65°.5	303	285	268	251	234	217	200	183	166	150	134	118	102	86	71	55	39	24	9
28	°40663	65°.5	304	287	270	252	235	218	201	184	167	151	134	118	103	87	71	56	40	24	9
30	°40794	65°.5	306	288	271	253	236	219	202	185	168	152	135	119	103	87	72	56	40	24	9
32	°40926	66°.0	308	290	272	254	237	220	203	186	169	153	136	120	104	88	72	56	40	24	9
34	°41058	66°.0	310	292	274	256	239	221	204	187	170	154	137	121	104	88	73	57	40	24	9
36	°41191	66°.5	312	294	275	257	240	223	205	188	171	154	137	121	105	89	73	57	41	25	9
38	°41324	66°.5	314	296	277	259	242	224	206	189	172	155	138	122	105	89	74	58	41	25	9
40	°41457	66°.5	316	298	278	260	243	225	207	190	173	156	139	123	106	90	74	58	41	25	9
42	°41590	67°.0	317	300	280	261	244	226	208	191	174	157	140	124	107	90	74	58	41	25	9
44	°41724	67°.5	319	301	281	263	245	227	209	192	175	158	141	124	107	91	75	58	41	25	9
46	°41859	67°.5	321	303	283	264	247	229	211	195	176	158	141	125	108	91	75	59	42	26	10
48	°41994	67°.5	323	304	284	266	248	230	212	194	177	159	142	125	108	92	76	59	42	26	10
50	°42129	68°.0	325	306	286	267	249	231	213	195	178	160	143	126	109	92	76	59	42	26	10
52	°42265	68°.0	327	308	288	269	250	232	214	196	179	161	144	127	110	93	76	59	42	26	10
54	°42401	68°.5	328	309	290	271	252	233	215	197	180	162	145	127	110	93	77	60	42	26	10
56	°42538	68°.5	330	311	291	272	253	235	217	198	180	163	145	128	111	94	77	60	43	26	10
58	°42674	68°.5	331	312	293	274	255	236	218	199	181	164	146	128	111	94	78	61	43	26	10
80. 0	°42811	68°.5	333	314	295	276	256	237	219	200	182	165	147	129	112	95	78	61	43	26	10
1	°42880	69°.0	334	315	296	277	257	238	219	201	182	165	147	129	112	95	78	61	43	26	10
2	°42948	69°.0	335	316	296	277	257	238	220	201	183	166	148	130	113	95	78	61	43	26	10
3	°43017	69°.0	336	316	297	278	258	239	221	202	183	166	148	130	113	96	79	61	43	26	10
4	°43086	69°.0	337	317	298	279	259	239	221	202	184	167	149	131	113	96	79	61	43	26	10
5	°43155	69°.0	338	318	299	280	260	240	222	203	184	167	149	131	114	96	79	62	44	27	10
6	°43224	69°.0	338	319	299	280	260	241	222	204	185	167	149	131	114	96	79	62	44	27	10
7	°43293	69°.0	339	320	300	281	261	241	223	204	185	168	150	132	114	96	79	62	44	27	10
8	°43362	69°.0	340	320	301	282	262	242	223	205	186	168	150	132	114	97	80	62	44	27	10
9	°43431	70°.0	341	321	301	282	262	242	224	205	186	169	151	133	115	97	80	62	44	27	10
10	°43501	70°.0	342	322	302	283	263	243	224	206	187	169	151	133	115	97	80	62	44	27	10
11	°43570	70°.0	343	323	303	284	264	244	225	206	187	169	151	133	115	97	80	62	44	27	10
12	°43640	70°.0	344	324	304	284	264	244	225	207	188	170	152	134	116	98	80	62	44	27	10
13	°43710	70°.0	345	324	304	285	265	245	226	207	188	170	152	134	116	98	81	63	44	27	10
14	°43780	70°.0	346	325	305	286	265	246	226	208	189	171	152	134	116	98	81	63	44	27	10
15	°43850	70°.0	347	326	306	287	266	247	227	208	189	171	153	135	117	99	81	63	45	28	10
16	°43919	70°.0	347	327	307	287	267	247	228	209	190	171	153	135	117	99	81	63	45	28	10
17	°43989	70°.0	348	328	308	288	267	248	228	209	190	172	153	135	117	99	81	63	45	28	10
18	°44060	71°.0	349	328	308	289	268	249	229	210	191	172	153	135	117	99	82	64	45	28	10
19	°44131	71°.0	350	329	309	289	268	249	229	210	191	173	154	136	118	100	82	64	45	28	10
20	°44201	71°.0	351	330	310	290	269	250	230	211	192	173	154	136	118	100	82	64	45	28	10
21	°44271	71°.0	352	331	311	291	270	251	231	212	192	173	154	136	118	100	82	64	45	28	10
22	°44342	71°.0	353	332	312	292	270	251	231	212	193	174	155	137	119	100	82	64	45	28	10
23	°44413	71°.0	354	333	312	292	271	252	232	213	193	174	155	137	119	101	83	65	45	28	10
24	°44484	71°.0	355	334	313	293	272	252	232	213	194	175	156	138	119	101	83	65	45	28	10
25	°44556	72°.0	356	335	314	294	273	253	233	214	194	175	156	138	120	101	83	65	46	28	11
26	°44627	71°.0	356	335	315	295	273	254	234	215	195	176	157	138	120	101	83	65	46	28	11
27	°44698	71°.0	357	336	316	296	274	254	234	215	195	176	157	139	120	101	83	65	46	28	11
28	°44769	71°.0	358	337	316	296	275	255	235	216	196	177	158	139	120	102	84	66	46	28	11
29	°44841	72°.0	359	338	317	297	275	255	235	216	196	177	158	140	121	102	84	66	46	28	11
30	°44912	71°.0	360	339	318	298	276	256	236	217	197	178	159	140	121	102	84	66	46	28	11
31	°44984	72°.0	361	340	319	299	277	257	237	217	197	178	159	140	121	102	84	66	46	28	11
32	°45056	72°.0	362	341	320	300	278	258	237	218	198	179	160	141	122	103	84	66	46	28	11

TABLE V.—*continued.*
Arguments—Apparent Zenith Distance and Reading of Barometer.

Zen. Dist.	BAROMETER.															
	in. 28°0	in. 28°2	in. 28°4	in. 28°6	in. 28°8	in. 29°0	in. 29°2	in. 29°4	in. 29°6	in. 29°8	in. 30°0	in. 30°2	in. 30°4	in. 30°6	in. 30°8	in. 31°0
	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
79. 12	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17
14	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17
16	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17
18	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17
20	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17
22	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17
24	1	2	3	4	5	7	8	9	10	11	12	13	14	15	17	17
26	1	2	3	4	5	7	8	9	10	11	12	14	15	16	17	18
28	1	2	3	5	6	7	8	9	10	11	12	14	15	16	17	18
30	1	2	3	5	6	7	8	9	10	11	12	14	15	16	17	18
32	1	2	3	5	6	7	8	9	10	11	12	14	15	16	17	18
34	1	2	3	5	6	7	8	9	10	11	12	14	15	16	17	18
36	1	2	4	5	6	7	8	9	11	12	13	14	15	16	17	18
38	1	2	4	5	6	7	8	9	11	12	13	14	15	16	17	18
40	1	2	4	5	6	7	8	9	11	12	13	14	15	16	17	18
42	1	2	4	5	6	7	8	9	11	12	13	14	15	16	17	18
44	1	2	4	5	6	7	8	9	11	12	13	14	15	16	17	18
46	1	2	4	5	6	7	8	10	11	12	13	14	15	17	17	19
48	1	2	4	5	6	7	8	10	11	12	13	14	15	17	18	19
50	1	2	4	5	6	7	8	10	11	12	13	14	15	17	18	19
52	1	2	4	5	6	7	8	10	11	12	13	14	15	17	18	19
54	1	2	4	5	6	7	8	10	11	12	13	14	15	17	18	19
56	1	2	4	5	6	7	9	10	11	12	13	15	16	17	18	19
58	1	2	4	5	6	7	9	10	11	12	13	15	16	17	18	19
80. 0	1	2	4	5	6	7	9	10	11	12	13	15	16	17	18	19
1	1	2	4	5	6	7	9	10	11	12	13	15	16	17	18	19
2	1	2	4	5	6	7	9	10	11	12	13	15	16	17	18	19
3	1	2	4	5	6	7	9	10	11	12	13	15	16	17	18	19
4	1	2	4	5	6	8	9	10	11	12	13	15	16	17	18	19
5	1	3	4	5	6	8	9	10	11	13	14	15	16	17	18	20
6	1	3	4	5	6	8	9	10	11	13	14	15	16	17	19	20
7	1	3	4	5	6	8	9	10	11	13	14	15	16	17	19	20
8	1	3	4	5	6	8	9	10	11	13	14	15	16	17	19	20
9	1	3	4	5	6	8	9	10	11	13	14	15	16	17	19	20
10	1	3	4	5	6	8	9	10	11	13	14	15	16	17	19	20
11	1	3	4	5	6	8	9	10	11	13	14	15	16	17	19	20
12	1	3	4	5	6	8	9	10	11	13	14	15	16	17	19	20
13	1	3	4	5	6	8	9	10	11	13	14	15	16	17	19	20
14	1	3	4	5	6	8	9	10	11	13	14	15	16	17	19	20
15	1	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
16	1	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
17	1	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
18	1	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
19	1	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
20	1	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
21	1	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
22	1	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
23	1	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
24	1	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
25	1	3	4	5	7	8	10	11	12	13	15	16	17	19	20	21
26	1	3	4	5	7	8	10	11	12	13	15	16	17	19	20	21
27	1	3	4	5	7	8	10	11	12	13	15	16	17	19	20	21
28	1	3	4	5	7	8	10	11	12	13	15	16	17	19	20	21
29	1	3	4	5	7	8	10	11	12	13	15	16	17	19	20	21
30	1	3	4	5	7	8	10	11	12	13	15	16	17	19	20	21
31	1	3	4	5	7	8	10	11	12	13	15	16	17	19	20	21
32	1	3	4	5	7	8	10	11	12	13	15	16	17	19	20	21
33	1	3	4	5	7	8	10	11	12	13	15	16	17	19	20	21
34	1	3	4	5	7	8	10	11	12	13	15	16	17	19	20	21
35	1	3	4	5	7	8	10	11	12	13	15	16	18	19	20	22
36	1	3	4	5	7	8	10	11	12	14	15	16	18	19	20	22
37	1	3	4	5	7	8	10	11	12	14	15	16	18	19	20	22
38	1	3	4	5	7	8	10	11	12	14	15	16	18	19	20	22
39	1	3	4	5	7	8	10	11	12	14	15	16	18	19	20	22
40	1	3	4	5	7	8	10	11	12	14	15	16	18	19	20	22
41	1	3	4	5	7	8	10	11	12	14	15	16	18	19	20	22
42	1	3	4	5	7	8	10	11	12	14	15	16	18	19	20	22
	in. 28°0	in. 28°2	in. 28°4	in. 28°6	in. 28°8	in. 29°0	in. 29°2	in. 29°4	in. 29°6	in. 29°8	in. 30°0	in. 30°2	in. 30°4	in. 30°6	in. 30°8	in. 31°0

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BESSEL'S REFRACTION TABLES.

