LAT.	35°			36°			37°			38°			39°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
45	49 42	+26	93	49 37	+28	94	49 32	+29	96	49 26	+30	97	49 18	+32	98	315
46	48 52	27	93	48 49	28	94	48 44	29	95	48 39	30	96	48 32	31	97	314
47	48 03	27	92	48 01	27	93	47 57	29	94	47 52	30	95	47 45	32	96	313
48	47 14	26	91	47 12	28	93	47 09	29	94	47 05	30	95	46 59	32	96	312
49	46 25	26	91	46 24	27	92	46 21	29	93	46 17	31	94	46 13	31	95	311
50	45 36	+26	90	45 35	+28	91	45 33	+29	92	45 30	+30	93	45 26	+32	94	310
51	44 47	26	90	44 47	27	91	44 45	29	92	44 43	30	93	44 40	31	94	309
52	43 58	26	89	43 58	28	90	43 58	28	91	43 56	30	92	43 53	31	93	308
53	43 09	26	89	43 10	27	90	43 10	28	90	43 09	30	91	43 07	31	92	307
54	42 20	26	88	42 21	28	89	42 22	28	90	42 21	30	91	42 20	31	92	306
55	41 30	+27	88	41 33	+27	88	41 34	+29	89	41 34	+30	90	41 34	+31	91	305
56	40 41	27	87	40 44	28	88	40 46	29	89	40 47	30	90	40 47	31	90	304
57	39 52	27	86	39 56	27	87	39 58	29	88	40 00	30	89	40 00	32	90	303
58	39 03	27	86	39 07	28	87	39 10	29	88	39 12	30	88	39 14	31	89	302
59	38 14	27	85	38 19	28	86	38 22	29	87	38 25	30	88	38 27	31	89	301
60	37 25	+27	85	37 30	+28	86	37 35	+29	86	37 38	+30	87	37 41	+31	88	300
61	36 37	26	84	36 42	28	85	36 47	29	86	36 51	30	87	36 54	31	87	299
62	35 48	27	84	35 54	28	85	35 59	29	85	36 04	30	86	36 07	32	87	298
63	34 59	27	83	35 05	29	84	35 11	30	85	35 17	30	85	35 21	31	86	297
64	34 10	27	83	34 17	28	83	34 24	29	84	34 29	31	85	34 34	32	86	296
65	33 21	+28	82	33 29	+28	83	33 36	+30	84	33 42	+31	84	33 48	+32	85	295
66	32 33	27	82	32 41	28	82	32 49	29	83	32 55	31	84	33 02	31	84	294
67	31 44	28	81	31 53	29	82	32 01	30	83	32 08	31	83	32 15	32	84	293
68	30 56	27	81	31 05	29	81	31 14	29	82	31 22	30	83	31 29	32	83	292
69	30 07	28	80	30 17	29	81	30 26	30	81	30 35	31	82	30 43	32	83	291
70	29 19	+28	80	29 29	+29	80	29 39	+30	81	29 48	+31	82	29 57	+32	82	290
71	28 31	28	79	28 41	30	80	28 52	30	80	29 01	32	81	29 10	33	82	289
72	27 42	29	79	27 54	29	79	28 05	30	80	28 15	31	80	28 24	33	81	288
73	26 54	29	78	27 06	30	79	27 17	31	79	27 28	32	80	27 38	33	80	287
74	26 06	29	78	26 19	29	78	26 30	31	79	26 42	31	79	26 53	32	80	286
75	25 18	+29	77	25 31	+30	78	25 44	+30	78	25 55	+32	79	26 07	+33	79	285
76	24 30	29	77	24 44	30	77	24 57	31	78	25 09	32	78	25 21	33	79	284
77	23 43	29	76	23 57	30	77	24 10	31	77	24 23	32	78	24 35	34	78	283
78	22 55	29	76	23 09	31	76	23 23	32	77	23 37	32	77	23 50	33	78	282
79	22 07	30	75	22 22	31	76	22 37	31	76	22 51	32	77	23 05	33	77	281
80	21 20	+30	75	21 35	+31	75	21 50	+32	76	22 05	+33	76	22 19	+34	76	280
81	20 33	30	74	20 49	31	75	21 04	32	75	21 19	33	76	21 34	34	76	279
82	19 46	30	74	20 02	31	74	20 18	32	75	20 34	33	75	20 49	34	75	278
83	18 58	31	73	19 15	32	74	19 32	32	74	19 48	33	74	20 04	34	75	277
84	18 12	30	73	18 29	31	73	18 46	32	74	19 03	33	74	19 19	34	74	276
85	17 25	+31	72	17 43	+31	73	18 00	+33	73	18 17	+34	73	18 34	+35	74	275
86	16 38	31	72	16 56	32	72	17 14	33	73	17 32	34	73	17 50	34	73	274
87	15 52	31	71	16 10	33	72	16 29	33	72	16 47	34	72	17 05	35	73	273
88	15 05	32	71	15 24	33	71	15 44	33	71	16 02	35	72	16 21	35	72	272
89	14 19	32	70	14 39	32	71	14 58	34	71	15 18	34	71	15 37	35	71	271
90	13 33	+32	70	13 53	+33	70	14 13	+34	70	14 33	+35	71	14 53	+35	71	270

In South Latitudes { For argument H.A. on the left, True Azimuth = 180° + Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = 180° − Tabulated Azimuth. } See p. 91.

24° DECLINATION SAME NAME AS LATITUDE 24°

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
90	13 33+32	70	13 53+33	70	14 13+34	70	14 33+35	71	14 53+35	71	270
91	12 47 32	69	13 08 33	70	13 28 34	70	13 49 35	70	14 09 36	70	269
92	12 01 33	69	12 23 33	69	12 44 34	69	13 05 35	70	13 25 36	70	268
93	11 16 33	68	11 38 33	69	11 59 35	69	12 21 35	69	12 42 36	69	267
94	10 30+33	68	10 53 34	68	11 15 35	68	11 37 35	68	11 59 36	69	266
95	...		10 08+34	68	10 31+35	68	10 53+36	68	11 16+36	68	265
96	...		...		...		10 10+36	67	10 33+36	68	264
97	...		...		...		...		...		263
98	...		...		...		...		...		262
99	...		...		...		...		...		261
100	...		...		...		...		...		260

24° DECLINATION CONTRARY NAME TO LATITUDE 24°

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
45	17 15−47	137	16 31−48	138	15 47−49	138	15 02−49	138	14 18−49	138	315
46	16 42 47	137	15 58 47	137	15 14 48	137	14 31 49	137	13 47 49	137	314
47	16 08 47	136	15 25 47	136	14 42 48	136	13 58 48	136	13 15 49	137	313
48	15 34 47	135	14 51 47	135	14 09 48	136	13 26 48	136	12 43 48	136	312
49	14 59 46	134	14 17 47	135	13 35 47	135	12 53 48	135	12 10 47	135	311
50	14 24−46	134	13 42−46	134	13 01−47	134	12 19−47	134	11 38−48	134	310
51	13 48 45	133	13 07 45	133	12 26 46	133	11 45 46	134	11 04 47	134	309
52	13 12 45	132	12 32 45	132	11 52 46	133	11 11 46	133	10 31−47	133	308
53	12 36 45	132	11 56 45	132	11 16 45	132	10 36 45	132	...		307
54	11 59 44	131	11 20 44	131	10 41 45	131	10 01−45	131	...		306
55	11 22−44	130	10 43−44	130	10 05−45	131	...		...		305
56	10 45 44	130	10 07−44	130	...		...		...		304
57	10 07−43	129	...		...		...		...		303
58	...		...		...		...		...		302
59	...		...		...		...		...		301
60	...		...		...		...		...		300

In North Latitudes { For argument H.A. on the left, True Azimuth = 360° − Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = Tabulated Azimuth. } See p. 90.

LAT.	35°			36°			37°			38°			39°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
0	31 01	−60	180	30 01	−60	180	29 01	−59	180	28 02	−60	180	27 02	−60	180	360
1	31 01	60	179	30 01	60	179	29 01	60	179	28 01	60	179	27 01	60	179	359
2	31 00	60	178	30 00	60	178	29 00	60	178	28 00	60	178	27 00	60	178	358
3	30 57	60	177	29 57	59	177	28 58	60	177	27 58	60	177	26 58	60	177	357
4	30 54	60	176	29 54	60	176	28 54	59	176	27 55	60	176	26 55	60	176	356
5	30 50	−60	175	29 50	−59	175	28 51	−60	175	27 51	−60	175	26 51	−60	175	355
6	30 45	60	174	29 45	59	174	28 46	60	174	27 46	59	174	26 47	60	174	354
7	30 39	59	173	29 40	60	173	28 40	59	173	27 41	60	173	26 41	59	173	353
8	30 32	59	172	29 33	59	172	28 34	60	172	27 34	59	172	26 35	59	172	352
9	30 25	60	170	29 25	59	171	28 26	59	171	27 27	59	171	26 28	59	171	351
10	30 16	−59	169	29 17	−59	170	28 18	−59	170	27 19	−59	170	26 20	−59	170	350
11	30 07	59	168	29 08	59	168	28 09	59	169	27 10	59	169	26 12	60	169	349
12	29 56	59	167	28 58	59	167	27 59	59	168	27 01	59	168	26 02	59	168	348
13	29 45	59	166	28 47	59	166	27 48	58	167	26 50	59	167	25 52	59	167	347
14	29 33	58	165	28 35	58	165	27 37	59	166	26 39	59	166	25 41	59	166	346
15	29 20	−58	164	28 22	−58	164	27 25	−59	165	26 27	−59	165	25 29	−58	165	345
16	29 06	58	163	28 09	58	163	27 11	58	164	26 14	58	164	25 16	58	164	344
17	28 52	58	162	27 55	58	162	26 58	58	163	26 00	58	163	25 03	58	163	343
18	28 36	57	161	27 40	58	161	26 43	58	162	25 46	58	162	24 49	58	162	342
19	28 20	57	160	27 24	57	160	26 27	57	161	25 31	58	161	24 34	57	161	341
20	28 03	−57	159	27 07	−57	159	26 11	−57	160	25 15	−57	160	24 19	−58	160	340
21	27 45	56	158	26 50	57	158	25 54	57	159	24 58	57	159	24 02	57	159	339
22	27 27	56	157	26 32	57	158	25 36	56	158	24 41	57	158	23 45	57	158	338
23	27 08	56	156	26 13	56	157	25 18	57	157	24 23	57	157	23 27	56	157	337
24	26 48	56	155	25 53	56	156	24 58	56	156	24 04	56	156	23 09	56	156	336
25	26 27	−56	154	25 33	−56	155	24 38	−55	155	23 44	−56	155	22 50	−56	155	335
26	26 05	55	154	25 12	56	154	24 18	56	154	23 24	56	154	22 30	56	154	334
27	25 43	55	153	24 50	55	153	23 56	55	153	23 03	55	153	22 09	55	153	333
28	25 20	54	152	24 27	54	152	23 34	54	152	22 41	55	152	21 48	55	152	332
29	24 56	53	151	24 04	54	151	23 12	55	151	22 19	55	151	21 26	54	152	331
30	24 32	−53	150	23 40	−54	150	22 48	−54	150	21 56	−54	151	21 04	−55	151	330
31	24 07	53	149	23 16	54	149	22 24	53	149	21 33	54	150	20 41	54	150	329
32	23 42	53	148	22 51	53	148	22 00	54	149	21 08	53	149	20 17	54	149	328
33	23 15	52	147	22 25	53	147	21 34	53	148	20 44	54	148	19 53	54	148	327
34	22 48	52	146	21 58	52	147	21 08	52	147	20 18	53	147	19 28	53	147	326
35	22 21	−52	146	21 31	−51	146	20 42	−52	146	19 52	−52	146	19 02	−52	146	325
36	21 53	51	145	21 04	52	145	20 15	52	145	19 26	53	145	18 36	52	146	324
37	21 24	51	144	20 36	51	144	19 47	51	144	18 59	52	144	18 10	52	145	323
38	20 55	51	143	20 07	51	143	19 19	51	143	18 31	52	144	17 43	52	144	322
39	20 25	50	142	19 38	51	142	18 50	51	143	18 03	52	143	17 15	52	143	321
40	19 55	−50	141	19 08	−50	142	18 21	−50	142	17 34	−51	142	16 47	−51	142	320
41	19 24	49	141	18 38	50	141	17 51	50	141	17 05	51	141	16 18	51	141	319
42	18 52	48	140	18 07	50	140	17 21	50	140	16 35	50	140	15 49	51	141	318
43	18 20	48	139	17 35	49	139	16 50	49	139	16 04	49	140	15 19	50	140	317
44	17 48	48	138	17 03	48	138	16 19	49	139	15 34	50	139	14 49	50	139	316
45	17 15	−47	137	16 31	−48	138	15 47	−49	138	15 02	−49	138	14 18	−49	138	315

In South Latitudes { For argument H.A. on the left, True Azimuth = 180° + Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = 180° − Tabulated Azimuth. } See p. 91.