TABLE III.—*contd.*

Arg.—App. Zen. Dist.

TABLE IV.—*continued.*

Arguments—Apparent Zenith Distance and Reading of Thermometer.

Zen. Dist.	Z.	Diff. for 1'	THERMOMETER.																		
			5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°
			t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
80. 42	2°45'77.9	73.0	372	350	329	308	287	265	244	223	203	183	164	144	125	106	86	67	48	29	11
43	45851	72.0	373	351	330	308	287	266	245	224	204	184	164	144	125	106	87	68	48	29	11
44	45925	74.0	374	352	331	309	288	267	245	225	204	184	165	145	125	106	87	68	48	29	11
45	45997	72.0	375	353	332	310	289	268	246	226	205	185	165	145	126	107	87	68	48	29	11
46	46070	73.0	376	354	332	311	290	268	247	226	206	186	165	145	126	107	87	68	49	30	11
47	46144	74.0	377	355	333	312	291	269	247	227	206	186	166	146	126	107	87	68	49	30	11
48	46217	73.0	378	356	334	312	291	270	248	228	207	187	166	146	126	107	88	69	49	30	11
49	46291	74.0	379	357	335	313	292	270	248	228	207	187	167	147	127	108	88	69	49	30	11
50	46364	73.0	380	358	336	314	293	271	249	229	208	188	167	147	127	108	88	69	49	30	11
51	46438	74.0	381	359	337	315	294	272	250	230	209	188	167	147	127	108	88	69	49	30	11
52	46512	74.0	382	360	338	316	295	273	251	230	209	189	168	148	128	109	89	69	49	30	11
53	46586	74.0	383	361	339	317	295	273	251	231	210	189	168	148	128	109	89	70	49	30	11
54	46660	74.0	384	362	340	318	296	274	252	231	210	190	169	149	129	109	89	70	49	30	11
55	46734	74.0	385	363	341	319	297	275	253	232	211	190	169	149	129	109	89	70	49	30	11
56	46808	74.0	387	364	342	319	298	276	254	233	212	191	170	150	129	110	90	70	50	31	12
57	46882	74.0	388	365	343	320	299	277	255	233	212	191	170	150	130	110	90	70	50	31	12
58	46957	75.0	389	366	344	321	299	277	255	234	213	192	171	151	130	110	90	71	50	31	12
59	47031	74.0	390	367	345	322	300	278	256	234	213	192	171	151	131	111	91	71	50	31	12
81. 0	47105	74.0	391	368	346	323	301	279	257	235	214	193	172	152	131	111	91	71	50	31	12
1	47180	75.0	392	369	347	324	302	280	258	236	215	194	172	152	131	111	91	71	50	31	12
2	47255	75.0	393	370	348	325	303	281	258	236	215	194	173	153	132	112	92	71	50	31	12
3	47330	75.0	394	371	349	326	304	282	259	237	216	195	173	153	132	112	92	72	51	31	12
4	47405	75.0	396	372	350	327	304	282	260	238	216	195	174	154	133	112	92	72	51	31	12
5	47480	75.0	397	373	351	328	305	283	261	239	217	196	174	154	133	113	93	72	51	31	12
6	47556	76.0	398	375	352	329	306	284	261	239	218	197	175	154	133	113	93	72	51	32	12
7	47632	76.0	399	376	353	330	307	285	262	240	218	197	175	155	134	113	93	72	51	32	12
8	47708	76.0	401	377	354	331	308	286	263	241	219	198	176	155	134	113	93	73	52	32	12
9	47784	76.0	402	378	355	332	309	287	263	241	219	198	176	156	135	114	94	73	52	32	12
10	47859	75.0	403	379	356	333	310	288	264	242	220	199	177	156	135	114	94	73	52	32	12
11	47935	76.0	404	380	357	334	311	289	265	243	221	200	178	156	135	114	94	73	52	32	12
12	48011	76.0	405	381	358	335	312	290	266	243	221	200	178	157	136	115	94	73	52	32	12
13	48087	76.0	406	382	359	336	313	290	266	244	222	201	179	157	136	115	95	74	52	32	12
14	48163	76.0	408	383	360	337	314	291	267	245	223	201	179	158	137	116	95	74	52	32	12
15	48240	77.0	409	384	361	338	314	292	268	246	224	202	180	158	137	116	95	74	52	32	12
16	48316	76.0	410	386	363	339	315	293	269	246	224	203	181	159	137	116	95	74	53	33	12
17	48393	77.0	411	387	364	340	316	294	270	247	225	203	181	159	138	117	95	74	53	33	12
18	48470	77.0	412	388	365	341	317	294	270	248	226	204	182	160	138	117	96	75	53	33	12
19	48547	77.0	414	389	366	342	318	295	271	248	226	204	182	160	139	118	96	75	53	33	12
20	48624	77.0	415	390	367	343	319	296	272	249	227	205	183	161	139	118	96	75	53	33	12
21	48701	77.0	416	391	368	344	320	297	273	250	228	206	184	161	139	118	96	75	53	33	12
22	48778	77.0	417	393	369	345	321	298	274	251	228	206	184	162	140	119	97	76	54	33	12
23	48856	78.0	419	394	370	346	322	299	275	252	229	207	185	162	140	119	97	76	54	33	12
24	48934	78.0	420	395	371	347	323	300	276	253	230	207	185	163	141	119	97	76	54	33	12
25	49011	78.0	421	397	372	348	324	301	277	254	231	208	186	163	141	120	98	77	55	33	12
26	49089	78.0	422	398	374	350	326	302	278	255	231	209	187	164	142	120	98	77	55	34	13
27	49167	78.0	424	399	375	351	327	303	279	256	232	209	187	164	142	120	98	77	55	34	13
28	49245	78.0	425	400	376	352	328	304	280	257	233	210	188	165	143	120	98	77	55	34	13
29	49323	78.0	426	402	377	353	329	305	281	258	233	210	188	165	143	121	99	78	56	34	13
30	49401	79.0	428	403	378	354	330	306	282	259	234	211	189	166	144	121	99	78	56	34	13
31	49480	79.0	429	404	379	355	331	307	283	260	235	212	190	167	144	121	99	78	56	34	13
32	49557	77.0	431	406	381	356	332	308	284	261	236	213	190	167	145	122	100	78	56	34	13
33	49636	78.0	432	407	382	358	333	309	285	262	236	213	191	168	145	122	100	79	57	34	13
34	49714	79.0	434	409	384	359	334	310	286	263	237	214	191	168	146	123	101	79	57	34	13
35	49793	79.0	435	410	385	360	335	311	287	264	238	215	192	169	146	123	101	79	57	34	13
36	49873	80.0	437	411	386	361	337	312	288	264	239	216	193	170	147	124	101	79	57	35	13
37	49951	80.0	438	413	388	362	338	313	289	265	240	217	193	170	147	124	102	79	57	35	13
38	50031	80.0	440	414	389	364	339	314	290	266	240	217	194	171	148	125	102	80			

BESSEL'S REFRACTION TABLES.

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TABLE V.—*continued.*
 Arguments—Apparent Zenith Distance and Reading of Barometer.

Zen. Dist.	BAROMETER.															
	in. 28°0	in. 28°2	in. 28°4	in. 28°6	in. 28°8	in. 29°0	in. 29°2	in. 29°4	in. 29°6	in. 29°8	in. 30°0	in. 30°2	in. 30°4	in. 30°6	in. 30°8	in. 31°0
	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
80.42	1	3	4	6	7	8	10	11	12	14	15	16	18	19	20	22
43	1	3	4	6	7	8	10	11	12	14	15	16	18	19	21	22
44	1	3	4	6	7	8	10	11	12	14	15	16	18	19	21	22
45	1	3	4	6	7	9	10	11	13	14	15	17	18	19	21	22
46	1	3	4	6	7	9	10	11	13	14	15	17	18	19	21	22
47	1	3	4	6	7	9	10	11	13	14	15	17	18	19	21	22
48	1	3	4	6	7	9	10	11	13	14	15	17	18	19	21	22
49	1	3	4	6	7	9	10	11	13	14	15	17	18	19	21	22
50	1	3	4	6	7	9	10	11	13	14	15	17	18	19	21	22
51	1	3	4	6	7	9	10	11	13	14	15	17	18	19	21	22
52	1	3	4	6	7	9	10	11	13	14	15	17	18	19	21	22
53	1	3	4	6	7	9	10	11	13	14	15	17	18	19	21	22
54	1	3	4	6	7	9	10	11	13	14	15	17	18	19	21	22
55	1	3	4	6	7	9	10	11	13	14	15	17	18	19	21	22
56	1	3	4	6	7	9	10	12	13	15	16	17	19	20	21	23
57	1	3	4	6	7	9	10	12	13	15	16	17	19	20	21	23
58	1	3	4	6	7	9	10	12	13	15	16	17	19	20	21	23
59	1	3	4	6	7	9	10	12	13	15	16	17	19	20	21	23
81. 0	1	3	4	6	7	9	10	12	13	15	16	17	19	20	21	23
1	1	3	4	6	7	9	10	12	13	15	16	17	19	20	21	23
2	1	3	4	6	7	9	10	12	13	15	16	17	19	20	21	23
3	1	3	4	6	7	9	10	12	13	15	16	17	19	20	21	23
4	1	3	4	6	7	9	10	12	13	15	16	17	19	20	21	23
5	1	3	4	6	7	9	10	12	13	15	16	17	19	20	21	23
6	1	3	5	6	8	9	11	12	14	15	16	18	19	21	22	24
7	1	3	5	6	8	9	11	12	14	15	16	18	19	21	22	24
8	1	3	5	6	8	9	11	12	14	15	16	18	19	21	22	24
9	1	3	5	6	8	9	11	12	14	15	16	18	19	21	22	24
10	1	3	5	6	8	9	11	12	14	15	16	18	19	21	22	24
11	1	3	5	6	8	9	11	12	14	15	16	18	19	21	22	24
12	1	3	5	6	8	9	11	12	14	15	16	18	19	21	22	24
13	1	3	5	6	8	9	11	12	14	15	16	18	19	21	22	24
14	1	3	5	6	8	9	11	12	14	15	16	18	19	21	22	24
15	1	3	5	6	8	9	11	12	14	15	16	18	19	21	22	24
16	2	3	5	6	8	9	11	13	14	15	17	19	20	22	23	25
17	2	3	5	6	8	9	11	13	14	15	17	19	20	22	23	25
18	2	3	5	6	8	9	11	13	14	15	17	19	20	22	23	25
19	2	3	5	6	8	9	11	13	14	15	17	19	20	22	23	25
20	2	3	5	6	8	9	11	13	14	15	17	19	20	22	23	25
21	2	3	5	6	8	9	11	13	14	15	17	19	20	22	23	25
22	2	3	5	6	8	9	11	13	14	15	17	19	20	22	23	25
23	2	3	5	6	8	9	11	13	14	15	17	19	20	22	23	25
24	2	3	5	6	8	9	11	13	14	15	17	19	20	22	23	25
25	2	3	5	6	8	9	11	13	14	15	17	19	20	22	23	25
26	2	3	5	7	8	10	11	13	15	16	18	19	21	22	24	25
27	2	3	5	7	8	10	11	13	15	16	18	19	21	22	24	25
28	2	3	5	7	8	10	11	13	15	16	18	19	21	22	24	25
29	2	3	5	7	8	10	11	13	15	16	18	19	21	22	24	25
30	2	3	5	7	8	10	11	13	15	16	18	19	21	22	24	25
31	2	3	5	7	8	10	11	13	15	16	18	19	21	22	24	25
32	2	3	5	7	8	10	11	13	15	16	18	19	21	22	24	25
33	2	3	5	7	8	10	11	13	15	16	18	19	21	22	24	25
34	2	3	5	7	8	10	11	13	15	16	18	19	21	22	24	25
35	2	3	5	7	8	10	11	13	15	16	18	19	21	22	24	25
36	2	3	5	7	8	10	12	13	15	16	18	20	22	23	25	26
37	2	3	5	7	8	10	12	13	15	16	18	20	22	23	25	26
38	2	3	5	7	8	10	12	13	15	16	18	20	22	23	25	26
39	2	3	5	7	8	10	12	13	15	16	18	20	22	23	25	26
40	2	3	5	7	8	10	12	13	15	16	18	20	22	23	25	26
41	2	3	5	7	8	10	12	13	15	16	18	20	22	23	25	26
42	2	3	5	7	8	10	12	13	15	16	18	20	22	23	25	26
43	2	3	5	7	8	10	12	13	15	16	18	20	22	23	25	26
44	2	3	5	7	8	10	12	13	15	16	18	20	22	23	25	26
45	2	3	5	7	8	11	12	13	15	16	18	20	22	23	25	26
46	2	3	5	7	9	11	12	14	16	17	19	20	22	24	26	27
47	2	3	5	7	9	11	12	14	16	17	19	20	22	24	26	27
48	2	3	5	7	9	11	12	14	16	17	19	20	22	24	26	27
	in. 28°0	in. 28°2	in. 28°4	in. 28°6	in. 28°8	in. 29°0	in. 29°2	in. 29°4	in. 29°6	in. 29°8	in. 30°0	in. 30°2	in. 30°4	in. 30°6	in. 30°8	in. 31°0