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
0	80 00+60	180	79 00+60	180	78 00+60	180	77 00+60	180	76 00+60	180	360
1	79 58 60	175	78 58 60	175	77 58 60	176	76 59 59	176	75 59 60	176	359
2	79 51 59	170	78 52 59	171	77 53 59	171	76 54 59	172	75 54 60	173	358
3	79 40 58	165	78 42 59	166	77 44 59	167	76 45 59	168	75 47 59	169	357
4	79 25 57	160	78 29 57	162	77 32 57	163	76 34 58	164	75 36 59	165	356
5	79 07+55	155	78 12+56	157	77 16+57	159	76 20+57	160	75 23+58	162	355
6	78 44 54	151	77 51 55	153	76 57 56	155	76 03 56	157	75 07 57	158	354
7	78 19 52	147	77 28 53	149	76 36 54	152	75 43 55	153	74 49 55	155	353
8	77 51 50	143	77 02 51	146	76 12 52	148	75 20 54	150	74 28 54	152	352
9	77 20 48	140	76 34 49	142	75 45 51	145	74 56 52	147	74 05 53	149	351
10	76 47+46	136	76 03+48	139	75 17+49	142	74 29+51	144	73 40+52	146	350
11	76 13 44	134	75 30 47	136	74 46 48	139	74 00 50	141	73 13 51	143	349
12	75 36 43	131	74 56 45	134	74 14 46	136	73 30 48	138	72 44 50	141	348
13	74 58 41	128	74 20 43	131	73 40 45	134	72 57 48	136	72 14 48	138	347
14	74 19 40	126	73 43 42	129	73 04 44	131	72 24 46	134	71 42 47	136	346
15	73 39+38	124	73 04+41	126	72 28+42	129	71 49+45	131	71 09+46	133	345
16	72 57 37	122	72 25 39	124	71 50 41	127	71 13 43	129	70 34 45	131	344
17	72 15 36	120	71 44 38	122	71 11 40	125	70 36 42	127	69 59 44	129	343
18	71 32 35	118	71 03 37	120	70 31 40	123	69 58 41	125	69 22 43	127	342
19	70 48 34	116	70 20 37	119	69 50 39	121	69 18 41	123	68 45 42	126	341
20	70 04+33	115	69 38+35	117	69 09+38	119	68 39+39	122	68 06+42	124	340
21	69 19 32	113	68 54 35	116	68 27 37	118	67 58 39	120	67 27 41	122	339
22	68 33 32	112	68 10 34	114	67 44 36	116	67 17 38	118	66 47 40	121	338
23	67 48 31	110	67 25 34	113	67 01 36	115	66 35 37	117	66 07 39	119	337
24	67 01 31	109	66 41 32	111	66 18 34	114	65 53 36	116	65 26 38	118	336
25	66 15+30	108	65 55+32	110	65 33+34	112	65 10+36	114	64 44+38	116	335
26	65 28 29	107	65 09 32	109	64 49 33	111	64 26 36	113	64 02 37	115	334
27	64 41 29	106	64 23 31	108	64 04 33	110	63 43 34	112	63 20 36	114	333
28	63 53 29	105	63 37 30	107	63 19 32	109	62 59 34	111	62 37 36	112	332
29	63 06 28	104	62 51 29	106	62 33 32	108	62 14 34	109	61 53 36	111	331
30	62 18+28	103	62 04+29	105	61 48+31	107	61 30+33	108	61 10+35	110	330
31	61 30 27	102	61 17 29	104	61 01 31	106	60 45 32	107	60 26 34	109	329
32	60 42 27	101	60 29 29	103	60 15 31	105	59 59 33	106	59 42 34	108	328
33	59 54 26	100	59 42 29	102	59 29 30	104	59 14 32	105	58 57 34	107	327
34	59 05 27	100	58 55 28	101	58 42 30	103	58 28 32	104	58 12 34	106	326
35	58 17+26	99	58 07+28	100	57 55+30	102	57 42+32	103	57 27+34	105	325
36	57 28 26	98	57 19 28	99	57 08 30	101	56 56 31	103	56 42 33	104	324
37	56 39 26	97	56 31 28	99	56 21 30	100	56 10 31	102	55 57 32	103	323
38	55 51 25	96	55 43 28	98	55 34 29	99	55 24 30	101	55 12 32	102	322
39	55 02 25	96	54 55 27	97	54 47 29	99	54 37 31	100	54 26 32	101	321
40	54 13+25	95	54 07+27	96	53 59+29	98	53 50+31	99	53 40+32	101	320
41	53 24 25	94	53 19 27	96	53 12 28	97	53 04 30	98	52 54 32	100	319
42	52 35 25	94	52 30 27	95	52 24 29	96	52 17 30	98	52 08 32	99	318
43	51 46 25	93	51 42 27	94	51 37 28	96	51 30 30	97	51 22 31	98	317
44	50 57 25	93	50 54 26	94	50 49 28	95	50 43 30	96	50 36 31	97	316
45	50 08+25	92	50 05+27	93	50 01+28	94	49 56+30	95	49 50+31	97	315

In North Latitudes { For argument H.A. on the left, True Azimuth = 360° − Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = Tabulated Azimuth. } See p. 90.

LAT.	35°			36°			37°			38°			39°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
45	50 08	+25	92	50 05	+27	93	50 01	+28	94	49 56	+30	95	49 50	+31	97	315
46	49 19	25	91	49 17	26	92	49 13	29	94	49 09	30	95	49 03	31	96	314
47	48 30	25	91	48 28	27	92	48 26	28	93	48 22	29	94	48 17	31	95	313
48	47 40	26	90	47 40	26	91	47 38	28	92	47 35	29	93	47 31	30	95	312
49	46 51	25	90	46 51	27	91	46 50	28	92	46 48	29	93	46 44	31	94	311
50	46 02	+25	89	46 03	+26	90	46 02	+28	91	46 00	+30	92	45 58	+30	93	310
51	45 13	25	88	45 14	27	89	45 14	28	90	45 13	29	91	45 11	31	92	309
52	44 24	25	88	44 26	26	89	44 26	28	90	44 26	29	91	44 24	31	92	308
53	43 35	25	87	43 37	27	88	43 38	28	89	43 39	29	90	43 38	30	91	307
54	42 46	25	87	42 49	26	88	42 50	28	89	42 51	30	90	42 51	31	91	306
55	41 57	+25	86	42 00	+27	87	42 03	+28	88	42 04	+29	89	42 05	+30	90	305
56	41 08	25	86	41 12	27	87	41 15	28	88	41 17	29	88	41 18	31	89	304
57	40 19	25	85	40 23	27	86	40 27	28	87	40 30	29	88	40 32	30	89	303
58	39 30	26	85	39 35	27	86	39 39	28	86	39 42	30	87	39 45	30	88	302
59	38 41	26	84	38 47	27	85	38 51	29	86	38 55	30	87	38 58	31	87	301
60	37 52	+26	84	37 58	+27	84	38 04	+28	85	38 08	+30	86	38 12	+30	87	300
61	37 03	26	83	37 10	27	84	37 16	28	85	37 21	30	85	37 25	31	86	299
62	36 15	26	83	36 22	27	83	36 28	29	84	36 34	30	85	36 39	31	86	298
63	35 26	26	82	35 34	27	83	35 41	28	84	35 47	30	84	35 52	31	85	297
64	34 37	27	82	34 45	28	82	34 53	29	83	35 00	30	84	35 06	31	84	296
65	33 49	+26	81	33 57	+28	82	34 06	+28	83	34 13	+30	83	34 20	+31	84	295
66	33 00	27	81	33 09	28	81	33 18	29	82	33 26	30	83	33 33	31	83	294
67	32 12	27	80	32 22	28	81	32 31	29	82	32 39	30	82	32 47	31	83	293
68	31 23	27	80	31 34	28	80	31 43	30	81	31 52	31	82	32 01	31	82	292
69	30 35	27	79	30 46	28	80	30 56	30	80	31 06	30	81	31 15	31	82	291
70	29 47	+27	79	29 58	+29	79	30 09	+30	80	30 19	+31	81	30 29	+31	81	290
71	28 59	27	78	29 11	28	79	29 22	30	79	29 33	30	80	29 43	31	81	289
72	28 11	28	78	28 23	29	78	28 35	30	79	28 46	31	79	28 57	32	80	288
73	27 23	28	77	27 36	29	78	27 48	30	78	28 00	31	79	28 11	32	79	287
74	26 35	28	77	26 48	29	77	27 01	30	78	27 13	32	78	27 25	32	79	286
75	25 47	+29	76	26 01	+29	77	26 14	+31	77	26 27	+32	78	26 40	+32	78	285
76	24 59	29	76	25 14	29	76	25 28	30	77	25 41	32	77	25 54	32	78	284
77	24 12	29	75	24 27	30	76	24 41	31	76	24 55	32	77	25 09	32	77	283
78	23 24	29	75	23 40	30	75	23 55	31	76	24 09	32	76	24 23	33	77	282
79	22 37	29	74	22 53	30	75	23 08	31	75	23 23	32	76	23 38	33	76	281
80	21 50	+29	74	22 06	+31	74	22 22	+31	75	22 38	+32	75	22 53	+33	76	280
81	21 03	29	74	21 20	30	74	21 36	32	74	21 52	33	75	22 08	33	75	279
82	20 16	30	73	20 33	31	73	20 50	32	74	21 07	32	74	21 23	33	74	278
83	19 29	30	73	19 47	31	73	20 04	32	73	20 21	33	74	20 38	34	74	277
84	18 42	31	72	19 00	32	72	19 18	33	73	19 36	33	73	19 53	34	73	276
85	17 56	+30	72	18 14	+32	72	18 33	+32	72	18 51	+33	73	19 09	+34	73	275
86	17 09	31	71	17 28	32	71	17 47	33	72	18 06	34	72	18 24	35	72	274
87	16 23	31	71	16 43	32	71	17 02	33	71	17 21	34	71	17 40	35	72	273
88	15 37	31	70	15 57	32	70	16 17	33	71	16 37	34	71	16 56	35	71	272
89	14 51	31	70	15 11	33	70	15 32	33	70	15 52	34	70	16 12	35	71	271
90	14 05	+32	69	14 26	+33	69	14 47	+34	70	15 08	+34	70	15 28	+36	70	270

In South Latitudes { For argument H.A. on the left, True Azimuth = 180° + Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = 180° − Tabulated Azimuth. } See p. 91.

25° DECLINATION SAME NAME AS LATITUDE 25°

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
90	14 05+32	69	14 26+33	69	14 47+34	70	15 08+34	70	15 28+36	70	270
91	13 19 32	69	13 41 33	69	14 02 34	69	14 24 34	69	14 45 35	70	269
92	12 34 32	68	12 56 33	68	13 18 34	69	13 40 35	69	14 01 36	69	268
93	11 49 32	68	12 11 34	68	12 34 34	68	12 56 35	68	13 18 36	68	267
94	11 03 33	67	11 27 33	67	11 50 34	67	12 12 36	68	12 35 36	68	266
95	10 19+33	67	10 42+34	67	11 06+35	67	11 29+36	67	11 52+37	67	265
96	...		...		10 22+35	66	10 46 36	67	11 09 37	67	264
97	...		...		...		10 03+36	66	10 27+37	66	263
98	...		...		...		...		...		262
99	...		...		...		...		...		261
100	...		...		...		...		...		260

25° DECLINATION CONTRARY NAME TO LATITUDE 25°

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
45	16 28−48	138	15 43−48	138	14 58−48	138	14 13−48	139	13 29−50	139	315
46	15 55 48	137	15 11 48	138	14 26 48	138	13 42 48	138	12 58 49	138	314
47	15 21 47	137	14 38 48	137	13 54 48	137	13 10 48	137	12 26 48	137	313
48	14 47 46	136	14 04 47	136	13 21 47	136	12 38 48	136	11 55 48	137	312
49	14 13 46	135	13 30 46	135	12 48 47	135	12 05 47	136	11 23 48	136	311
50	13 38−46	134	12 56−46	135	12 14−46	135	11 32−47	135	10 50−47	135	310
51	13 03 45	134	12 22 46	134	11 40 46	134	10 59 47	134	10 17−47	134	309
52	12 27 44	133	11 47 46	133	11 06 46	133	10 25−46	133	...		308
53	11 51 44	132	11 11 45	132	10 31−45	133	...		...		307
54	11 15 44	132	10 36−45	132	...		...		...		306
55	10 38−43	131	...		...		...		...		305
56	10 01−43	130	...		...		...		...		304
57	...		...		...		...		...		303
58	...		...		...		...		...		302
59	...		...		...		...		...		301
60	...		...		...		...		...		300

In North Latitudes { For argument H.A. on the left, True Azimuth = 360° − Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = Tabulated Azimuth. } See p. 90.