TABLE III.—*contd.*

Arg.—App. Zen. Dist.

Zen. Dist.	Z.	Diff. for 1'
81.48	2°50830	80.0
49	50911	81.0
50	50991	80.0
51	51072	81.0
52	51153	82.0
53	51235	81.0
54	51316	81.0
55	51397	82.0
56	51479	82.0
57	51561	82.0
58	51643	82.0
59	51725	82.0
82.0	51807	82.0
1	51889	82.0
2	51971	83.0
3	52054	83.0
4	52137	83.0
5	52219	83.0
6	52302	84.0
7	52386	84.0
8	52469	84.0
9	52552	84.0
10	52636	84.0
11	52719	84.0
12	52803	85.0
13	52886	85.0
14	52970	85.0
15	53054	85.0
16	53138	85.0
17	53223	85.0
18	53307	85.0
19	53392	85.0
20	53476	85.0
21	53561	85.0
22	53647	85.0
23	53732	85.0
24	53817	86.0
25	53903	86.0
26	53988	86.0
27	54074	86.0
28	54160	86.0
29	54246	86.0
30	54332	86.0
31	54419	87.0
32	54506	87.0
33	54593	87.0
34	54679	87.0
35	54766	87.0
36	54854	88.0
37	54941	87.0
38	55028	87.0
39	55115	88.0
40	55203	88.0
41	55291	88.0
42	55379	88.0
43	55467	88.0
44	55556	88.0
45	55644	88.0
46	55733	88.0
47	55821	88.0
48	55910	89.0
49	55999	89.0
50	56088	89.0
51	56178	90.0
52	56268	90.0
53	56357	90.0
54	56447	90.0

TABLE IV.—*continued.*

Arguments—Apparent Zenith Distance and Reading of Thermometer.

THERMOMETER.																		
5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°
t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
456	429	403	376	351	326	300	275	249	225	201	177	153	129	106	82	60	36	14
457	431	405	378	352	327	301	276	250	225	201	177	153	130	107	83	60	36	14
459	432	406	379	353	328	302	277	251	226	202	178	154	130	107	83	60	36	14
461	434	407	380	354	329	303	278	252	227	203	179	154	130	107	83	60	36	14
462	435	409	382	356	330	304	279	253	228	203	179	155	131	108	84	60	36	14
464	437	410	383	357	331	305	280	254	229	204	180	155	131	108	84	61	37	14
465	438	412	385	358	332	306	281	255	230	205	180	156	132	108	84	61	37	14
467	440	413	386	360	333	307	282	256	230	206	181	156	132	109	85	61	37	14
469	442	414	387	361	335	309	283	257	231	206	182	157	133	109	85	61	37	14
470	443	416	389	362	336	310	284	258	232	207	182	157	133	109	85	61	37	14
472	445	417	390	363	337	311	285	259	233	208	183	158	134	109	85	62	38	14
473	446	419	392	365	338	312	286	260	234	208	183	158	134	110	86	62	38	14
475	448	420	393	366	339	313	287	261	235	209	184	159	135	110	86	62	38	14
477	449	421	394	367	340	314	288	262	236	210	185	160	135	110	86	62	38	14
479	451	423	396	369	342	315	289	263	237	211	185	160	136	111	87	63	38	14
481	452	424	397	370	343	316	290	264	238	211	186	161	136	111	87	63	39	14
483	454	426	399	371	344	317	291	265	239	212	187	161	137	112	87	63	39	14
484	455	427	400	373	346	318	292	266	240	213	188	162	137	112	88	64	39	14
486	457	429	401	374	347	319	293	267	240	214	188	163	138	113	88	64	39	15
488	459	431	403	375	348	320	294	268	241	215	189	163	138	113	88	64	39	15
490	460	432	404	376	349	322	295	269	242	215	190	164	139	113	88	64	40	15
492	462	434	406	378	351	323	296	270	243	216	190	164	139	114	89	65	40	15
494	464	436	407	379	352	324	297	271	244	217	191	165	140	114	89	65	40	15
496	466	438	409	380	353	325	298	272	245	218	192	166	140	114	89	65	40	15
498	468	439	410	382	355	327	299	273	246	219	192	166	141	115	90	65	40	15
500	470	441	412	383	356	328	301	274	247	219	193	167	141	115	90	66	41	15
502	472	442	413	385	357	329	302	275	248	220	194	168	142	116	91	66	41	15
503	474	444	415	386	359	331	303	276	249	221	195	169	142	116	91	66	41	15
505	475	446	417	388	360	332	304	277	250	222	195	169	143	117	91	66	41	15
507	477	447	418	389	361	333	305	278	251	223	196	170	143	117	92	66	41	15
509	479	449	420	391	362	334	307	279	252	223	197	171	144	118	92	67	42	15
511	481	450	421	392	364	336	308	280	253	224	197	171	144	118	93	67	42	15
513	483	452	423	394	365	337	309	281	254	225	198	172	145	119	93	67	42	15
515	485	454	425	395	366	338	310	282	255	226	199	173	146	119	93	67	42	15
517	487	456	426	397	368	340	311	283	256	227	200	173	146	120	94	68	42	15
519	488	457	428	398	369	341	313	284	257	228	200	174	147	120	94	68	42	15
521	490	459	429	400	371	342	314	285	258	229	201	174	147	121	94	68	42	15
523	492	461	431	401	372	344	315	286	259	230	202	175	148	121	94	68	42	15
524	494	463	432	403	373	345	316	288	259	230	203	176	148	121	95	69	43	16
526	496	465	434	404	375	346	317	280	260	231	204	176	149	122	95	69	43	16
528	497	466	436	406	376	347	319	290	261	232	204	177	149	122	95	69	43	16
530	499	468	437	407	378	349	320	291	262	233	205	177	150	123	96	70	43	16
532	501	470	439	409	379	350	321	292	263	234	206	178	151	123	96	70	43	16
534	503	472	441	411	380	351	322	293	264	235	207	179	151	123	96	70	43	16
536	505	474	443	412	382	353	323	294	265	236	208	179	152	124	97	70	43	16
538	507	476	444	414	383	354	324	295	266	237	208	180	152	124	97	71	44	16
540	509	478	446	415	385	355	326	296	267	237	209	181	153	125	98	71	44	16
542	511	479	448	417	386	357	327	297	268	238	210	182	153	125	98	71	44	16
544	513	481	450	419	388	358	328	299	269	239	211	182	154	126	98	71	44	16
546	515	483	452	420	389	359	329	300	270	240	212	183	154	126	99	71	44	16
548	517	485	453	422	391	360	331	301	271	241	212	184	155	127	99	72	45	16
550	519	487	455	423	392	362	332	302	272	242	213	184	155	127	100	72	45	16
553	521	489	457	425	394	363	333	303	273	243	214	185	156	128	100	72	45	16
555	523	491	459	427	396	364	334	304	274	244	215	186	157	128	100	72	45	16
557	525	493	461	428	397	366	335	305	275	245	216	186	157	129	101	73	45	16
560	527	495	462	430	399	367	337	307	276	246	216	187	158	129	101	73	45	16
562	529	497	464	432	400	369	338	308	277	247	217	188	159	130	102	73	45	16
564	531	498	466	434	402	370	340	309	279	249	218	189	160	130	102	74	45	16
566	533	500	468	435	404	372	341	310	280	250	219	189	160	131	102	74	46	17
568	535	502	469	437	405	373	342	311	281	251	220	190	161	131	103	74	46	17
571	537	504	471	439	407	375	343	313	282	252	220	191	162	132	103	74	46	17
573	539	506	473	440	408	376	345	314	283	253	221	191	162	132	104	75	46	17
575	541	508	475	442	410	378	346	315	284	254	222	192	163	133	104	75	46	17
577	543	510	477	444	412	379	347	316	286	255	223	193	164	133	104	75	46	17
580	545	512	479	446	413	381	349	318	288	256	224	194	164	134	105	76	46	17
582	548	514	481	447	415	382	350	319	289	257	225	194	165	134	105	76	47	17
584	550	516	483	449	416	384	352	320	289	258	226	195	165	135	106	76	47	17
5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°

BESSEL'S REFRACTION TABLES.

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TABLE V—continued.

Arguments—Apparent Zenith Distance and Reading of Barometer.

Zen. Dist.	BAROMETER.															
	in. 28.0	in. 28.2	in. 28.4	in. 28.6	in. 28.8	in. 29.0	in. 29.2	in. 29.4	in. 29.6	in. 29.8	in. 30.0	in. 30.2	in. 30.4	in. 30.6	in. 30.8	in. 31.0
	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
81.48	2	3	5	7	9	11	12	14	16	17	19	20	22	24	26	27
49	2	3	5	7	9	11	12	14	16	17	19	20	22	24	26	27
50	2	3	5	7	9	11	12	14	16	17	19	20	22	24	26	27
51	2	3	5	7	9	11	12	14	16	17	19	20	22	24	26	27
52	2	3	5	7	9	11	12	14	16	17	19	20	22	24	26	27
53	2	3	5	7	9	11	12	14	16	17	19	20	22	24	26	27
54	2	3	5	7	9	11	12	14	16	17	19	20	22	24	26	27
55	2	3	5	7	9	11	12	14	16	17	19	20	22	24	26	27
56	2	4	5	7	9	11	13	14	16	18	20	21	23	25	27	28
57	2	4	5	7	9	11	13	14	16	18	20	21	23	25	27	28
58	2	4	5	7	9	11	13	14	16	18	20	21	23	25	27	28
59	2	4	5	7	9	11	13	14	16	18	20	21	23	25	27	28
82. 0	2	4	5	7	9	11	13	14	16	18	20	21	23	25	27	28
1	2	4	5	7	9	11	13	14	16	18	20	21	23	25	27	28
2	2	4	5	7	9	11	13	14	16	18	20	21	23	25	27	28
3	2	4	5	7	9	11	13	14	16	18	20	21	23	25	27	28
4	2	4	5	7	9	11	13	14	16	18	20	21	23	25	27	28
5	2	4	5	7	9	11	13	14	16	18	20	21	23	25	27	28
6	2	4	6	8	9	11	13	15	17	19	20	22	24	26	28	29
7	2	4	6	8	9	11	13	15	17	19	20	22	24	26	28	29
8	2	4	6	8	9	11	13	15	17	19	20	22	24	26	28	29
9	2	4	6	8	9	11	13	15	17	19	20	22	24	26	28	29
10	2	4	6	8	9	11	13	15	17	19	20	22	24	26	28	29
11	2	4	6	8	9	11	13	15	17	19	20	22	24	26	28	29
12	2	4	6	8	9	11	13	15	17	19	20	22	24	26	28	29
13	2	4	6	8	9	11	13	15	17	19	20	22	24	26	28	29
14	2	4	6	8	9	11	13	15	17	19	20	22	24	26	28	30
15	2	4	6	8	9	11	13	15	17	19	21	23	24	26	28	30
16	2	4	6	8	10	12	14	16	18	19	21	23	25	27	29	30
17	2	4	6	8	10	12	14	16	18	19	21	23	25	27	29	30
18	2	4	6	8	10	12	14	16	18	19	21	23	25	27	29	31
19	2	4	6	8	10	12	14	16	18	19	21	23	25	27	29	31
20	2	4	6	8	10	12	14	16	18	19	21	23	25	27	29	31
21	2	4	6	8	10	12	14	16	18	19	21	23	25	27	29	31
22	2	4	6	8	10	12	14	16	18	19	21	23	25	27	29	31
23	2	4	6	8	10	12	14	16	18	19	21	23	25	27	29	31
24	2	4	6	8	10	12	14	16	18	19	21	23	25	27	29	31
25	2	4	6	8	10	12	14	16	18	19	21	23	25	27	29	31
26	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
27	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
28	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
29	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
30	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
31	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
32	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
33	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
34	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
35	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
36	2	4	6	8	11	13	15	17	19	21	23	25	27	29	31	33
37	2	4	6	8	11	13	15	17	19	21	23	25	27	29	31	33
38	2	4	6	8	11	13	15	17	19	21	23	25	27	29	31	33
39	2	4	6	8	11	13	15	17	19	21	23	25	27	29	31	33
40	2	4	6	8	11	13	15	17	19	21	23	25	27	29	31	33
41	2	4	6	8	11	13	15	17	19	21	23	25	27	29	31	33
42	2	4	6	8	11	13	15	17	19	21	23	25	27	29	31	33
43	2	4	6	8	11	13	15	17	19	21	23	25	27	29	31	33
44	2	4	6	8	11	13	15	17	19	21	23	25	27	29	31	33
45	2	4	6	8	11	13	15	17	19	21	23	25	27	29	31	33
46	2	4	7	9	11	13	15	18	20	22	24	26	28	30	32	34
47	2	4	7	9	11	13	15	18	20	22	24	26	28	30	32	34
48	2	4	7	9	11	13	15	18	20	22	24	26	28	30	32	34
49	2	4	7	9	11	13	15	18	20	22	24	26	28	30	32	34
50	2	4	7	9	11	13	15	18	20	22	24	26	28	30	32	34
51	2	4	7	9	11	13	15	18	20	22	24	26	28	30	32	34
52	2	4	7	9	11	13	15	18	20	22	24	26	28	30	32	34
53	2	4	7	9	11	13	15	18	20	22	24	26	28	30	32	34
54	2	4	7	9	11	13	15	18	20	22	24	26	28	30	32	34
	in. 28.0	in. 28.2	in. 28.4	in. 28.6	in. 28.8	in. 29.0	in. 29.2	in. 29.4	in. 29.6	in. 29.8	in. 30.0	in. 30.2	in. 30.4	in. 30.6	in. 30.8	in. 31.0

TABLE III.—*contd.*

Arg.—App. Zen. Dist.

TABLE IV.—*continued.*

Arguments—Apparent Zenith Distance and Reading of Thermometer.

Zen. Dist.	Z.	Diff. for 1'	THERMOMETER.																
			5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°
			t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
82.54	2.56447	90.0	584	550	516	483	449	416	384	352	320	289	258	226	195	165	135	106	76
55	56537	90.0	587	552	518	485	451	418	385	353	322	290	259	226	196	166	135	106	77
56	56628	91.0	589	554	520	487	453	420	387	354	323	291	260	227	197	167	136	106	77
57	56718	90.0	591	556	522	488	455	421	388	356	324	292	261	228	198	167	136	107	77
58	56809	91.0	593	559	524	490	456	423	390	357	325	294	262	229	198	168	137	107	77
59	56900	91.0	596	561	527	492	458	424	391	359	327	295	263	230	199	168	137	108	78
83.0	56991	91.0	598	563	529	494	460	426	393	360	328	296	264	231	200	169	138	108	78
1	57082	91.0	600	565	531	496	462	428	394	361	329	297	265	232	201	170	139	108	78
2	57174	92.0	603	567	533	498	464	429	396	363	331	298	266	233	202	170	139	109	79
3	57265	91.0	605	570	535	500	466	431	397	364	332	299	267	234	202	171	140	109	79
4	57356	91.0	607	572	537	502	468	433	399	366	333	300	268	235	203	172	140	110	79
5	57448	92.0	610	574	539	504	469	435	400	367	335	302	269	236	204	173	141	110	80
6	57540	92.0	612	576	541	506	471	436	402	368	336	303	270	237	205	173	142	110	80
7	57633	93.0	614	578	543	508	473	438	403	370	337	304	271	238	206	174	142	111	80
8	57725	92.0	616	580	545	510	475	440	405	371	338	305	272	239	206	175	143	111	80
9	57818	93.0	619	583	547	512	477	441	406	373	340	306	273	240	207	175	143	112	81
10	57910	92.0	621	585	549	514	479	443	408	374	341	307	274	241	208	176	144	112	81
11	58003	93.0	623	587	551	516	481	445	410	375	342	308	275	242	209	177	145	112	81
12	58097	94.0	626	590	553	518	483	447	411	377	344	309	276	243	210	177	145	113	82
13	58190	93.0	628	592	556	520	485	448	413	378	345	311	277	244	210	178	146	113	82
14	58284	94.0	631	594	558	522	487	450	415	380	346	312	278	245	211	179	146	114	82
15	58377	93.0	633	597	560	524	488	452	417	381	348	313	279	246	212	180	147	114	83
16	58471	94.0	636	599	562	526	490	454	418	383	349	314	280	247	213	180	148	115	83
17	58565	94.0	638	601	564	528	492	456	420	384	350	315	281	248	214	181	148	115	83
18	58659	94.0	641	603	567	530	494	457	422	386	351	317	282	249	214	182	149	116	83
19	58754	95.0	643	606	569	532	496	459	423	387	353	318	284	250	215	182	149	116	84
20	58849	95.0	646	608	571	534	498	461	425	389	354	319	285	251	216	183	150	117	84
21	58943	94.0	648	610	573	536	500	463	427	390	355	320	286	252	217	184	150	117	84
22	59038	95.0	651	613	575	538	502	465	428	392	357	321	287	253	218	184	151	118	85
23	59133	95.0	653	615	578	540	503	466	430	393	358	323	288	254	218	185	151	118	85
24	59228	95.0	656	617	580	542	505	468	431	395	360	324	289	255	219	186	152	118	85
25	59323	95.0	658	620	582	544	507	470	433	396	361	325	290	255	220	187	152	119	86
26	59419	96.0	660	622	584	546	509	472	435	398	362	326	292	256	221	187	153	119	86
27	59514	95.0	663	624	586	548	511	474	436	399	364	327	293	257	222	188	153	120	86
28	59610	96.0	665	626	589	550	512	475	438	401	365	329	294	258	222	189	154	120	86
29	59706	96.0	668	629	591	552	514	477	439	402	367	330	295	259	223	189	154	121	87
30	59802	96.0	670	631	593	554	516	479	441	404	368	331	296	260	224	190	155	121	87
31	59899	97.0	673	633	595	556	518	481	443	406	369	332	297	261	225	191	156	121	87
32	59995	96.0	675	636	598	559	520	483	445	407	371	334	298	262	226	191	156	122	88
33	60092	97.0	678	638	600	561	522	484	446	409	372	335	299	263	227	192	157	122	88
34	60189	97.0	681	641	602	563	524	486	448	411	374	336	300	264	228	193	157	123	89
35	60286	97.0	684	643	605	565	526	488	450	413	375	338	301	265	229	194	158	123	89
36	60383	97.0	686	646	607	567	528	490	452	414	376	339	303	266	230	194	159	124	89
37	60481	98.0	689	648	609	569	530	492	454	416	378	340	304	267	231	195	159	124	90
38	60579	98.0	692	651	611	572	532	493	455	418	379	341	305	268	232	196	160	125	90
39	60677	98.0	694	653	614	574	534	495	457	419	381	343	306	269	233	196	160	125	91
40	60775	98.0	697	656	616	576	536	497	459	421	382	344	307	270	234	197	161	126	91
41	60873	98.0	700	659	618	578	538	499	461	423	383	345	308	271	235	198	162	126	91
42	60972	99.0	703	661	621	580	540	501	463	424	385	347	309	272	236	199	162	127	92
43	61070	98.0	705	664	623	583	543	503	464	426	386	348	311	273	237	199	163	127	92
44	61169	99.0	708	667	626	585	545	505	466	427	388	350	312	274	238	200	164	128	92
45	61268	99.0	711	670	628	587	547	507	468	429	389	351	313	275	239	201	165	128	92
46	61366	98.0	714	672	630	589	549	509	470	431	391	352	314	276	239	202	165	129	93
47	61466	100.0	717	675	633	591	551	511	472	432	392	354	315	278	240	203	166	129	93
48	61565	99.0	719	677	635	594	554	513	473	434	394	355	317	279	241	203	167	130	93
49	61665	100.0	722	680	638	596	556	515	475	435	395	357	318	280	242	204	167	130	94
50	61765	100.0	725	683	640	598	558	517	477	437	397	358	319	281	243	205	168	131	94
51	61866	101.0	728	686	643	600	560	519	479	439	399	359	320	282	244	206	169	131	94
52	61966	100.0	731	688	645	603	562	521	481	441	400	361	322	283	245	207	169	132	95
53	62066	100.0	734	691	648	605	565	523	483	442	402	362	323	284	246	208	170	132	95
54	62167	101.0	737	694	651	608	567	525	485	444	403	363	324	285	247	209	170	133	96
55	62267	100.0	739	697	654	610	569	527	487	446	405	365	326	286	248	210	171	133	96
56	62369	102.0	742	699	656	613	571	530	488	448	407	366	327	288	249	210	172	134	96
57	62470	101.0	745	702	659	615	573	532	490	450	408	368	328	289	250	211	172	134	97
58	62572	102.0	748	705	662	618	576	534	492	451	410	369	329	290	251	212	173	135	97
59	62673	101.0	751	707	664	620	578	536	494	453	411	371	331	291	252	213	173	135	98
84.0	2.62775	102.0	754	710	667	623	580	538	496	455	413	372	332	292	253	214	174	136	98
			5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°