LAT.	35°			36°			37°			38°			39°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
0	30 01	−60	180	29 01	−59	180	28 02	−60	180	27 02	−60	180	26 02	−60	180	360
1	30 01	60	179	29 01	60	179	28 01	60	179	27 01	60	179	26 01	60	179	359
2	30 00	60	178	29 00	60	178	28 00	60	178	27 00	60	178	26 00	60	178	358
3	29 57	59	177	28 58	60	177	27 58	60	177	26 58	60	177	25 58	60	177	357
4	29 54	60	176	28 54	59	176	27 55	60	176	26 55	60	176	25 55	60	176	356
5	29 50	−60	175	28 51	−60	175	27 51	−60	175	26 51	−60	175	25 51	−59	175	355
6	29 45	59	174	28 46	60	174	27 46	60	174	26 47	60	174	25 47	60	174	354
7	29 40	60	173	28 40	60	173	27 41	60	173	26 41	59	173	25 42	60	173	353
8	29 33	60	172	28 34	60	172	27 34	59	172	26 35	60	172	25 36	60	172	352
9	29 25	59	171	28 26	59	171	27 27	59	171	26 28	60	171	25 29	60	171	351
10	29 17	−59	170	28 18	−59	170	27 19	−59	170	26 20	−59	170	25 21	−59	170	350
11	29 08	59	169	28 09	59	169	27 10	59	169	26 11	59	169	25 12	59	169	349
12	28 57	58	168	27 59	59	168	27 00	59	168	26 02	59	168	25 03	59	168	348
13	28 46	58	167	27 48	59	167	26 50	59	167	25 51	58	167	24 53	59	167	347
14	28 35	59	166	27 37	59	166	26 38	58	166	25 40	58	166	24 42	58	166	346
15	28 22	−58	165	27 24	−58	165	26 26	−58	165	25 28	−58	165	24 31	−59	165	345
16	28 08	58	164	27 11	58	164	26 13	58	164	25 16	58	164	24 18	58	164	344
17	27 54	58	163	26 57	58	163	26 00	58	163	25 02	58	163	24 05	58	163	343
18	27 39	57	162	26 42	57	162	25 45	57	162	24 48	58	162	23 51	58	162	342
19	27 23	57	161	26 27	58	161	25 30	57	161	24 33	57	161	23 37	58	161	341
20	27 06	−57	160	26 10	−57	160	25 14	−57	160	24 18	−58	160	23 21	−57	160	340
21	26 49	57	159	25 53	57	159	24 57	57	159	24 01	57	159	23 05	57	159	339
22	26 31	57	158	25 35	56	158	24 40	57	158	23 44	57	158	22 48	57	158	338
23	26 12	56	157	25 17	57	157	24 21	56	157	23 26	56	157	22 31	57	157	337
24	25 52	56	156	24 57	56	156	24 02	56	156	23 08	57	156	22 13	57	157	336
25	25 31	−55	155	24 37	−55	155	23 43	−56	155	22 48	−56	155	21 54	−56	156	335
26	25 10	55	154	24 16	55	154	23 22	55	154	22 28	55	155	21 34	56	155	334
27	24 48	54	153	23 55	55	153	23 01	55	153	22 08	56	154	21 14	55	154	333
28	24 26	55	152	23 33	55	152	22 40	55	153	21 46	55	153	20 53	55	153	332
29	24 03	54	151	23 10	54	151	22 17	54	152	21 24	54	152	20 32	55	152	331
30	23 39	−54	150	22 46	−53	151	21 54	−54	151	21 02	−54	151	20 09	−54	151	330
31	23 14	53	149	22 22	53	150	21 31	54	150	20 39	54	150	19 47	54	150	329
32	22 49	53	149	21 58	54	149	21 06	53	149	20 15	54	149	19 23	54	149	328
33	22 23	53	148	21 32	53	148	20 41	53	148	19 50	53	148	18 59	53	149	327
34	21 56	52	147	21 06	52	147	20 16	53	147	19 25	53	148	18 35	53	148	326
35	21 29	−52	146	20 40	−53	146	19 50	−53	146	19 00	−53	147	18 10	−53	147	325
36	21 02	52	145	20 12	51	145	19 23	52	146	18 33	52	146	17 44	53	146	324
37	20 33	51	144	19 45	52	145	18 56	52	145	18 07	52	145	17 18	53	145	323
38	20 04	50	144	19 16	51	144	18 28	51	144	17 39	51	144	16 51	52	144	322
39	19 35	50	143	18 47	50	143	17 59	50	143	17 11	51	143	16 23	51	144	321
40	19 05	−50	142	18 18	−50	142	17 31	−51	142	16 43	−51	143	15 56	−52	143	320
41	18 35	50	141	17 48	50	141	17 01	50	142	16 14	50	142	15 27	51	142	319
42	18 04	49	140	17 17	49	141	16 31	50	141	15 45	50	141	14 58	50	141	318
43	17 32	49	140	16 46	49	140	16 01	50	140	15 15	50	140	14 29	50	140	317
44	17 00	48	139	16 15	49	139	15 30	49	139	14 44	49	139	13 59	50	140	316
45	16 28	−48	138	15 43	−48	138	14 58	−48	138	14 13	−48	139	13 29	−50	139	315

In South Latitudes { For argument H.A. on the left, True Azimuth = 180° + Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = 180° − Tabulated Azimuth. } See p. 91.

LAT.	35°			36°			37°			38°			39°			LAT.
H.A.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	H.A.
°	° ′	d	°	° ′	d	°	° ′	d	°	° ′	d	°	° ′	d	°	°
0	...			80 00	+60	180	79 00	+60	180	78 00	+60	180	77 00	+60	180	360
1	...			79 58	60	175	78 58	60	175	77 58	60	176	76 59	59	176	359
2	...			79 51	60	170	78 52	60	171	77 53	60	171	76 54	59	172	358
3	...			79 41	58	165	78 43	58	166	77 44	59	167	76 46	59	168	357
4	...			79 26	57	160	78 29	58	162	77 32	58	163	76 35	58	164	356
5	...			79 08	+55	155	78 13	+56	157	77 17	+57	159	76 21	+57	161	355
6	79 38	+52	149	78 46	53	151	77 53	54	153	76 59	55	155	76 04	56	157	354
7	79 11	50	144	78 21	52	147	77 30	53	150	76 38	54	152	75 44	55	154	353
8	78 41	47	140	77 53	50	143	77 04	52	146	76 14	53	148	75 22	54	150	352
9	78 08	46	137	77 23	48	140	76 36	50	143	75 48	51	145	74 58	53	147	351
10	77 33	+44	134	76 51	+46	137	76 06	+49	139	75 20	+50	142	74 32	+51	144	350
11	76 57	42	131	76 17	44	134	75 34	47	137	74 50	48	139	74 04	50	141	349
12	76 19	40	128	75 41	43	131	75 00	46	134	74 18	47	136	73 34	48	139	348
13	75 39	39	125	75 03	42	128	74 25	44	131	73 45	45	134	73 02	48	136	347
14	74 59	37	123	74 25	40	126	73 48	43	129	73 10	44	131	72 29	46	134	346
15	74 17	+36	121	73 45	+39	124	73 10	+42	127	72 34	+43	129	71 55	+45	131	345
16	73 34	35	119	73 04	38	122	72 31	40	124	71 56	42	127	71 19	44	129	344
17	72 51	34	117	72 22	37	120	71 51	39	122	71 18	41	125	70 43	43	127	343
18	72 07	33	115	71 40	35	118	71 11	37	121	70 39	40	123	70 05	42	125	342
19	71 22	32	114	70 57	34	116	70 29	37	119	69 59	39	121	69 27	41	124	341
20	70 37	+31	112	70 13	+34	115	69 47	+36	117	69 18	+38	120	68 48	+40	122	340
21	69 51	31	111	69 29	32	113	69 04	35	116	68 37	37	118	68 08	39	120	339
22	69 05	30	109	68 44	32	112	68 20	35	114	67 55	36	116	67 27	38	119	338
23	68 19	29	108	67 59	31	111	67 37	33	113	67 12	36	115	66 46	37	117	337
24	67 32	28	107	67 13	31	109	66 52	33	112	66 29	35	114	66 04	37	116	336
25	66 45	+28	106	66 27	+30	108	66 07	+33	110	65 46	+34	112	65 22	+36	114	335
26	65 57	28	105	65 41	29	107	65 22	32	109	65 02	33	111	64 39	36	113	334
27	65 10	27	104	64 54	29	106	64 37	31	108	64 17	34	110	63 56	35	112	333
28	64 22	26	103	64 07	29	105	63 51	31	107	63 33	32	109	63 13	34	111	332
29	63 34	26	102	63 20	29	104	63 05	30	106	62 48	32	108	62 29	34	109	331
30	62 46	+26	101	62 33	+28	103	62 19	+30	105	62 03	+32	107	61 45	+33	108	330
31	61 57	26	100	61 46	28	102	61 32	30	104	61 17	32	106	61 00	34	107	329
32	61 09	25	99	60 58	28	101	60 46	29	103	60 32	31	105	60 16	33	106	328
33	60 20	26	99	60 11	27	100	59 59	29	102	59 46	31	104	59 31	32	105	327
34	59 32	25	98	59 23	27	99	59 12	29	101	59 00	30	103	58 46	32	104	326
35	58 43	+25	97	58 35	+27	99	58 25	+29	100	58 14	+30	102	58 01	+31	103	325
36	57 54	25	96	57 47	26	98	57 38	28	99	57 27	30	101	57 15	32	102	324
37	57 05	25	96	56 59	26	97	56 51	28	99	56 41	29	100	56 29	32	102	323
38	56 16	25	95	56 11	26	96	56 03	28	98	55 54	30	99	55 44	31	101	322
39	55 27	25	94	55 22	26	96	55 16	27	97	55 08	29	98	54 58	31	100	321
40	54 38	+25	94	54 34	+26	95	54 28	+28	96	54 21	+29	98	54 12	+31	99	320
41	53 49	25	93	53 46	25	94	53 40	28	96	53 34	29	97	53 26	30	98	319
42	53 00	24	92	52 57	26	94	52 53	27	95	52 47	29	96	52 40	30	98	318
43	52 11	24	92	52 09	25	93	52 05	27	94	52 00	29	96	51 53	31	97	317
44	51 22	24	91	51 20	26	92	51 17	27	94	51 13	28	95	51 07	30	96	316
45	50 33	+24	90	50 32	+25	92	50 29	+28	93	50 26	+28	94	50 21	+30	95	315

In North Latitudes { For argument H.A. on the left, True Azimuth = 360° − Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = Tabulated Azimuth. } See p. 90.

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
45	50 33+24	90	50 32+25	92	50 29+28	93	50 26+28	94	50 21+30	95	315
46	49 44 24	90	49 43 26	91	49 42 27	92	49 39 28	93	49 34 30	95	314
47	48 55 24	89	48 55 25	90	48 54 27	92	48 51 29	93	48 48 30	94	313
48	48 06 24	89	48 06 26	90	48 06 27	91	48 04 29	92	48 01 30	93	312
49	47 16 25	88	47 18 25	89	47 18 27	90	47 17 28	91	47 15 30	93	311
50	46 27+25	88	46 29+26	89	46 30+27	90	46 30+28	91	46 28+30	92	310
51	45 38 25	87	45 41 25	88	45 42 27	89	45 42 29	90	45 42 29	91	309
52	44 49 25	87	44 52 26	88	44 54 27	89	44 55 29	90	44 55 30	91	308
53	44 00 25	86	44 04 26	87	44 06 27	88	44 08 28	89	44 08 30	90	307
54	43 11 25	86	43 15 26	87	43 18 28	87	43 21 28	88	43 22 30	89	306
55	42 22+25	85	42 27+26	86	42 31+27	87	42 33+29	88	42 35+30	89	305
56	41 33 25	85	41 39 26	85	41 43 27	86	41 46 29	87	41 49 29	88	304
57	40 44 25	84	40 50 26	85	40 55 27	86	40 59 29	87	41 02 30	88	303
58	39 56 25	84	40 02 26	84	40 07 28	85	40 12 29	86	40 15 30	87	302
59	39 07 25	83	39 14 26	84	39 20 27	85	39 25 29	86	39 29 30	86	301
60	38 18+25	83	38 25+27	83	38 32+28	84	38 38+29	85	38 42+31	86	300
61	37 29 26	82	37 37 27	83	37 44 28	84	37 51 29	84	37 56 30	85	299
62	36 41 25	82	36 49 27	82	36 57 28	83	37 04 29	84	37 10 30	85	298
63	35 52 26	81	36 01 27	82	36 09 28	83	36 17 29	83	36 23 31	84	297
64	35 04 26	81	35 13 27	81	35 22 28	82	35 30 29	83	35 37 30	83	296
65	34 15+26	80	34 25+27	81	34 34+29	82	34 43+29	82	34 51+30	83	295
66	33 27 26	80	33 37 28	80	33 47 29	81	33 56 30	82	34 04 31	82	294
67	32 39 26	79	32 50 27	80	33 00 28	80	33 09 30	81	33 18 31	82	293
68	31 50 27	79	32 02 28	79	32 13 28	80	32 23 30	81	32 32 31	81	292
69	31 02 27	78	31 14 28	79	31 26 28	79	31 36 30	80	31 46 31	81	291
70	30 14+27	78	30 27+28	78	30 39+29	79	30 50+30	80	31 00+31	80	290
71	29 26 28	77	29 39 28	78	29 52 29	78	30 03 31	79	30 14 32	80	289
72	28 39 27	77	28 52 28	77	29 05 29	78	29 17 30	78	29 29 31	79	288
73	27 51 27	76	28 05 28	77	28 18 30	77	28 31 30	78	28 43 32	78	287
74	27 03 28	76	27 17 29	76	27 31 30	77	27 45 30	77	27 57 32	78	286
75	26 16+28	75	26 30+29	76	26 45+30	76	26 59+31	77	27 12+32	77	285
76	25 28 28	75	25 43 30	75	25 58 30	76	26 13 31	76	26 26 33	77	284
77	24 41 28	74	24 57 29	75	25 12 30	75	25 27 31	76	25 41 33	76	283
78	23 53 29	74	24 10 29	74	24 26 30	75	24 41 32	75	24 56 33	76	282
79	23 06 29	74	23 23 30	74	23 39 31	74	23 55 32	75	24 11 33	75	281
80	22 19+30	73	22 37+30	73	22 53+32	74	23 10+32	74	23 26+33	75	280
81	21 32 30	73	21 50 31	73	22 08 31	73	22 25 32	74	22 41 33	74	279
82	20 46 29	72	21 04 31	72	21 22 31	73	21 39 33	73	21 56 34	74	278
83	19 59 30	72	20 18 31	72	20 36 32	72	20 54 33	73	21 12 33	73	277
84	19 13 30	71	19 32 31	71	19 51 32	72	20 09 33	72	20 27 34	73	276
85	18 26+31	71	18 46+31	71	19 05+33	71	19 24+33	72	19 43+34	72	275
86	17 40 31	70	18 00 32	70	18 20 33	71	18 40 33	71	18 59 34	71	274
87	16 54 31	70	17 15 31	70	17 35 33	70	17 55 34	71	18 15 34	71	273
88	16 08 31	69	16 29 32	69	16 50 33	70	17 11 33	70	17 31 35	70	272
89	15 22 32	69	15 44 32	69	16 05 34	69	16 26 34	70	16 47 35	70	271
90	14 37+32	68	14 59+33	68	15 21+33	69	15 42+35	69	16 04+35	69	270

In South { For argument H.A. on the left, True Azimuth = 180° + Tabulated Azimuth. } See Latitudes { For argument H.A. on the right, True Azimuth = 180° − Tabulated Azimuth. } p. 91.

26° DECLINATION **SAME** NAME AS LATITUDE 26°

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
90	14 37+32	68	14 59+33	68	15 21+33	69	15 42+35	69	16 04+35	69	270
91	13 51 33	68	14 14 33	68	14 36 34	68	14 58 35	68	15 20 36	69	269
92	13 06 33	67	13 29 33	67	13 52 34	68	14 15 34	68	14 37 36	68	268
93	12 21 33	67	12 45 33	67	13 08 34	67	13 31 35	67	13 54 36	68	267
94	11 36 33	66	12 00 34	66	12 24 35	67	12 48 35	67	13 11 36	67	266
95	10 52+33	66	11 16+34	66	11 41+34	66	12 05+35	66	12 29+36	66	265
96	10 07+34	65	10 32+35	65	10 57 35	66	11 22 36	66	11 46 37	66	264
97	...		...		10 14+35	65	10 39+36	65	11 04 37	65	263
98	...		...		...		...		10 22+37	65	262
99	...		...		...		...		...		261
100	...		...		...		...		...		260

26° DECLINATION **CONTRARY** NAME TO LATITUDE 26°

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
45	15 40−48	139	14 55−48	139	14 10−49	139	13 25−49	139	12 39−49	139	315
46	15 07 47	138	14 23 48	138	13 38 48	138	12 54 49	138	12 09 49	139	314
47	14 34 47	137	13 50 47	137	13 06 48	138	12 22 48	138	11 38 49	138	313
48	14 01 47	137	13 17 47	137	12 34 48	137	11 50 48	137	11 07 49	137	312
49	13 27 46	136	12 44 47	136	12 01 47	136	11 18 47	136	10 35 48	136	311
50	12 52−45	135	12 10−46	135	11 28−47	135	10 45−47	136	10 03−48	136	310
51	12 18 46	134	11 36 46	135	10 54 46	135	10 12−46	135	...		309
52	11 43 45	134	11 01 45	134	10 20−46	134	...		...		308
53	11 07 44	133	10 26−45	133	...		...		...		307
54	10 31−44	132	...		...		...		...		306
55	...		...		...		...		...		305

In North Latitudes { For argument H.A. on the left, True Azimuth = 360° − Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = Tabulated Azimuth. } See p. 90.

LAT.	35°			36°			37°			38°			39°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
0	29 01	−59	180	28 02	−60	180	27 02	−60	180	26 02	−60	180	25 02	−60	180	360
1	29 01	60	179	28 01	60	179	27 01	60	179	26 01	60	179	25 01	60	179	359
2	29 00	60	178	28 00	60	178	27 00	60	178	26 00	60	178	25 00	60	178	358
3	28 58	60	177	27 58	60	177	26 58	60	177	25 58	60	177	24 58	60	177	357
4	28 54	59	176	27 55	60	176	26 55	60	176	25 55	60	176	24 55	60	176	356
5	28 50	−59	175	27 51	−60	175	26 51	−60	175	25 51	−59	175	24 52	−60	175	355
6	28 46	60	174	27 46	60	174	26 46	59	174	25 47	60	174	24 47	59	174	354
7	28 40	60	173	27 40	59	173	26 41	60	173	25 42	60	173	24 42	60	173	353
8	28 33	59	172	27 34	59	172	26 35	60	172	25 35	59	172	24 36	59	172	352
9	28 26	59	171	27 27	60	171	26 28	60	171	25 28	59	171	24 29	59	171	351
10	28 18	−59	170	27 19	−59	170	26 20	−60	170	25 21	−60	170	24 22	−60	170	350
11	28 09	59	169	27 10	59	169	26 11	59	169	25 12	59	169	24 13	59	169	349
12	27 59	59	168	27 00	59	168	26 01	58	168	25 03	59	168	24 04	59	168	348
13	27 48	59	167	26 49	58	167	25 51	59	167	24 53	59	167	23 54	59	167	347
14	27 36	58	166	26 38	58	166	25 40	59	166	24 42	59	166	23 44	59	166	346
15	27 24	−58	165	26 26	−58	165	25 28	−58	165	24 30	−58	165	23 32	−58	165	345
16	27 10	58	164	26 13	58	164	25 15	58	164	24 18	59	164	23 20	58	164	344
17	26 56	57	163	25 59	58	163	25 02	58	163	24 04	58	163	23 07	58	163	343
18	26 42	58	162	25 45	58	162	24 48	58	162	23 50	57	162	22 53	58	162	342
19	26 26	57	161	25 29	57	161	24 33	58	161	23 36	58	161	22 39	58	162	341
20	26 09	−57	160	25 13	−57	160	24 17	−57	160	23 20	−57	160	22 24	−58	161	340
21	25 52	56	159	24 56	57	159	24 00	57	159	23 04	57	160	22 08	57	160	339
22	25 34	56	158	24 39	57	158	23 43	57	158	22 47	57	159	21 51	56	159	338
23	25 16	56	157	24 20	56	157	23 25	56	158	22 30	57	158	21 34	56	158	337
24	24 56	56	156	24 01	56	156	23 06	56	157	22 11	56	157	21 16	56	157	336
25	24 36	−55	155	23 42	−56	156	22 47	−56	156	21 52	−56	156	20 58	−56	156	335
26	24 15	55	154	23 21	55	155	22 27	55	155	21 33	56	155	20 38	55	155	334
27	23 54	55	154	23 00	55	154	22 06	55	154	21 12	55	154	20 19	56	154	333
28	23 31	54	153	22 38	54	153	21 45	55	153	20 51	55	153	19 58	55	153	332
29	23 09	55	152	22 16	55	152	21 23	55	152	20 30	55	152	19 37	55	152	331
30	22 45	−54	151	21 53	−54	151	21 00	−54	151	20 08	−55	151	19 15	−55	152	330
31	22 21	54	150	21 29	54	150	20 37	54	150	19 45	54	151	18 53	55	151	329
32	21 56	53	149	21 04	53	149	20 13	54	150	19 21	54	150	18 29	54	150	328
33	21 30	52	148	20 39	53	148	19 48	53	149	18 57	53	149	18 06	54	149	327
34	21 04	52	147	20 14	53	148	19 23	53	148	18 32	53	148	17 42	54	148	326
35	20 37	−51	147	19 47	−52	147	18 57	−52	147	18 07	−53	147	17 17	−53	147	325
36	20 10	51	146	19 21	52	146	18 31	52	146	17 41	52	146	16 51	52	146	324
37	19 42	51	145	18 53	51	145	18 04	52	145	17 15	52	146	16 25	52	146	323
38	19 14	51	144	18 25	51	144	17 37	52	145	16 48	52	145	15 59	52	145	322
39	18 45	50	143	17 57	51	144	17 09	51	144	16 20	51	144	15 32	52	144	321
40	18 15	−50	143	17 28	−51	143	16 40	−51	143	15 52	−51	143	15 04	−51	143	320
41	17 45	49	142	16 58	50	142	16 11	50	142	15 24	51	142	14 36	51	142	319
42	17 15	49	141	16 28	49	141	15 41	49	141	14 55	51	142	14 08	51	142	318
43	16 43	48	140	15 57	49	140	15 11	49	141	14 25	50	141	13 39	50	141	317
44	16 12	48	139	15 26	48	140	14 41	49	140	13 55	49	140	13 09	50	140	316
45	15 40	−48	139	14 55	−48	139	14 10	−49	139	13 25	−49	139	12 39	−49	139	315

In South Latitudes { For argument H.A. on the left, True Azimuth = 180° + Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = 180° − Tabulated Azimuth. } See p. 91.