TABLE V.—*continued*.

Arguments—Apparent Zenith Distance and Reading of Barometer.

Zen. Dist.	BAROMETER.															
	in. 28° 0	in. 28° 2	in. 28° 4	in. 28° 6	in. 28° 8	in. 29° 0	in. 29° 2	in. 29° 4	in. 29° 6	in. 29° 8	in. 30° 0	in. 30° 2	in. 30° 4	in. 30° 6	in. 30° 8	in. 31° 0
	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
82. 54	2	4	7	9	11	13	15	18	20	22	24	26	28	30	32	34
55	2	4	7	9	11	13	15	18	20	22	25	26	28	30	32	34
56	2	5	7	9	11	14	16	18	20	22	25	27	29	31	33	35
57	2	5	7	9	11	14	16	18	20	22	25	27	29	31	33	35
58	2	5	7	9	11	14	16	18	20	22	25	27	29	31	33	35
59	2	5	7	9	11	14	16	18	20	22	25	27	29	31	33	35
83. 0	2	5	7	9	11	14	16	18	20	22	25	27	29	31	33	35
1	2	5	7	9	11	14	16	18	20	22	25	27	29	31	33	35
2	2	5	7	9	11	14	16	18	20	22	25	27	29	31	33	36
3	2	5	7	9	11	14	16	18	20	22	25	27	29	31	34	36
4	2	5	7	9	11	14	16	18	20	22	25	27	29	31	34	36
5	2	5	7	9	12	14	16	18	21	23	26	28	30	32	34	36
6	2	5	7	9	12	14	16	19	21	23	26	28	30	32	34	36
7	2	5	7	9	12	14	16	19	21	23	26	28	30	32	34	36
8	2	5	7	9	12	14	16	19	21	23	26	28	30	32	34	36
9	2	5	7	9	12	14	16	19	21	23	26	28	30	32	35	37
10	2	5	7	9	12	14	16	19	21	23	26	28	30	32	35	37
11	2	5	7	9	12	14	16	19	21	23	26	28	30	32	35	37
12	2	5	7	9	12	14	16	19	21	23	26	28	30	32	35	37
13	2	5	7	9	12	14	16	19	21	23	26	28	30	33	35	37
14	2	5	7	9	12	14	16	19	21	23	26	28	30	33	35	37
15	2	5	7	10	12	14	16	19	21	23	26	28	30	33	36	38
16	2	5	7	10	12	15	17	20	22	24	27	29	31	33	36	38
17	2	5	7	10	12	15	17	20	22	24	27	29	31	33	36	38
18	2	5	7	10	12	15	17	20	22	24	27	29	31	33	36	38
19	2	5	7	10	12	15	17	20	22	24	27	29	31	34	36	38
20	2	5	7	10	12	15	17	20	22	24	27	29	31	34	36	38
21	2	5	7	10	12	15	17	20	22	24	27	29	31	34	36	38
22	2	5	7	10	12	15	17	20	22	24	27	29	31	34	36	38
23	2	5	7	10	12	15	17	20	22	24	27	29	31	34	36	39
24	2	5	7	10	12	15	17	20	22	24	27	29	31	34	36	39
25	2	5	8	10	13	15	18	20	22	25	28	30	32	35	37	39
26	2	5	8	10	13	15	18	20	23	25	28	30	32	35	37	39
27	2	5	8	10	13	15	18	20	23	25	28	30	32	35	37	39
28	2	5	8	10	13	15	18	20	23	25	28	30	32	35	37	40
29	2	5	8	10	13	15	18	20	23	25	28	30	32	35	37	40
30	2	5	8	10	13	15	18	20	23	25	28	30	32	35	37	40
31	2	5	8	10	13	15	18	20	23	25	28	30	32	35	37	40
32	2	5	8	10	13	15	18	20	23	25	28	30	32	35	37	40
33	2	5	8	10	13	15	18	20	23	25	28	30	33	36	38	41
34	2	5	8	10	13	15	18	20	23	25	28	30	33	36	38	41
35	3	5	8	11	13	16	19	21	24	26	29	31	33	36	38	41
36	3	5	8	11	13	16	19	21	24	26	29	31	33	36	38	41
37	3	5	8	11	13	16	19	21	24	26	29	31	33	36	38	41
38	3	5	8	11	13	16	19	21	24	26	29	31	34	37	39	41
39	3	5	8	11	13	16	19	21	24	26	29	31	34	37	39	41
40	3	5	8	11	13	16	19	21	24	26	29	31	34	37	39	41
41	3	5	8	11	13	16	19	21	24	26	29	31	34	37	39	41
42	3	5	8	11	13	16	19	21	24	27	29	32	34	37	39	41
43	3	5	8	11	13	16	19	21	24	27	29	32	35	37	40	42
44	3	5	8	11	13	16	19	21	24	27	29	32	35	37	40	42
45	3	6	8	11	14	17	19	22	25	27	30	32	35	38	40	42
46	3	6	8	11	14	17	19	22	25	27	30	32	35	38	40	42
47	3	6	8	11	14	17	19	22	25	27	30	32	35	38	40	42
48	3	6	8	11	14	17	19	22	25	28	30	33	36	38	41	43
49	3	6	8	11	14	17	19	22	25	28	30	33	36	38	41	43
50	3	6	8	11	14	17	19	22	25	28	30	33	36	38	41	43
51	3	6	8	11	14	17	19	22	25	28	30	33	36	38	41	43
52	3	6	8	11	14	17	19	22	25	28	30	33	36	38	41	43
53	3	6	8	11	14	17	19	22	25	28	31	33	36	39	42	44
54	3	6	8	11	14	17	19	22	25	28	31	33	36	39	42	44
55	3	6	9	11	15	18	20	23	26	29	31	34	37	39	42	44
56	3	6	9	11	15	18	20	23	26	29	31	34	37	39	42	44
57	3	6	9	11	15	18	20	23	26	29	31	34	37	39	42	44
58	3	6	9	11	15	18	20	23	26	29	32	34	37	40	43	45
59	3	6	9	11	15	18	20	23	26	29	32	34	37	40	43	45
84. 0	3	6	9	11	15	18	20	23	26	29	32	34	37	40	43	45

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BESSEL'S REFRACTION TABLES.