LAT.	35°			36°			37°			38°			39°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
0	...			...			80 00	+60	180	79 00	+60	180	78 00	+60	180	360
1	...			...			79 58	60	175	78 58	60	175	77 58	60	176	359
2	...			...			79 52	59	170	78 53	59	171	77 53	60	171	358
3	...			...			79 41	58	165	78 43	59	166	77 45	58	167	357
4	...			...			79 27	57	160	78 30	57	162	77 33	58	163	356
5	...			...			79 09	+55	156	78 14	+56	158	77 18	+57	159	355
6	...			79 39	+53	149	78 47	54	151	77 54	55	154	77 00	56	156	354
7	...			79 13	50	145	78 23	52	147	77 32	53	150	76 39	55	152	353
8	79 28	+46	137	78 43	48	141	77 56	50	144	77 07	51	146	76 16	53	149	352
9	78 54	43	134	78 11	46	137	77 26	49	140	76 39	50	143	75 51	51	145	351
10	78 17	+42	130	77 37	+44	134	76 55	+46	137	76 10	+48	140	75 23	+50	142	350
11	77 39	40	127	77 01	43	131	76 21	45	134	75 38	47	137	74 54	48	139	349
12	76 59	38	125	76 24	41	128	75 46	43	131	75 05	45	134	74 22	48	137	348
13	76 18	37	122	75 45	39	126	75 09	42	129	74 30	44	131	73 50	46	134	347
14	75 36	35	120	75 05	38	123	74 31	40	126	73 54	43	129	73 15	45	132	346
15	74 53	+34	118	74 24	+36	121	73 52	+39	124	73 17	+41	127	72 40	+43	129	345
16	74 09	33	116	73 42	35	119	73 11	38	122	72 38	41	125	72 03	43	127	344
17	73 25	31	114	72 59	34	117	72 30	37	120	71 59	39	123	71 26	41	125	343
18	72 40	30	113	72 15	34	115	71 48	36	118	71 19	38	121	70 47	40	123	342
19	71 54	30	111	71 31	33	114	71 06	35	116	70 38	37	119	70 08	39	121	341
20	71 08	+29	110	70 47	+31	112	70 23	+34	115	69 56	+36	117	69 28	+38	120	340
21	70 22	28	108	70 01	31	111	69 39	33	113	69 14	35	116	68 47	37	118	339
22	69 35	27	107	69 16	30	110	68 55	32	112	68 31	35	114	68 05	37	117	338
23	68 48	26	106	68 30	29	108	68 10	32	111	67 48	34	113	67 23	36	115	337
24	68 00	27	105	67 44	29	107	67 25	31	109	67 04	33	112	66 41	35	114	336
25	67 13	+25	104	66 57	+29	106	66 40	+30	108	66 20	+33	110	65 58	+35	112	335
26	66 25	25	103	66 10	28	105	65 54	30	107	65 35	33	109	65 15	34	111	334
27	65 37	25	102	65 23	28	104	65 08	30	106	64 51	31	108	64 31	34	110	333
28	64 48	25	101	64 36	27	103	64 22	29	105	64 05	32	107	63 47	33	109	332
29	64 00	25	100	63 49	26	102	63 35	29	104	63 20	31	106	63 03	32	108	331
30	63 12	+24	99	63 01	+27	101	62 49	+28	103	62 35	+30	105	62 18	+33	107	330
31	62 23	24	98	62 14	26	100	62 02	28	102	61 49	30	104	61 34	31	106	329
32	61 34	24	97	61 26	26	99	61 15	28	101	61 03	29	103	60 49	31	105	328
33	60 46	23	97	60 38	25	98	60 28	28	100	60 17	29	102	60 03	31	104	327
34	59 57	23	96	59 50	25	98	59 41	27	99	59 30	29	101	59 18	31	103	326
35	59 08	+23	95	59 02	+25	97	58 54	+27	99	58 44	+29	100	58 32	+31	102	325
36	58 19	23	95	58 13	25	96	58 06	27	98	57 57	29	99	57 47	30	101	324
37	57 30	23	94	57 25	25	95	57 19	26	97	57 10	29	99	57 01	30	100	323
38	56 41	23	93	56 37	25	95	56 31	27	96	56 24	28	98	56 15	30	99	322
39	55 52	23	93	55 48	25	94	55 43	27	96	55 37	28	97	55 29	30	98	321
40	55 03	+23	92	55 00	+25	93	54 56	+26	95	54 50	+28	96	54 43	+29	98	320
41	54 14	23	91	54 11	25	93	54 08	26	94	54 03	28	95	53 56	30	97	319
42	53 24	23	91	53 23	25	92	53 20	26	93	53 16	28	95	53 10	29	96	318
43	52 35	23	90	52 34	25	91	52 32	26	93	52 29	27	94	52 24	29	95	317
44	51 46	23	90	51 46	25	91	51 44	27	92	51 41	28	93	51 37	29	95	316
45	50 57	+23	89	50 57	+25	90	50 57	+26	92	50 54	+28	93	50 51	+29	94	315

In North Latitudes { For argument H.A. on the left, True Azimuth = 360° − Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = Tabulated Azimuth. } See p. 90.

LAT.	35°			36°			37°			38°			39°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
45	50 57	+23	89	50 57	+25	90	50 57	+26	92	50 54	+28	93	50 51	+29	94	315
46	50 08	23	88	50 09	25	90	50 09	26	91	50 07	28	92	50 04	29	93	314
47	49 19	23	88	49 20	25	89	49 21	26	90	49 20	27	91	49 18	29	93	313
48	48 30	23	87	48 32	25	89	48 33	26	90	48 33	27	91	48 31	29	92	312
49	47 41	23	87	47 43	25	88	47 45	26	89	47 45	28	90	47 45	28	91	311
50	46 52	+23	86	46 55	+25	87	46 57	+26	88	46 58	+28	90	46 58	+29	91	310
51	46 03	23	86	46 06	25	87	46 09	26	88	46 11	27	89	46 11	29	90	309
52	45 14	23	85	45 18	25	86	45 21	27	87	45 24	27	88	45 25	29	89	308
53	44 25	23	85	44 30	25	86	44 33	27	87	44 36	28	88	44 38	29	89	307
54	43 36	24	84	43 41	25	85	43 46	26	86	43 49	28	87	43 52	29	88	306
55	42 47	+24	84	42 53	+25	85	42 58	+26	86	43 02	+28	87	43 05	+29	88	305
56	41 58	24	83	42 05	25	84	42 10	27	85	42 15	28	86	42 18	30	87	304
57	41 09	25	83	41 16	26	84	41 22	27	85	41 28	28	85	41 32	29	86	303
58	40 21	24	82	40 28	26	83	40 35	27	84	40 41	28	85	40 45	30	86	302
59	39 32	24	82	39 40	26	83	39 47	27	84	39 54	28	84	39 59	29	85	301
60	38 43	+25	81	38 52	+26	82	39 00	+27	83	39 07	+28	84	39 13	+29	85	300
61	37 55	25	81	38 04	26	82	38 12	27	82	38 20	28	83	38 26	30	84	299
62	37 06	25	80	37 16	26	81	37 25	27	82	37 33	28	83	37 40	29	84	298
63	36 18	25	80	36 28	26	81	36 37	28	81	36 46	28	82	36 54	29	83	297
64	35 30	25	80	35 40	27	80	35 50	28	81	35 59	29	82	36 07	30	82	296
65	34 41	+26	79	34 52	+27	80	35 03	+27	80	35 12	+29	81	35 21	+30	82	295
66	33 53	26	79	34 05	27	79	34 16	27	80	34 26	29	81	34 35	30	81	294
67	33 05	26	78	33 17	27	79	33 28	29	79	33 39	29	80	33 49	30	81	293
68	32 17	26	78	32 30	27	78	32 41	29	79	32 53	29	80	33 03	31	80	292
69	31 29	26	77	31 42	27	78	31 54	29	78	32 06	30	79	32 17	31	80	291
70	30 41	+27	77	30 55	+27	77	31 08	+28	78	31 20	+30	79	31 31	+31	79	290
71	29 54	26	76	30 07	28	77	30 21	29	77	30 34	29	78	30 46	31	79	289
72	29 06	27	76	29 20	28	76	29 34	29	77	29 47	30	77	30 00	31	78	288
73	28 18	28	75	28 33	28	76	28 48	29	76	29 01	31	77	29 15	31	78	287
74	27 31	27	75	27 46	29	75	28 01	29	76	28 15	31	76	28 29	32	77	286
75	26 44	+27	74	26 59	+29	75	27 15	+29	75	27 30	+30	76	27 44	+31	76	285
76	25 56	28	74	26 13	28	74	26 28	30	75	26 44	31	75	26 59	31	76	284
77	25 09	28	74	25 26	29	74	25 42	30	74	25 58	31	75	26 14	31	75	283
78	24 22	29	73	24 39	30	73	24 56	31	74	25 13	31	74	25 29	32	75	282
79	23 35	29	73	23 53	30	73	24 10	31	73	24 27	32	74	24 44	32	74	281
80	22 49	+28	72	23 07	+30	73	23 25	+30	73	23 42	+32	73	23 59	+32	74	280
81	22 02	29	72	22 21	30	72	22 39	31	72	22 57	32	73	23 14	33	73	279
82	21 15	30	71	21 35	30	72	21 53	31	72	22 12	32	72	22 30	33	73	278
83	20 29	30	71	20 49	30	71	21 08	31	71	21 27	32	72	21 45	34	72	277
84	19 43	30	70	20 03	31	71	20 23	31	71	20 42	33	71	21 01	34	72	276
85	18 57	+30	70	19 17	+31	70	19 38	+31	70	19 57	+33	71	20 17	+34	71	275
86	18 11	30	69	18 32	31	70	18 53	32	70	19 13	33	70	19 33	34	71	274
87	17 25	31	69	17 46	32	69	18 08	32	69	18 29	33	70	18 49	34	70	273
88	16 39	31	68	17 01	32	69	17 23	33	69	17 44	34	69	18 06	34	69	272
89	15 54	31	68	16 16	32	68	16 39	33	68	17 00	34	69	17 22	35	69	271
90	15 09	+31	67	15 32	+32	68	15 54	+33	68	16 17	+34	68	16 39	+35	68	270

In South Latitudes { For argument H.A. on the left, True Azimuth = 180° + Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = 180° − Tabulated Azimuth. } See p. 91.

27° DECLINATION **SAME** NAME AS LATITUDE 27°

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
90	15 09+31	67	15 32+32	68	15 54+33	68	16 17+34	68	16 39+35	68	270
91	14 24 31	67	14 47 33	67	15 10 34	67	15 33 34	68	15 56 35	68	269
92	13 39 32	66	14 02 33	67	14 26 34	67	14 49 35	67	15 13 35	67	268
93	12 54 32	66	13 18 33	66	13 42 34	66	14 06 35	67	14 30 36	67	267
94	12 09 33	65	12 34 34	66	12 59 34	66	13 23 35	66	13 47 36	66	266
95	11 25+33	65	11 50+34	65	12 15+35	65	12 40+36	65	13 05+36	66	265
96	10 41+33	64	11 07 34	65	11 32 35	65	11 58 35	65	12 23 36	65	264
97	...		10 23+35	64	10 49 35	64	11 15 36	64	11 41 36	65	263
98	...		...		10 06+36	64	10 33+36	64	10 59 37	64	262
99	...		...		...		...		10 18+37	63	261
100	...		...		...		...		...		260

27° DECLINATION **CONTRARY** NAME TO LATITUDE 27°

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
45	14 52−48	139	14 07−49	139	13 21−49	140	12 36−50	140	11 50−50	140	315
46	14 20 48	139	13 35 48	139	12 50 48	139	12 05 49	139	11 20 49	139	314
47	13 47 47	138	13 03 48	138	12 18 47	138	11 34 48	138	10 49 48	138	313
48	13 14 46	137	12 30 47	137	11 46 47	137	11 02 47	138	10 18−48	138	312
49	12 41 47	136	11 57 46	137	11 14 47	137	10 31−48	137	...		311
50	12 07−46	136	11 24−46	136	10 41−47	136	...		...		310
51	11 32 45	135	10 50 46	135	10 08−46	135	...		...		309
52	10 58 45	134	10 16−45	134	...		...		...		308
53	10 23−45	134	...		...		...		...		307
54	...		...		...		...		...		306
55	...		...		...		...		...		305

In North Latitudes { For argument H.A. on the left, True Azimuth = 360° − Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = Tabulated Azimuth. } See p. 90.

LAT.	35°			36°			37°			38°			39°			LAT.
H.A.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	H.A.
°	° ′	d	°	° ′	d	°	° ′	d	°	° ′	d	°	° ′	d	°	°
0	28 02	−60	180	27 02	−60	180	26 02	−60	180	25 02	−60	180	24 02	−60	180	360
1	28 01	60	179	27 01	60	179	26 01	60	179	25 01	60	179	24 01	59	179	359
2	28 00	60	178	27 00	60	178	26 00	60	178	25 00	60	178	24 00	60	178	358
3	27 58	60	177	26 58	60	177	25 58	60	177	24 58	60	177	23 58	60	177	357
4	27 55	60	176	26 55	60	176	25 55	60	176	24 55	60	176	23 55	59	176	356
5	27 51	−60	175	26 51	−60	175	25 51	−59	175	24 52	−60	175	23 52	−60	175	355
6	27 46	60	174	26 46	59	174	25 47	60	174	24 47	59	174	23 48	60	174	354
7	27 40	59	173	26 41	60	173	25 41	59	173	24 42	60	173	23 42	59	173	353
8	27 34	59	172	26 35	60	172	25 35	59	172	24 36	60	172	23 37	60	172	352
9	27 27	60	171	26 27	59	171	25 28	59	171	24 29	59	171	23 30	60	171	351
10	27 19	−60	170	26 20	−60	170	25 20	−59	170	24 21	−59	170	23 22	−59	170	350
11	27 10	59	169	26 11	59	169	25 12	59	169	24 13	59	169	23 14	59	169	349
12	27 00	59	168	26 01	59	168	25 03	59	168	24 04	59	168	23 05	59	168	348
13	26 49	58	167	25 51	59	167	24 52	58	167	23 54	59	167	22 55	58	167	347
14	26 38	59	166	25 40	59	166	24 41	58	166	23 43	58	166	22 45	59	166	346
15	26 26	−59	165	25 28	−59	165	24 30	−59	165	23 32	−59	165	22 34	−59	166	345
16	26 12	58	164	25 15	58	164	24 17	58	164	23 19	58	164	22 22	59	165	344
17	25 59	58	163	25 01	58	163	24 04	58	163	23 06	58	164	22 09	58	164	343
18	25 44	57	162	24 47	58	162	23 50	58	162	22 53	58	163	21 55	57	163	342
19	25 29	58	161	24 32	57	161	23 35	57	162	22 38	57	162	21 41	57	162	341
20	25 12	−57	160	24 16	−57	160	23 20	−58	161	22 23	−57	161	21 26	−57	161	340
21	24 56	57	159	23 59	56	160	23 03	57	160	22 07	57	160	21 11	57	160	339
22	24 38	56	158	23 42	56	159	22 46	56	159	21 50	56	159	20 55	57	159	338
23	24 20	57	158	23 24	56	158	22 29	57	158	21 33	56	158	20 38	57	158	337
24	24 00	55	157	23 05	56	157	22 10	56	157	21 15	56	157	20 20	56	157	336
25	23 41	−56	156	22 46	−56	156	21 51	−56	156	20 56	−55	156	20 02	−56	156	335
26	23 20	55	155	22 26	55	155	21 32	56	155	20 37	56	155	19 43	56	155	334
27	22 59	55	154	22 05	55	154	21 11	55	154	20 17	55	154	19 23	55	155	333
28	22 37	54	153	21 44	55	153	20 50	55	153	19 56	55	154	19 03	55	154	332
29	22 14	54	152	21 21	54	152	20 28	54	153	19 35	55	153	18 42	55	153	331
30	21 51	−54	151	20 59	−54	152	20 06	−54	152	19 13	−54	152	18 20	−54	152	330
31	21 27	53	150	20 35	53	151	19 43	54	151	18 51	54	151	17 58	54	151	329
32	21 03	53	150	20 11	53	150	19 19	53	150	18 27	53	150	17 35	53	150	328
33	20 38	53	149	19 46	52	149	18 55	53	149	18 04	54	149	17 12	53	149	327
34	20 12	52	148	19 21	52	148	18 30	53	148	17 39	53	148	16 48	53	149	326
35	19 46	−52	147	18 55	−52	147	18 05	−53	147	17 14	−52	148	16 24	−53	148	325
36	19 19	52	146	18 29	52	146	17 39	52	147	16 49	53	147	15 59	53	147	324
37	18 51	51	145	18 02	52	146	17 12	51	146	16 23	52	146	15 33	52	146	323
38	18 23	51	145	17 34	51	145	16 45	51	145	15 56	51	145	15 07	52	145	322
39	17 55	51	144	17 06	51	144	16 18	51	144	15 29	51	144	14 40	51	145	321
40	17 25	−50	143	16 37	−50	143	15 49	−50	143	15 01	−51	144	14 13	−51	144	320
41	16 56	50	142	16 08	50	143	15 21	50	143	14 33	50	143	13 45	50	143	319
42	16 26	50	142	15 39	50	142	14 52	50	142	14 04	50	142	13 17	50	142	318
43	15 55	49	141	15 08	49	141	14 22	50	141	13 35	49	141	12 49	51	141	317
44	15 24	49	140	14 38	49	140	13 52	49	140	13 06	50	141	12 19	49	141	316
45	14 52	−48	139	14 07	−49	139	13 21	−49	140	12 36	−50	140	11 50	−50	140	315

In South Latitudes { For argument H.A. on the left, True Azimuth = 180° + Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = 180° − Tabulated Azimuth. } See p. 91.

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
0	...		...		...		80 00+60	180	79 00+60	180	360
1	...		...		...		79 58 60	175	78 58 60	175	359
2	...		...		...		79 52 59	170	78 53 59	171	358
3	...		...		...		79 42 58	165	78 43 59	166	357
4	...		...		...		79 27 57	160	78 31 57	162	356
5	...		...		...		79 10+55	156	78 15+56	158	355
6	...		...		79 41+52	149	78 49 54	152	77 56 54	154	354
7	...		...		79 15 50	145	78 25 52	148	77 34 53	150	353
8	...		79 31+46	138	78 46 48	141	77 58 51	144	77 09 52	146	352
9	79 37+41	130	78 57 44	134	78 15 46	137	77 29 49	140	76 42 50	143	351
10	78 59+38	127	78 21+42	131	77 41+45	134	76 58+47	137	76 13+49	140	350
11	78 19 36	124	77 44 40	128	77 06 42	131	76 25 45	134	75 42 47	137	349
12	77 37 35	121	77 05 38	125	76 29 41	128	75 50 44	131	75 10 45	134	348
13	76 55 33	119	76 24 37	122	75 51 39	126	75 14 42	129	74 36 44	132	347
14	76 11 32	117	75 43 35	120	75 11 38	123	74 37 41	126	74 00 43	129	346
15	75 27+31	115	75 00+34	118	74 31+36	121	73 58+40	124	73 23+42	127	345
16	74 42 29	113	74 17 33	116	73 49 36	119	73 19 38	122	72 46 40	125	344
17	73 56 29	111	73 33 32	114	73 07 35	117	72 38 37	120	72 07 39	123	343
18	73 10 28	110	72 49 30	113	72 24 34	116	71 57 36	118	71 27 39	121	342
19	72 24 27	108	72 04 29	111	71 41 32	114	71 15 35	117	70 47 37	119	341
20	71 37+26	107	71 18+29	110	70 57+31	112	70 32+35	115	70 06+36	118	340
21	70 50 25	106	70 32 29	108	70 12 31	111	69 49 34	114	69 24 36	116	339
22	70 02 25	104	69 46 28	107	69 27 30	110	69 06 32	112	68 42 35	114	338
23	69 14 25	103	68 59 28	106	68 42 29	108	68 22 32	111	67 59 35	113	337
24	68 27 24	102	68 13 26	105	67 56 29	107	67 37 32	109	67 16 34	112	336
25	67 38+24	101	67 26+26	104	67 10+29	106	66 53+30	108	66 33+33	110	335
26	66 50 24	100	66 38 26	103	66 24 28	105	66 08 30	107	65 49 32	109	334
27	66 02 23	99	65 51 25	102	65 38 27	104	65 22 30	106	65 05 32	108	333
28	65 13 23	99	65 03 25	101	64 51 27	103	64 37 29	105	64 20 32	107	332
29	64 25 22	98	64 15 25	100	64 04 27	102	63 51 29	104	63 35 32	106	331
30	63 36+22	97	63 28+24	99	63 17+27	101	63 05+29	103	62 51+30	105	330
31	62 47 22	96	62 40 24	98	62 30 27	100	62 19 28	102	62 05 31	104	329
32	61 58 22	95	61 52 24	97	61 43 26	99	61 32 29	101	61 20 30	103	328
33	61 09 22	95	61 03 24	97	60 56 26	98	60 46 28	100	60 34 30	102	327
34	60 20 22	94	60 15 24	96	60 08 26	98	59 59 28	99	59 49 29	101	326
35	59 31+22	93	59 27+24	95	59 21+25	97	59 13+27	98	59 03+29	100	325
36	58 42 22	93	58 38 24	94	58 33 25	96	58 26 27	98	58 17 29	99	324
37	57 53 22	92	57 50 24	94	57 45 26	95	57 39 27	97	57 31 29	98	323
38	57 04 22	92	57 02 23	93	56 58 25	95	56 52 27	96	56 45 28	98	322
39	56 15 22	91	56 13 24	92	56 10 25	94	56 05 27	95	55 59 28	97	321
40	55 26+21	90	55 25+23	92	55 22+25	93	55 18+27	95	55 12+29	96	320
41	54 37 21	90	54 36 24	91	54 34 25	93	54 31 26	94	54 26 28	95	319
42	53 47 22	89	53 48 23	91	53 46 25	92	53 44 26	93	53 39 29	95	318
43	52 58 22	89	52 59 24	90	52 58 25	91	52 56 27	93	52 53 28	94	317
44	52 09 22	88	52 11 23	89	52 11 25	91	52 09 27	92	52 06 29	93	316
45	51 20+22	88	51 22+24	89	51 23+25	90	51 22+26	91	51 20+28	93	315

In North Latitudes { For argument H.A. on the left, True Azimuth = 360° − Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = Tabulated Azimuth. } See p. 90.

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
45	51 20+22	88	51 22+24	89	51 23+25	90	51 22+26	91	51 20+28	93	315
46	50 31 22	87	50 34 23	88	50 35 25	89	50 35 26	91	50 33 28	92	314
47	49 42 22	87	49 45 24	88	49 47 25	89	49 47 27	90	49 47 28	91	313
48	48 53 22	86	48 57 23	87	48 59 25	88	49 00 27	89	49 00 28	91	312
49	48 04 22	86	48 08 24	87	48 11 25	88	48 13 26	89	48 13 28	90	311
50	47 15+22	85	47 20+24	86	47 23+25	87	47 26+26	88	47 27+28	89	310
51	46 26 23	85	46 31 24	86	46 35 26	87	46 38 27	88	46 40 28	89	309
52	45 37 23	84	45 43 24	85	45 48 25	86	45 51 27	87	45 54 28	88	308
53	44 48 23	84	44 55 24	85	45 00 25	86	45 04 27	87	45 07 28	88	307
54	44 00 23	83	44 06 25	84	44 12 26	85	44 17 27	86	44 21 28	87	306
55	43 11+23	83	43 18+25	84	43 24+26	84	43 30+27	85	43 34+28	86	305
56	42 22 23	82	42 30 24	83	42 37 26	84	42 43 27	85	42 48 28	86	304
57	41 34 23	82	41 42 25	83	41 49 26	83	41 56 27	84	42 01 29	85	303
58	40 45 24	81	40 54 25	82	41 02 26	83	41 09 27	84	41 15 28	85	302
59	39 56 24	81	40 06 25	82	40 14 26	82	40 22 27	83	40 28 29	84	301
60	39 08+24	80	39 18+25	81	39 27+26	82	39 35+27	83	39 42+29	84	300
61	38 20 24	80	38 30 25	81	38 39 27	81	38 48 28	82	38 56 29	83	299
62	37 31 25	79	37 42 26	80	37 52 27	81	38 01 28	82	38 09 29	82	298
63	36 43 25	79	36 54 26	80	37 05 27	80	37 14 28	81	37 23 29	82	297
64	35 55 25	78	36 07 25	79	36 18 27	80	36 28 28	81	36 37 29	81	296
65	35 07+25	78	35 19+26	79	35 30+28	79	35 41+28	80	35 51+30	81	295
66	34 19 25	78	34 32 26	78	34 43 28	79	34 55 28	80	35 05 30	80	294
67	33 31 25	77	33 44 27	78	33 57 27	78	34 08 29	79	34 19 30	80	293
68	32 43 26	77	32 57 26	77	33 10 27	78	33 22 29	79	33 34 29	79	292
69	31 55 26	76	32 09 27	77	32 23 28	77	32 36 29	78	32 48 30	79	291
70	31 08+26	76	31 22+27	76	31 36+28	77	31 50+29	77	32 02+30	78	290
71	30 20 27	75	30 35 28	76	30 50 28	76	31 03 30	77	31 17 30	78	289
72	29 33 26	75	29 48 28	75	30 03 29	76	30 17 30	76	30 31 31	77	288
73	28 46 26	74	29 01 28	75	29 17 29	75	29 32 29	76	29 46 31	77	287
74	27 58 27	74	28 15 28	74	28 30 29	75	28 46 30	75	29 01 31	76	286
75	27 11+27	73	27 28+28	74	27 44+30	74	28 00+30	75	28 15+32	75	285
76	26 24 28	73	26 41 29	73	26 58 30	74	27 15 30	74	27 30 32	75	284
77	25 37 28	73	25 55 29	73	26 12 30	73	26 29 31	74	26 45 32	74	283
78	24 51 27	72	25 09 29	73	25 27 29	73	25 44 31	73	26 01 31	74	282
79	24 04 28	72	24 23 29	72	24 41 30	72	24 59 31	73	25 16 32	73	281
80	23 17+29	71	23 37+29	72	23 55+31	72	24 14+31	72	24 31+33	73	280
81	22 31 29	71	22 51 29	71	23 10 30	72	23 29 31	72	23 47 32	72	279
82	21 45 29	70	22 05 30	71	22 24 31	71	22 44 32	71	23 03 32	72	278
83	20 59 29	70	21 19 30	70	21 39 31	71	21 59 32	71	22 19 32	71	277
84	20 13 29	69	20 34 30	70	20 54 32	70	21 15 32	70	21 35 33	71	276
85	19 27+30	69	19 48+31	69	20 09+32	70	20 30+33	70	20 51+33	70	275
86	18 41 30	68	19 03 31	69	19 25 32	69	19 46 33	69	20 07 34	70	274
87	17 56 30	68	18 18 31	68	18 40 32	69	19 02 33	69	19 23 34	69	273
88	17 10 31	67	17 33 32	68	17 56 32	68	18 18 33	68	18 40 34	69	272
89	16 25 31	67	16 48 32	67	17 12 32	68	17 34 34	68	17 57 34	68	271
90	15 40+32	66	16 04+32	67	16 27+33	67	16 51+34	67	17 14+34	68	270