TABLE III.— <i>concl'd.</i>			TABLE IV.— <i>concluded.</i>																		
Arg.—App. Zen. Dist.			Arguments—Apparent Zenith Distance and Reading of Thermometer.																		
Zen. Dist.	Z.	Diff. for 1'	THERMOMETER.																		
			5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°
t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
84. 0	2.62775	102.0	754	710	667	623	580	538	496	455	413	372	332	292	253	214	174	136	98	61	23
1	.62877	102.0	757	713	670	626	582	540	498	457	415	374	333	293	254	215	175	137	98	61	23
2	.62979	102.0	761	716	673	628	585	543	500	459	417	375	335	295	255	216	176	137	99	61	23
3	.63081	103.0	764	719	675	631	587	545	502	461	419	377	336	296	256	217	176	138	99	62	23
4	.63184	103.0	767	722	678	634	590	547	504	463	421	378	338	297	257	218	177	138	100	62	23
5	.63287	103.0	771	725	681	637	592	550	506	465	423	380	339	299	258	219	178	139	100	62	23
6	.63390	103.0	774	728	684	639	595	552	509	467	424	382	340	300	259	219	179	140	100	62	23
7	.63493	103.0	777	731	687	642	597	554	511	468	426	383	342	301	260	220	180	140	101	62	24
8	.63596	103.0	780	735	689	645	600	556	513	470	428	385	343	302	262	221	180	141	101	63	24
9	.63699	104.0	784	738	692	647	602	559	515	472	430	386	345	304	263	222	181	141	102	63	24
10	.63803	104.0	787	741	695	650	605	561	517	474	432	388	346	305	264	223	182	142	102	63	24
11	.63907	104.0	790	744	698	653	608	563	519	476	434	390	348	306	265	224	183	143	102	63	24
12	.64012	105.0	794	748	701	656	610	566	522	478	436	392	349	308	266	225	184	143	103	64	24
13	.64116	104.0	797	751	704	659	613	568	524	480	438	393	351	309	268	226	184	144	103	64	24
14	.64221	105.0	801	754	707	662	616	571	526	482	440	395	352	310	269	227	185	144	104	64	24
15	.64325	105.0	804	758	710	664	619	573	529	484	441	397	354	312	270	228	186	145	104	64	24
16	.64430	106.0	807	761	713	667	621	576	531	487	443	399	356	313	271	229	187	146	105	65	25
17	.64536	106.0	811	764	717	670	624	578	533	489	445	401	357	314	272	230	188	146	105	65	25
18	.64641	105.0	814	767	720	673	627	581	535	491	447	402	359	315	274	231	188	147	106	65	25
19	.64747	106.0	818	771	723	676	629	583	538	493	449	404	360	317	275	232	189	147	106	66	25
20	.64853	106.0	821	774	726	679	632	586	540	495	451	406	362	318	276	233	190	148	107	66	25
21	.64959	106.0	825	777	729	682	635	588	542	497	453	408	364	319	277	234	191	149	107	66	25
22	.65065	106.0	828	781	732	685	638	591	545	499	455	410	365	321	278	235	192	149	108	67	25
23	.65172	107.0	832	784	736	688	640	593	547	502	457	411	367	322	280	236	192	150	108	67	25
24	.65279	107.0	836	788	739	691	643	596	550	504	459	413	368	324	281	237	193	151	109	67	25
25	.65386	107.0	840	791	742	694	646	598	552	506	460	415	370	325	282	238	194	152	109	68	26
26	.65494	108.0	843	794	745	697	649	601	554	508	462	417	372	326	283	239	195	152	110	68	26
27	.65601	107.0	847	798	748	700	652	603	557	510	464	419	373	328	284	240	196	153	110	68	26
28	.65709	108.0	850	801	752	703	654	606	559	513	466	420	375	329	286	241	196	154	111	68	26
29	.65817	108.0	854	805	755	706	657	608	562	515	468	422	376	331	287	242	197	154	111	69	26
30	.65925	108.0	858	808	758	709	660	611	564	517	470	424	378	332	288	243	198	155	112	69	26
31	.66034	109.0	862	811	761	712	663	614	566	519	472	426	380	333	289	244	199	156	112	69	26
32	.66143	109.0	866	815	765	715	666	617	569	522	474	428	381	335	290	245	200	156	113	70	26
33	.66251	108.0	869	818	768	718	669	620	571	524	476	430	383	336	292	246	201	157	113	70	27
34	.66361	110.0	873	822	772	721	672	623	574	526	478	432	384	338	293	247	202	158	114	70	27
35	.66470	109.0	877	825	775	724	675	625	576	529	480	433	386	339	294	248	203	159	114	71	27
36	.66580	110.0	881	829	778	727	678	628	579	531	483	435	388	341	296	249	204	159	114	71	27
37	.66690	111.0	885	832	782	730	681	631	581	533	485	437	389	342	297	250	205	160	115	71	27
38	.66801	110.0	888	836	785	733	684	634	584	535	487	439	391	344	298	252	206	161	115	71	28
39	.66911	111.0	892	839	789	737	687	637	586	538	489	441	392	345	299	253	207	161	116	72	28
40	.67022	111.0	896	843	792	740	690	640	589	540	491	443	394	347	300	254	208	162	116	72	28
41	.67133	111.0	900	847	795	743	693	643	591	542	493	445	396	348	301	255	209	163	116	72	28
42	.67245	112.0	904	850	799	746	696	645	594	545	495	447	398	350	303	256	210	163	117	73	28
43	.67356	111.0	907	854	802	749	699	648	596	547	497	449	399	351	304	257	211	164	117	73	28
44	.67468	113.0	911	858	805	752	702	650	599	549	499	451	401	353	305	258	212	165	118	73	28
45	.67581	112.0	915	862	809	755	704	653	601	552	501	452	403	354	307	259	212	166	118	73	28
46	.67693	113.0	919	865	812	758	707	655	604	554	503	454	405	356	308	261	213	166	119	74	29
47	.67806	113.0	923	869	815	761	710	658	606	556	506	456	407	357	309	262	214	167	119	74	29
48	.67918	112.0	926	873	818	764	713	661	609	558	508	458	408	359	310	263	215	168	120	74	29
49	.68031	113.0	930	876	822	767	716	663	611	561	510	460	410	360	312	264	216	168	120	75	29
50	.68144	114.0	934	880	825	771	719	666	614	563	512	462	412	362	313	265	217	169	121	75	29
51	.68258	114.0	938	884	829	774	722	669	617	565	514	464	414	364	314	266	218	170	121	75	29
52	.68372	115.0	942	888	832	778	725	672	619	568	516	466	416	365	316	267	219	171	122	76	29
53	.68487	115.0	946	891	836	781	728	675	622	570	519	468	417	367	317	268	220	171	122	76	29
54	.68601	114.0	950	895	839	785	731	678	625	573	521	470	419	368	319	269	221	172	123	76	29
55	.68716	115.0	954	899	843	788	734	681	628	575	523	472	421	370	320	270	221	173	123	76	30
56	.68832	116.0	958	903	847	791	738	683	630	577	525	474	423	372	322	271	222	174	124	77	30
57	.68947	115.0	962	907	850	795	741	686	633	580	527	476	425	373	323	273	223	175	125	77	30
58	.69063	116.0	966	910	854	798	744	689	636	582	530	478	426	375	325</						

BESSEL'S REFRACTION TABLES.

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TABLE V.—concluded.

Arguments—Apparent Zenith Distance and Reading of Barometer.

Zen. Dist.	BAROMETER.															
	in. 28°0	in. 28°2	in. 28°4	in. 28°6	in. 28°8	in. 29°0	in. 29°2	in. 29°4	in. 29°6	in. 29°8	in. 30°0	in. 30°2	in. 30°4	in. 30°6	in. 30°8	in. 31°0
	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
84. 0	3	6	9	11	15	18	20	23	26	29	32	34	37	40	43	45
1	3	6	9	11	15	18	20	23	26	29	32	34	37	40	43	45
2	3	6	9	11	15	18	20	23	26	29	32	34	37	40	43	45
3	3	6	9	11	15	18	20	23	26	29	32	34	37	40	43	45
4	3	6	9	11	15	18	20	23	26	29	32	35	38	41	43	46
5	3	6	9	12	15	18	21	24	27	30	32	35	38	41	43	46
6	3	6	9	12	15	18	21	24	27	30	33	35	38	41	44	46
7	3	6	9	12	15	18	21	24	27	30	33	35	38	41	44	46
8	3	6	9	12	15	18	21	24	27	30	33	36	39	42	44	47
9	3	6	9	12	15	18	21	24	27	30	33	36	39	42	44	47
10	3	6	9	12	15	18	21	24	27	30	33	36	39	42	44	47
11	3	6	9	12	15	18	21	24	27	30	33	36	39	42	44	47
12	3	6	9	12	15	18	21	24	27	30	33	36	39	42	44	47
13	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	47
14	3	6	9	12	15	18	21	24	27	30	34	37	40	43	45	48
15	3	6	10	12	16	19	22	25	28	31	34	37	40	43	45	48
16	3	6	10	12	16	19	22	25	28	31	34	37	40	43	45	48
17	3	6	10	12	16	19	22	25	28	31	34	37	40	43	45	48
18	3	6	10	12	16	19	22	25	28	31	34	37	41	44	46	49
19	3	6	10	12	16	19	22	25	28	31	35	38	41	44	47	49
20	3	6	10	12	16	19	22	25	28	31	35	38	41	44	47	49
21	3	6	10	12	16	19	22	25	28	31	35	38	41	44	47	49
22	3	6	10	12	16	19	22	25	28	31	35	38	41	44	47	49
23	3	6	10	12	16	19	22	25	28	31	35	38	41	44	47	50
24	3	6	10	12	16	19	22	25	29	32	35	38	42	45	48	50
25	3	6	10	12	16	19	22	26	29	32	35	38	42	45	48	50
26	3	7	10	13	17	20	23	26	29	32	36	38	42	45	48	51
27	3	7	10	13	17	20	23	26	29	32	36	38	42	45	48	51
28	3	7	10	13	17	20	23	26	29	32	36	39	43	45	49	51
29	3	7	10	13	17	20	23	27	30	33	36	39	43	46	49	52
30	3	7	10	13	17	20	23	27	30	33	36	39	43	46	49	52
31	3	7	10	13	17	20	23	27	30	33	36	39	43	46	49	52
32	3	7	10	13	17	20	23	27	30	33	36	39	43	46	49	52
33	3	7	10	13	17	20	23	27	30	33	37	40	43	47	50	53
34	3	7	10	13	17	20	23	27	30	33	37	40	43	47	50	53
35	3	7	10	14	17	21	24	28	31	34	37	40	44	47	50	53
36	3	7	10	14	17	21	24	28	31	34	37	40	44	47	50	53
37	3	7	10	14	17	21	24	28	31	34	37	40	44	47	50	53
38	3	7	10	14	17	21	24	28	31	34	38	41	44	48	51	54
39	3	7	10	14	17	21	24	28	31	34	38	41	44	48	51	54
40	3	7	10	14	17	21	24	28	31	34	38	41	44	48	51	54
41	3	7	10	14	17	21	24	28	31	34	38	41	44	48	51	54
42	3	7	10	14	17	21	24	28	31	34	38	41	44	48	51	54
43	3	7	10	14	17	21	25	28	32	35	39	42	45	48	51	55
44	3	7	10	14	17	21	25	28	32	35	39	42	45	49	52	55
45	4	7	11	15	18	22	25	28	32	35	39	42	45	49	52	55
46	4	7	11	15	18	22	25	29	32	35	39	42	45	49	52	55
47	4	7	11	15	18	22	25	29	32	35	39	42	46	49	53	56
48	4	7	11	15	18	22	26	29	33	36	40	43	46	50	53	56
49	4	7	11	15	18	22	26	29	33	36	40	43	47	50	54	57
50	4	7	11	15	18	22	26	29	33	36	40	43	47	50	54	57
51	4	7	11	15	18	22	26	29	33	36	40	43	47	51	54	57
52	4	7	11	15	18	22	26	29	33	36	40	43	47	51	54	57
53	4	7	11	15	18	22	26	30	33	37	41	44	47	51	55	58
54	4	7	11	15	18	22	26	30	33	37	41	44	48	51	55	58
55	4	8	12	15	19	23	26	30	34	37	41	44	48	52	55	58
56	4	8	12	15	19	23	26	30	34	37	41	44	48	52	55	59
57	4	8	12	15	19	23	27	30	34	37	42	44	48	52	56	59
58	4	8	12	15	19	23	27	31	34	38	42	45	49	53	56	59
59	4	8	12	15	19	23	27	31	34	38	42	45	49	53	56	60
85. 0	4	8	12	15	19	23	27	31	34	38	42	45	49	53	56	60
	in. 28°0	in. 28°2	in. 28°4	in. 28°6	in. 28°8	in. 29°0	in. 29°2	in. 29°4	in. 29°6	in. 29°8	in. 30°0	in. 30°2	in. 30°4	in. 30°6	in. 30°8	in. 31°0

TABLE VI.

BESSEL'S TABLE OF VALUES OF LOG. *B* EXPANDED.

Argument—Reading of Barometer, in English Inches.

Baro- meter.	Log. <i>B</i> .	Baro- meter.	Log. <i>B</i> .	Baro- meter.	Log. <i>B</i> .	Baro- meter.	Log. <i>B</i> .	Baro- meter.	Log. <i>B</i> .	Baro- meter.	Log. <i>B</i> .
in.		in.		in.		in.		in.		in.	
28.70 — 0.01336		29.00 — 0.00885		29.30 — 0.00438		29.60 + 0.00005		29.90 + 0.00443		30.20 + 0.00876	
.71 — 0.01321		.01 — 0.00870		.31 — 0.00423		.61 + 0.00020		.91 + 0.00458		.21 + 0.00890	
.72 — 0.01306		.02 — 0.00855		.32 — 0.00408		.62 + 0.00034		.92 + 0.00472		.22 + 0.00905	
.73 — 0.01291		.03 — 0.00840		.33 — 0.00394		.63 + 0.00049		.93 + 0.00487		.23 + 0.00919	
.74 — 0.01276		.04 — 0.00825		.34 — 0.00379		.64 + 0.00063		.94 + 0.00501		.24 + 0.00934	
.75 — 0.01260		.05 — 0.00810		.35 — 0.00364		.65 + 0.00078		.95 + 0.00516		.25 + 0.00948	
.76 — 0.01245		.06 — 0.00795		.36 — 0.00349		.66 + 0.00093		.96 + 0.00530		.26 + 0.00962	
.77 — 0.01230		.07 — 0.00780		.37 — 0.00334		.67 + 0.00107		.97 + 0.00545		.27 + 0.00977	
.78 — 0.01215		.08 — 0.00765		.38 — 0.00320		.68 + 0.00122		.98 + 0.00559		.28 + 0.00991	
.79 — 0.01200		.09 — 0.00750		.39 — 0.00305		.69 + 0.00136		.99 + 0.00574		.29 + 0.01006	
.80 — 0.01185		.10 — 0.00735		.40 — 0.00290		.70 + 0.00151		30.00 + 0.00588		.30 + 0.01020	
.81 — 0.01170		.11 — 0.00720		.41 — 0.00275		.71 + 0.00166		.01 + 0.00602		.31 + 0.01034	
.82 — 0.01155		.12 — 0.00705		.42 — 0.00260		.72 + 0.00180		.02 + 0.00617		.32 + 0.01049	
.83 — 0.01140		.13 — 0.00690		.43 — 0.00246		.73 + 0.00195		.03 + 0.00631		.33 + 0.01063	
.84 — 0.01125		.14 — 0.00675		.44 — 0.00231		.74 + 0.00209		.04 + 0.00646		.34 + 0.01077	
.85 — 0.01110		.15 — 0.00660		.45 — 0.00216		.75 + 0.00224		.05 + 0.00660		.35 + 0.01092	
.86 — 0.01095		.16 — 0.00646		.46 — 0.00201		.76 + 0.00239		.06 + 0.00674		.36 + 0.01106	
.87 — 0.01080		.17 — 0.00631		.47 — 0.00186		.77 + 0.00253		.07 + 0.00689		.37 + 0.01120	
.88 — 0.01065		.18 — 0.00616		.48 — 0.00172		.78 + 0.00268		.08 + 0.00703		.38 + 0.01134	
.89 — 0.01050		.19 — 0.00601		.49 — 0.00157		.79 + 0.00282		.09 + 0.00718		.39 + 0.01149	
.90 — 0.01035		.20 — 0.00586		.50 — 0.00142		.80 + 0.00297		.10 + 0.00732		.40 + 0.01163	
.91 — 0.01020		.21 — 0.00571		.51 — 0.00127		.81 + 0.00312		.11 + 0.00746		.41 + 0.01177	
.92 — 0.01005		.22 — 0.00556		.52 — 0.00113		.82 + 0.00326		.12 + 0.00761		.42 + 0.01192	
.93 — 0.00990		.23 — 0.00542		.53 — 0.00098		.83 + 0.00341		.13 + 0.00775		.43 + 0.01206	
.94 — 0.00975		.24 — 0.00527		.54 — 0.00083		.84 + 0.00355		.14 + 0.00790		.44 + 0.01220	
.95 — 0.00960		.25 — 0.00512		.55 — 0.00068		.85 + 0.00370		.15 + 0.00804		.45 + 0.01235	
.96 — 0.00945		.26 — 0.00497		.56 — 0.00054		.86 + 0.00385		.16 + 0.00818		.46 + 0.01249	
.97 — 0.00930		.27 — 0.00482		.57 — 0.00039		.87 + 0.00399		.17 + 0.00833		.47 + 0.01263	
.98 — 0.00915		.28 — 0.00468		.58 — 0.00024		.88 + 0.00414		.18 + 0.00847		.48 + 0.01277	
.99 — 0.00900		.29 — 0.00453		.59 — 0.00010		.89 + 0.00428		.19 + 0.00862		.49 + 0.01292	
29.00 — 0.00885		29.30 — 0.00438		29.60 + 0.00005		29.90 + 0.00443		30.20 + 0.00876		30.50 + 0.01306	

TABLE VII.

BESSEL'S TABLE OF VALUES OF LOG. T .

Argument—Reading of the Thermometer attached to the Barometer, in Degrees of Fahrenheit.

Attached Thermo- meter.	Log. T .	Attached Thermo- meter.	Log. T .	Attached Thermo- meter.	Log. T .	Attached Thermo- meter.	Log. T .	Attached Thermo- meter.	Log. T .	Attached Thermo- meter.	Log. T .
20	+ 0'00047	32	+ 0'00000	44	— 0'00047	56	— 0'00090	68	— 0'00136	80	— 0'00186
21	+ 0'00043	33	— 0'00004	45	— 0'00051	57	— 0'00093	69	— 0'00140	81	— 0'00190
22	+ 0'00039	34	— 0'00008	46	— 0'00054	58	— 0'00101	70	— 0'00144	82	— 0'00194
23	+ 0'00035	35	— 0'00012	47	— 0'00058	59	— 0'00105	71	— 0'00148	83	— 0'00198
24	+ 0'00031	36	— 0'00016	48	— 0'00062	60	— 0'00109	72	— 0'00152	84	— 0'00202
25	+ 0'00027	37	— 0'00020	49	— 0'00066	61	— 0'00113	73	— 0'00156	85	— 0'00206
26	+ 0'00024	38	— 0'00023	50	— 0'00070	62	— 0'00117	74	— 0'00160	86	— 0'00209
27	+ 0'00020	39	— 0'00027	51	— 0'00074	63	— 0'00121	75	— 0'00164	87	— 0'00213
28	+ 0'00016	40	— 0'00031	52	— 0'00078	64	— 0'00125	76	— 0'00168	88	— 0'00217
29	+ 0'00012	41	— 0'00035	53	— 0'00082	65	— 0'00129	77	— 0'00172	89	— 0'00221
30	+ 0'00008	42	— 0'00039	54	— 0'00086	66	— 0'00132	78	— 0'00176	90	— 0'00225
31	+ 0'00004	43	— 0'00043								

TABLE VIII.

BESSEL'S TABLE OF VALUES OF LOG. γ .

Argument—Reading of Exterior Thermometer, in Degrees of Fahrenheit.

Ext. Ther.	Log. γ .	Diff.	Ext. Ther.	Log. γ .	Diff.	Ext. Ther.	Log. γ .	Diff.	Ext. Ther.	Log. γ .	Diff.	Ext. Ther.	Log. γ .	Diff.
15	+ 0'02969	—91	28	+ 0'01801	—88	40	+ 0'00750	—86	52	— 0'00275	—85	64	— 0'01278	—82
16	+ 0'02878	—91	29	+ 0'01713	—89	41	+ 0'00664	—86	53	— 0'00360	—84	65	— 0'01360	—83
17	+ 0'02787	—90				42	+ 0'00578	—86	54	— 0'00444	—84	66	— 0'01443	—82
18	+ 0'02697	—91	30	+ 0'01624	—88	43	+ 0'00492	—86				67	— 0'01525	—82
19	+ 0'02606	—92	31	+ 0'01536	—88	44	+ 0'00406	—86	55	— 0'00528	—86	68	— 0'01607	—82
			32	+ 0'01448	—88				56	— 0'00612	—82	69	— 0'01689	—81
20	+ 0'02514	—88	33	+ 0'01360	—87	45	+ 0'00320	—85	57	— 0'00698	—83			
21	+ 0'02426	—90	34	+ 0'01273	—88	46	+ 0'00234	—85	58	— 0'00780	—83	70	— 0'01770	—81
22	+ 0'02336	—89				47	+ 0'00149	—85	59	— 0'00863	—83	71	— 0'01852	—82
23	+ 0'02247	—90	35	+ 0'01185	—87	48	+ 0'00064	—85	60	— 0'00946	—83	72	— 0'01933	—81
24	+ 0'02157	—89	36	+ 0'01098	—87	49	— 0'00021	—85	61	— 0'01029	—83	73	— 0'02015	—82
			37	+ 0'01011	—87				62	— 0'01112	—83	74	— 0'02096	—81
25	+ 0'02068	—89	38	+ 0'00924	—87	50	— 0'00106	—85	63	— 0'01195	—83			
26	+ 0'01979	—89	39	+ 0'00837	—87	51	— 0'00191	—84	64	— 0'01278	—83	75	— 0'02177	
27	+ 0'01890	—89				52	— 0'00275							
28	+ 0'01801	—89	40	+ 0'00750										

TABLE IX.

BESSEL'S TABLE OF VALUES OF A AND λ , AND OF LOG. MEAN REFRACTION (FOR ZENITH DISTANCES GREATER THAN 85°).

Argument—Apparent Zenith Distance.