In South { For argument H.A. on the left, True Azimuth = 180° + Tabulated Azimuth. } See Latitudes { For argument H.A. on the right, True Azimuth = 180° − Tabulated Azimuth. } p. 91.

28° DECLINATION **SAME** NAME AS LATITUDE 28°

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
90	15 40+32	66	16 04+32	67	16 27+33	67	16 51+34	67	17 14+34	68	270
91	14 55 32	66	15 20 32	66	15 44 33	66	16 07 34	67	16 31 35	67	269
92	14 11 32	65	14 35 33	66	15 00 33	66	15 24 35	66	15 48 35	66	268
93	13 26 33	65	13 51 33	65	14 16 34	65	14 41 35	66	15 06 35	66	267
94	12 42 33	65	13 08 33	65	13 33 34	65	13 58 35	65	14 23 36	65	266
95	11 58+33	64	12 24+34	64	12 50+34	64	13 16+35	65	13 41+36	65	265
96	11 14 33	64	11 41 34	64	12 07 35	64	12 33 36	64	12 59 37	64	264
97	10 31+33	63	10 58 34	63	11 24 35	63	11 51 36	64	12 17 37	64	263
98	...		10 15+34	63	10 42 35	63	11 09 36	63	11 36 37	63	262
99	...		...		10 00+35	62	10 27+37	62	10 55 37	63	261
100	...		...		...		...		10 14+37	62	260

28° DECLINATION **CONTRARY** NAME TO LATITUDE 28°

LAT.	35°		36°		37°		38°		39°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
45	14 04−48	140	13 18−48	140	12 32−48	140	11 46−49	140	11 00−49	141	315
46	13 32 47	139	12 47 48	139	12 02 49	140	11 16 48	140	10 31 49	140	314
47	13 00 47	138	12 15 47	139	11 31 48	139	10 46 49	139	10 01−49	139	313
48	12 28 47	138	11 43 47	138	10 59 48	138	10 15−48	138	...		312
49	11 54 46	137	11 11 47	137	10 27−47	137	...		...		311
50	11 21−46	136	10 38−47	137	...		...		...		310
51	10 47 45	136	10 04−45	136	...		...		...		309
52	10 13−45	135	...		...		...		...		308
53	...		...		...		...		...		307
54	...		...		...		...		...		306
55	...		...		...		...		...		305

In North Latitudes { For argument H.A. on the left, True Azimuth = 360° − Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = Tabulated Azimuth. } See p. 90.

LAT.	35°			36°			37°			38°			39°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
0	27 02	−60	180	26 02	−60	180	25 02	−60	180	24 02	−60	180	23 02	−60	180	360
1	27 01	60	179	26 01	60	179	25 01	60	179	24 01	59	179	23 02	60	179	359
2	27 00	60	178	26 00	60	178	25 00	60	178	24 00	60	178	23 00	60	178	358
3	26 58	60	177	25 58	60	177	24 58	60	177	23 58	60	177	22 58	59	177	357
4	26 55	60	176	25 55	60	176	24 55	60	176	23 55	59	176	22 56	60	176	356
5	26 51	−60	175	25 51	−59	175	24 52	−60	175	23 52	−60	175	22 52	−60	175	355
6	26 46	59	174	25 47	60	174	24 47	60	174	23 48	60	174	22 48	60	174	354
7	26 41	60	173	25 41	59	173	24 42	60	173	23 42	59	173	22 43	60	173	353
8	26 35	60	172	25 35	59	172	24 36	60	172	23 36	59	172	22 37	59	172	352
9	26 27	59	171	25 28	59	171	24 29	59	171	23 30	60	171	22 30	59	171	351
10	26 19	−59	170	25 20	−59	170	24 21	−59	170	23 22	−59	170	22 23	−59	170	350
11	26 11	59	169	25 12	59	169	24 13	59	169	23 14	59	169	22 15	59	170	349
12	26 01	59	168	25 02	59	168	24 04	59	168	23 05	59	168	22 06	59	169	348
13	25 51	59	167	24 52	59	167	23 54	59	167	22 55	59	168	21 57	59	168	347
14	25 39	58	166	24 41	58	166	23 43	59	167	22 45	59	167	21 46	58	167	346
15	25 27	−58	165	24 29	−58	165	23 31	−58	166	22 33	−58	166	21 35	−58	166	345
16	25 14	58	164	24 17	58	165	23 19	58	165	22 21	58	165	21 23	58	165	344
17	25 01	58	163	24 03	57	164	23 06	58	164	22 08	58	164	21 11	58	164	343
18	24 47	58	163	23 49	57	163	22 52	58	163	21 55	58	163	20 58	58	163	342
19	24 31	57	162	23 35	58	162	22 38	58	162	21 41	58	162	20 44	58	162	341
20	24 15	−57	161	23 19	−57	161	22 22	−57	161	21 26	−58	161	20 29	−57	161	340
21	23 59	57	160	23 03	57	160	22 06	57	160	21 10	57	160	20 14	58	160	339
22	23 42	57	159	22 46	57	159	21 50	57	159	20 54	57	159	19 58	57	159	338
23	23 23	56	158	22 28	56	158	21 32	56	158	20 37	57	158	19 41	57	159	337
24	23 05	56	157	22 09	56	157	21 14	56	157	20 19	56	157	19 24	57	158	336
25	22 45	−55	156	21 50	−55	156	20 55	−55	156	20 01	−57	157	19 06	−57	157	335
26	22 25	55	155	21 31	56	155	20 36	56	156	19 41	55	156	18 47	56	156	334
27	22 04	55	154	21 10	55	155	20 16	55	155	19 22	56	155	18 28	56	155	333
28	21 43	55	154	20 49	55	154	19 55	55	154	19 01	55	154	18 08	56	154	332
29	21 20	54	153	20 27	54	153	19 34	55	153	18 40	54	153	17 47	55	153	331
30	20 57	−53	152	20 05	−54	152	19 12	−55	152	18 19	−55	152	17 26	−55	152	330
31	20 34	54	151	19 42	54	151	18 49	54	151	17 57	55	151	17 04	54	152	329
32	20 10	53	150	19 18	54	150	18 26	54	150	17 34	54	151	16 42	55	151	328
33	19 45	53	149	18 54	53	149	18 02	53	150	17 10	53	150	16 19	54	150	327
34	19 20	53	148	18 29	53	149	17 37	52	149	16 46	53	149	15 55	53	149	326
35	18 54	−52	148	18 03	−52	148	17 12	−52	148	16 22	−53	148	15 31	−53	148	325
36	18 27	51	147	17 37	52	147	16 47	52	147	15 56	52	147	15 06	53	147	324
37	18 00	51	146	17 10	51	146	16 21	52	146	15 31	52	147	14 41	53	147	323
38	17 32	50	145	16 43	51	145	15 54	52	146	15 05	52	146	14 15	52	146	322
39	17 04	50	144	16 15	50	145	15 27	51	145	14 38	52	145	13 49	52	145	321
40	16 35	−50	144	15 47	−50	144	14 59	−51	144	14 10	−51	144	13 22	−51	144	320
41	16 06	49	143	15 18	50	143	14 31	51	143	13 43	51	143	12 55	51	144	319
42	15 36	49	142	14 49	49	142	14 02	50	142	13 14	50	143	12 27	51	143	318
43	15 06	49	141	14 19	49	142	13 32	49	142	12 46	50	142	11 58	50	142	317
44	14 35	48	141	13 49	49	141	13 03	49	141	12 16	49	141	11 30	50	141	316
45	14 04	−48	140	13 18	−48	140	12 32	−48	140	11 46	−49	140	11 00	−49	141	315

In South Latitudes { For argument H.A. on the left, True Azimuth = 180° + Tabulated Azimuth. / For argument H.A. on the right, True Azimuth = 180° − Tabulated Azimuth. } See p. 91

EXPLANATION

By agreement with the Admiralty, the *Astronomical Navigation Tables* are produced by H.M. Nautical Almanac Office to the general requirements of the Air Ministry.

These tables are designed to give, in a simple and direct manner, the solution of the astronomical spherical triangle that occurs in navigational practice. They have been planned for use with the *Air Almanac* (Air Publication 1602) and are consequently designed primarily to meet the requirements of modern air navigation: their use can however be extended to surface navigation, as in the case of the *Air Almanac*, within the limitations of the precision of the tabulated altitude and azimuth.

The general object of the *Astronomical Navigation Tables* is to facilitate the calculation of the Altitude and Azimuth of an observed heavenly body, as seen from some position close to that of the observer. This information, together with the observed altitude, allows to be plotted on the chart a position line upon which the observer must lie; two such position lines serve in general to determine the position of the observer. The tables have been arranged with special relation to the determination of the altitude and azimuth when an assumed position is adopted such that the latitude and hour angle are both integral degrees; interpolation in this case is consequently restricted to interpolation to the declination of the body observed, and provision has been made for this to be done in a simple manner. The precision of the tabulated data is consistent with that adopted for the *Air Almanac*, namely that the altitudes are given to the nearest minute of arc, and so are correct to within $0'{\cdot}5$; this standard of precision is sufficient for all purposes of air navigation and, in fact, is at present (1938) considerably greater than the precision obtainable in an altitude observed with a bubble sextant. Although these tables have been prepared in conjunction with the *Air Almanac*, they are equally applicable for use with any other almanac from which the Greenwich Hour Angle and Declination of the body observed can be found for the time of observation; it is intended, however, that the two publications should provide, in the most convenient form, all the material for a rapid solution of the navigator's problem, for all practical observations.

The *Astronomical Navigation Tables* consist of main tables and auxiliary tables. The main tables give the Tabulated Altitude, to the nearest minute of arc, and the Tabulated Azimuth, to the nearest degree, with the three arguments:—

Latitude —each integral degree from S.64° to N.64°.

Declination—for 22 selected stars for the epoch 1940 and each integral degree from S.28° to N.28°.

Hour Angle—each integral degree for which the altitude is greater than 10°* and less than 80°.

Thus for every combination of an integral degree of latitude, declination and hour angle in the above ranges, the tables give immediately the quantities required.

* This limit is decreased for latitudes above 55°, for declinations appropriate to the Sun (0°–23°), since in these latitudes the Sun is at a low altitude for long periods of each day, when observation of other bodies is not possible.