Z. D.	Log. Mean Refr.	Diff.	A .	Diff.	λ	Diff.	Z. D.	Log. Mean Refr.	Diff.	A .	Diff.	λ	Diff.
85. 0	2.76687	131	1.0127	0	1.1229	5	85. 52	2.83393	132	1.0165	1	1.1563	7
1	.76818	130	1.0127	1	1.1234	6	53	.83525	131	1.0166	1	1.1570	8
2	.76948	131	1.0128	0	1.1240	5	54	.83656	132	1.0167	1	1.1578	7
3	.77079	130	1.0128	1	1.1245	6	55	.83788	131	1.0168	0	1.1585	8
4	.77209	130	1.0129	1	1.1251	6	56	.83919	131	1.0168	1	1.1593	8
5	.77340	131	1.0130	0	1.1257	5	57	.84050	131	1.0169	1	1.1601	7
6	.77471	130	1.0130	1	1.1262	5	58	.84181	131	1.0170	1	1.1608	8
7	.77601	131	1.0130	0	1.1267	6	59	.84312	132	1.0171	1	1.1616	7
8	.77732	130	1.0131	1	1.1273	5	86. 0	.84444	134	1.0172	1	1.1624	8
9	.77862	131	1.0132	1	1.1278	6	1	.84578	134	1.0173	1	1.1632	8
10	.77993	130	1.0133	1	1.1284	6	2	.84712	134	1.0174	1	1.1640	9
11	.78123	130	1.0134	0	1.1290	6	3	.84846	134	1.0175	1	1.1649	8
12	.78253	131	1.0134	1	1.1296	6	4	.84981	135	1.0176	1	1.1657	8
13	.78384	130	1.0135	1	1.1302	6	5	.85115	134	1.0177	1	1.1665	9
14	.78514	130	1.0136	0	1.1308	6	6	.85249	134	1.0178	1	1.1674	8
15	.78644	130	1.0136	1	1.1314	6	7	.85383	134	1.0179	1	1.1682	8
16	.78774	130	1.0137	0	1.1320	6	8	.85517	135	1.0180	1	1.1690	9
17	.78904	131	1.0137	1	1.1326	6	9	.85652	134	1.0181	1	1.1699	8
18	.79035	130	1.0138	1	1.1332	6	10	.85786	134	1.0182	1	1.1707	9
19	.79165	130	1.0139	1	1.1338	6	11	.85920	134	1.0183	1	1.1716	8
20	.79295	130	1.0140	1	1.1344	6	12	.86054	134	1.0184	1	1.1724	9
21	.79425	129	1.0141	0	1.1350	7	13	.86189	135	1.0185	1	1.1733	8
22	.79554	130	1.0141	1	1.1357	6	14	.86323	134	1.0186	1	1.1741	9
23	.79684	129	1.0142	1	1.1363	7	15	.86457	134	1.0187	1	1.1750	9
24	.79813	130	1.0143	0	1.1370	6	16	.86591	134	1.0188	1	1.1759	8
25	.79943	129	1.0143	1	1.1376	6	17	.86725	135	1.0189	1	1.1767	9
26	.80072	130	1.0144	1	1.1382	7	18	.86860	134	1.0190	1	1.1776	8
27	.80202	129	1.0145	1	1.1389	6	19	.86994	134	1.0191	1	1.1784	9
28	.80331	129	1.0146	0	1.1395	7	20	.87128	143	1.0192	1	1.1793	9
29	.80460	130	1.0146	1	1.1402	6	21	.87271	143	1.0193	1	1.1802	8
30	.80590	129	1.0147	1	1.1408	7	22	.87414	142	1.0194	2	1.1812	9
31	.80719	129	1.0148	1	1.1415	7	23	.87556	143	1.0196	1	1.1821	10
32	.80848	129	1.0149	0	1.1422	6	24	.87699	143	1.0197	1	1.1831	10
33	.80977	129	1.0149	1	1.1428	7	25	.87842	142	1.0198	1	1.1841	9
34	.81106	129	1.0150	1	1.1435	7	26	.87984	143	1.0199	1	1.1850	10
35	.81235	129	1.0151	1	1.1442	7	27	.88127	143	1.0200	1	1.1860	9
36	.81364	129	1.0152	1	1.1449	7	28	.88270	142	1.0201	1	1.1869	9
37	.81493	129	1.0153	0	1.1456	7	29	.88412	143	1.0202	2	1.1878	10
38	.81622	129	1.0153	1	1.1463	7	30	.88555	148	1.0204	1	1.1888	10
39	.81751	129	1.0154	1	1.1470	6	31	.88703	149	1.0205	1	1.1898	10
40	.81880	125	1.0155	1	1.1476	7	32	.88852	148	1.0206	2	1.1908	11
41	.82005	125	1.0156	0	1.1483	7	33	.89000	148	1.0208	1	1.1919	10
42	.82130	125	1.0156	1	1.1490	7	34	.89148	149	1.0209	1	1.1929	10
43	.82255	125	1.0157	1	1.1497	8	35	.89297	148	1.0210	1	1.1939	10
44	.82380	126	1.0158	1	1.1505	7	36	.89445	148	1.0211	1	1.1949	11
45	.82506	125	1.0159	1	1.1512	7	37	.89593	149	1.0212	2	1.1960	10
46	.82631	125	1.0160	0	1.1519	7	38	.89742	148	1.0214	1	1.1970	10
47	.82756	125	1.0160	1	1.1526	7	39	.89890	148	1.0215	1	1.1980	10
48	.82881	125	1.0161	1	1.1533	7	40	.90038	154	1.0216	1	1.1990	11
49	.83006	125	1.0162	1	1.1540	7	41	.90192	155	1.0217	2	1.2001	10
50	.83131	131	1.0163	1	1.1547	8	42	.90347	154	1.0219	1	1.2011	11
51	.83262	131	1.0164	1	1.1555	8	43	.90501	154	1.0220	1	1.2022	11
85. 52	2.83393		1.0165		1.1563		86. 44	2.90655		1.0221		1.2033	

TABLE IX.—concluded.

Argument—Apparent Zenith Distance.

Z. D.	Log. Mean Refr.	Diff.	A.	Diff.	λ	Diff.	Z. D.	Log. Mean Refr.	Diff.	A.	Diff.	λ	Diff.
86. 44	2.90655	155	1.0221	2	1.2033	11	87. 32	2.98623	177	1.0302	2	1.2656	16
45	.90810	154	1.0223	1	1.2044	10	33	.98800	177	1.0304	3	1.2672	16
46	.90964	154	1.0224	1	1.2054	11	34	.98977	177	1.0307	2	1.2688	16
47	.91118	155	1.0225	1	1.2065	11	35	.99154	177	1.0309	2	1.2704	16
48	.91273	154	1.0226	2	1.2076	10	36	.99331	177	1.0311	2	1.2720	16
49	.91427	154	1.0228	1	1.2086	11	37	.99508	177	1.0313	2	1.2736	16
50	.91581	154	1.0229	1	1.2097	12	38	.99685	177	1.0315	3	1.2752	16
51	.91740	159	1.0230	1	1.2109	11	39	2.99862	177	1.0318	2	1.2768	16
52	.91900	160	1.0232	2	1.2120	12	40	3.00039	177	1.0320	2	1.2784	17
53	.92059	159	1.0233	1	1.2132	12	41	.00216	177	1.0322	2	1.2801	17
54	.92218	159	1.0235	1	1.2144	12	42	.00393	178	1.0324	3	1.2818	17
55	.92378	160	1.0237	2	1.2156	12	43	.00571	177	1.0327	2	1.2835	17
56	.92537	159	1.0238	1	1.2168	12	44	.00748	177	1.0329	2	1.2852	16
57	.92696	159	1.0240	2	1.2179	11	45	.00925	177	1.0331	2	1.2868	17
58	.92856	160	1.0241	1	1.2191	12	46	.01102	177	1.0333	2	1.2885	17
59	.93015	159	1.0243	2	1.2203	12	47	.01279	177	1.0335	3	1.2902	17
87. 0	.93174	159	1.0244	1	1.2215	13	48	.01456	178	1.0338	2	1.2919	17
1	.93339	165	1.0246	2	1.2228	12	49	.01634	177	1.0340	2	1.2936	17
2	.93504	165	1.0247	1	1.2240	12	50	.01811	187	1.0342	3	1.2953	19
3	.93668	164	1.0249	2	1.2253	13	51	.01998	188	1.0345	2	1.2972	19
4	.93832	164	1.0250	1	1.2265	12	52	.02186	187	1.0347	3	1.2991	18
5	.93997	165	1.0252	2	1.2278	13	53	.02373	188	1.0350	3	1.3009	19
6	.94161	164	1.0253	1	1.2291	13	54	.02561	187	1.0353	2	1.3028	19
7	.94326	165	1.0255	2	1.2304	13	55	.02748	187	1.0355	3	1.3047	18
8	.94490	164	1.0256	1	1.2316	12	56	.02936	188	1.0358	3	1.3065	18
9	.94655	165	1.0258	2	1.2329	13	57	.03123	187	1.0361	3	1.3084	19
10	.94819	164	1.0260	2	1.2342	13	58	.03311	188	1.0363	3	1.3103	19
11	.94990	171	1.0262	1	1.2355	13	59	.03499	187	1.0366	2	1.3122	19
12	.95162	172	1.0263	2	1.2368	14	88. 0	.03686	194	1.0368	3	1.3141	20
13	.95334	172	1.0265	1	1.2382	14	1	.03880	194	1.0371	3	1.3161	21
14	.95505	171	1.0267	2	1.2395	15	2	.04074	195	1.0374	3	1.3182	20
15	.95677	172	1.0269	2	1.2409	14	3	.04269	194	1.0377	2	1.3202	20
16	.95849	172	1.0271	1	1.2422	13	4	.04463	194	1.0379	3	1.3222	20
17	.96020	171	1.0272	2	1.2435	14	5	.04658	195	1.0382	3	1.3242	21
18	.96192	172	1.0274	2	1.2449	14	6	.04852	194	1.0385	3	1.3263	20
19	.96363	171	1.0276	2	1.2463	14	7	.05046	194	1.0388	3	1.3283	20
20	.96535	172	1.0278	2	1.2476	15	8	.05241	194	1.0391	3	1.3303	21
21	.96708	173	1.0280	2	1.2491	15	9	.05435	194	1.0394	3	1.3324	20
22	.96882	174	1.0282	2	1.2506	15	10	.05629	199	1.0397	3	1.3344	21
23	.97055	173	1.0284	2	1.2520	15	11	.05828	199	1.0400	3	1.3365	21
24	.97228	173	1.0286	2	1.2535	15	12	.06027	199	1.0403	3	1.3386	22
25	.97402	174	1.0288	2	1.2550	15	13	.06226	199	1.0407	4	1.3408	21
26	.97575	173	1.0290	2	1.2564	14	14	.06425	200	1.0410	3	1.3429	21
27	.97749	174	1.0292	2	1.2579	15	15	.06625	199	1.0413	3	1.3450	21
28	.97922	173	1.0294	2	1.2594	15	16	.06824	199	1.0416	3	1.3471	21
29	.98095	174	1.0296	2	1.2609	15	17	.07023	199	1.0419	4	1.3492	22
30	.98269	177	1.0298	2	1.2624	16	18	.07222	199	1.0423	3	1.3514	21
31	.98446	177	1.0300	2	1.2640	16	19	.07421	199	1.0426	3	1.3535	21
87. 32	2.98623	177	1.0302	2	1.2656	16	88. 20	3.07620	199	1.0429	3	1.3556	21