EXPLANATION

In the case of the separate tabulations for the 22 stars, the values of the declinations used in the tables are those of the stars themselves at the middle of 1940; the declinations of the stars change slowly owing to precession and to other causes, but the effect of these changes can be allowed for by means of a simple correcting term, which although smaller, is catered for in a similar way to the interpolation for the declination of other bodies. The stars have been selected for their brightness and their distribution in the sky, and are the same in both name and number as stars Nos. 1-22 in the *Air Almanac*. The tables for integral degrees of declination are applicable to observations of the Sun, Moon and planets, as well as for all stars with declinations between S.29° and N.29°; a list of 13 such stars is given in the *Air Almanac* (Nos. 23-35). It is only for stars outside these limits of declination, in particular stars Nos. 36-50 in the *Air Almanac*, that these tables are not applicable; some other method of obtaining the altitude and azimuth must then be employed. The 22 stars catered for separately may however be regarded as generally sufficient for all practical purposes of air navigation; with the 13 additional stars to be used in exceptional circumstances, reference to other methods should be unnecessary.

The interpolation of tables with three arguments is both laborious and difficult, and should be avoided wherever possible; no provision has therefore been made for interpolation other than for declination, and the navigator should not interpolate for latitude and hour angle, but should use an assumed position so that this may be avoided. The arrangement of the tables, however, allows for interpolation for latitude and hour angle without, in general, the necessity for the comparison of figures on different pages, and the tables may therefore be interpolated for these arguments for the solution of special problems.

The tabulated altitude includes the effect of atmospheric refraction, and is thus directly comparable with the corrected sextant reading; it is in fact the altitude of the body as would be measured by an observer. The refraction included is based on the mean value of the refraction at a height of 5,000 feet in normal conditions, and it is unlikely that at heights in that neighbourhood the refraction will differ by more than o'·5 from that used. Table VI on page 222 gives the adjustment necessary at heights that differ materially from the basic height adopted; the values in this table should only be applied in extreme cases, and where great accuracy is necessary.

The tabulated azimuth is measured from the elevated pole either to the east or to the west. This can be converted to true azimuth, measured always from the north through east, either by the rules given at the foot of each page, or by the use of Table III on pages 90 and 91.

For the greater convenience of the user, the tables are issued in thirteen volumes, each of which caters for a belt of latitude, 5° in width, in both the northern and southern hemispheres. In each volume tabulations are given for five integral degrees of latitude; working from an assumed position, whose latitude is taken to be the nearest integral degree to that of the D.R. (or estimated) position of the observer, each tabular latitude suffices to cover observations from positions within 0° 30′ of the integral degree used. The Explanation and auxiliary tables are reprinted in each volume.

Each volume consists of two main parts, pages 2–89 giving the tabulations for the selected 22 stars and pages 94–209 those for declinations 0°–28°. Each part is

divided into sections of four pages, covering one star or one whole degree of declination; separate indexes on the margin enable immediate reference to be made to the first opening of each section. Throughout, the arrangement of the tabulations in each section is generally the same; the five values of latitude (LAT.) are given across the page and the values of the hour angle (H.A.) down the page. For the stars, the tabulations for NORTH latitudes precede those for SOUTH latitudes, and for the integral degrees of declination, those for the SAME name as the latitude precede those for CONTRARY name. The amount of tabulation varies in each case with different stars and declinations, and in some cases there are no tabulations either in north or in south latitudes, as the star or a body of the given declination does not reach an altitude which makes it suitable for observation in those latitudes; occasionally it has been necessary to continue the tabulation from one page on to the previous page, and for one or two stars, in south latitudes, on to two pages before.

For the stars, each column refers to a given latitude, and contains for all applicable values of the hour angle, the altitude (Alt.), its variation with time (t) and the azimuth (Az.). For the degrees of declination, the variation t is replaced by the difference (d) between the altitude given and that for the following degree. The procedure of entering and interpolating the tables is not appreciably different in the two cases.

An assumed position is taken close to the D.R. position so that the latitude is an integral degree, while the longitude is chosen so that the hour angle, formed by the combination of longitude (*added* if *east*, *subtracted* if *west*) with the G.H.A., taken from the *Air Almanac*, is also an integral degree. The appropriate part (star or degree of declination) is chosen, and the correct section obtained by the marginal index, using the star number, or the integral degree numerically *less* than the declination of the observed body as found from the *Air Almanac*. In this section, the column is chosen corresponding to the assumed latitude, care being taken to select the correct hemisphere. In this column, the values of Alt., t, and Az. can be read off for the stars, corresponding to the particular integral hour angle; for a degree of declination, the values of Alt., d and Az. are similarly found.

The tabulated altitude must now be corrected, in the case of the 22 stars, for the effect of precession, and for other bodies, interpolated to the true declination. Table I on the inside front cover gives the correction to be applied to the altitude of the stars for all years to 2000 for values of t; this correction must be added or subtracted according to the sign prefixed to t. For each star a limiting year is given before which this correction cannot exceed 1′, and there is therefore no need to apply it until after that date. Similarly, the inside back cover and its facing page contain Table XV, with arguments d and the minutes of the declination of the body, giving the correction to be applied to the tabulated altitude taken out for an integral degree; this correction is to be applied to the tabulated altitude with the same sign as that of d.

It is unnecessary to correct the tabulated azimuth in any way, but it must of course be converted to true azimuth before being used to plot a position line.

Having thus obtained the corrected tabulated altitude and the true azimuth, the position line is drawn in the usual manner. The intercept is obtained from the difference between the corrected sextant reading and the corrected tabulated altitude, and is set off from the assumed position either *towards* the direction given

by the true azimuth or in the opposite direction (*away* from), according to the following rules:

Corr. Tab. Alt. *less* than Corr. Sext. Rdg., intercept *towards*;
Corr. Tab. Alt. *greater* than Corr. Sext. Rdg., intercept *away*.

The position line is then drawn at right angles to the intercept through the point so obtained. The expression corrected sextant reading is used conveniently for the observed altitude to emphasize that this quantity is the altitude as measured by the sextant, corrected only for sextant errors and for dome refraction if applicable. As the atmospheric refraction is catered for in the tabulated altitude, no correction for this should be applied to the sextant reading.

If the assumed position is close to the true position, a slight inaccuracy in plotting the tabulated azimuth is unimportant; when the tabulated azimuth is near 0° or 180° advantage may be taken of this to draw the position line simply as part of a parallel of latitude. A double border rule, given when the azimuth is within a few degrees of the meridian, indicates the portions of the tables where this can be done without great error; the limit of azimuth has been varied slightly in different volumes, according to the latitude, so as to reduce the error due to this simplified procedure. The accuracy of this method depends upon the error in the assumed longitude; for an error of 20 miles in the D.R. longitude, the maximum error introduced into the deduced latitude is about 2 miles, while the remaining error (due to the use of an assumed position) may reach a maximum of 2 miles in the worst case. This method should therefore only be adopted either when errors up to about 4 miles can be tolerated, or when the D.R. longitude is known to be fairly accurate; if the D.R. position is liable to much greater error than 20 miles, this method should not be used. An assumed position is taken and the tables entered in exactly the same way (whether for stars or other bodies) as for an ordinary observation, but there is now no necessity to take out the azimuth or to convert to true azimuth. The tabulated altitude is corrected by Table I or Table XV as necessary, and the intercept formed by the usual rules. The intercept is then set off from the assumed position *towards* or *away* from the direction of the object observed, this direction being taken as true north or true south; the position line is thus drawn in as a parallel of latitude. Although the procedure of entering the tables is exactly the same, this method saves a considerable amount of work in the plotting of the position line.

A list of the auxiliary tables is given in the list of contents; in general the titles of these tables are self-explanatory and their use either self-evident or explained on the page concerned.

Tables VII, VIII, IX, X, XI and XIII are arranged as critical tables, so that the result is obtained immediately without interpolation. The argument is divided into intervals, successive intervals corresponding to successive values of the result; for any values of the argument, inside one of these intervals, the corresponding result is the quantity opposite that interval and has in general a maximum error of less than half a unit in the last figure given; when successive values of the result are not consecutive integers, this error can rise to half the difference between successive values. The tabulated values of the argument correspond to half-way values of the result, and these are always chosen so that when the argument is exactly equal to one of the tabulated values, the nearest value of the result is the one corresponding to the previous interval. Thus the rule to be followed is:

When the argument is an exact tabulated value, the *upper* of the two possible values of the result should be taken.

ILLUSTRATIONS

Example 1.—On 1939 September 30, local date, about two hours after sunset, in dead reckoning position latitude 38° 17′ N., longitude 125° 20′ W., star number 5 (Altair) was observed to obtain a position line. Corrected sextant reading 58° 39′: G.M.T. of observation $04^h\ 18^m\ 14^s$.

From Table IV, page 92:

Long. 120° W. (approx.)

Approx.	Hrs.	Date
L.M.T.	2000	Sept. 30
G.M.T.	0400	Oct. 1

From page 18:
Lat. of ass. position 38° NORTH

	°	′
Tab. Alt.	59	05
Correction		—
Corr. Tab. Alt.	59	05
Corr. Sext. Rdg.	58	39
Intercept	26′ *away*	

From *Air Almanac*, 1939 Oct. 1:

		°	′
G.H.A. ♈	($04^h\ 10^m$)	71	30
Increment	($8^m\ 14^s$)	2	04
S.H.A.	(No. 5)	63	02
G.H.A. of star		136	36
Long. of ass. position		−125	36

Star No. 5 H.A. 11°

No correction for date is necessary in 1939. Tab. Az. 158°

Assumed position: Lat. 38° N. Long. 125° 36′ W.

From Table III, page 90: True Az. 202° T.

Example 2.—On 1950 August 17, Greenwich date, in dead reckoning position latitude 35° 52′ S., longitude 26° 29′ E., star number 4 (Alpheratz) was observed to obtain a position line. From the *Almanac* of that date it was found that the G.H.A. of the star corresponding to the G.M.T. of observation was 355° 14′. Corrected sextant reading 22° 10′.

	°	′
G.H.A. of star	355	14
Long. of ass. position	+ 26	46
	382	00
	−360	

From page 17:
Lat. of ass. position 36° SOUTH

	°	′
Tab. Alt.	22	02
Correction (Table I)	−	3
Corr. Tab. Alt.	21	59
Corr. Sext. Rdg.	22	10
Intercept	11′ *towards*	

Star No. 4 H.A. 22°

t . . −19 Tab. Az. 159°

Year . . 1950

Assumed position: Lat. 36° S. Long. 26° 46′ E.

From Table III, page 91: True Az. 339° T.

Example 3.—On 1939 October 1, local date, at approximate local noon, in dead reckoning position latitude 38° 40′ S., longitude 22° 07′ W., the Sun was observed to obtain a position line. Corrected sextant reading 54° 13′; G.M.T. of observation $13^h\ 11^m\ 27^s$.

From Table IV, page 92 :

Long. 15° W. (approx.)		
Approx.	Hrs.	Date
L.M.T.	1200	Oct. 1
G.M.T.	1300	Oct. 1

From *Air Almanac*, 1939 Oct. 1 :

G.H.A.	($13^h\ 10^m$)	.	20° 02′
Increment	($1^m\ 27^s$)	.	22
G.H.A. of Sun		.	20 24
Long. of ass. position		.	− 22 24
			− 2 00
			+360
			H.A. 358°

From page 102 :

Lat. of ass. position 39° S. Dec. 2° 58′ S. SAME name

Tab. Alt.	. . .	52° 58′	*d* . .	+60
Correction (Table XV)		+ 58	Minutes of dec.	58
Corr. Tab. Alt.	. .	53 56		
Corr. Sext. Rdg..	.	54 13		
Intercept	. . .	17′ *towards*		

Tab. Az. 177°

Assumed position : Lat. 39° S. Long. 22° 24′ W.

From Table III, page 91 : True Az. 003° T.

Since there is a double border rule opposite the entry on page 102, this observation may be reduced by the method described on page 213. In this case the intercept is set off from the assumed position *towards* the Sun (i.e. northwards), and the position line drawn as a parallel of latitude. There is then no necessity to take out the tabulated azimuth.

Example 4.—On 1939 October 2, local date, about an hour before sunrise, in dead reckoning position latitude 34° 38′ N., longitude 147° 58′ E., star number 35 (Wezen) was observed to obtain a position line. Corrected sextant reading 24° 23′; G.M.T. of observation $18^h\ 58^m\ 19^s$.

From Table IV, page 93 :

Long. 150° E. (approx.)		
Approx.	Hrs.	Date
L.M.T.	0500	Oct. 2
G.M.T.	*1900*	*Oct. 1*

From *Air Almanac*, 1939 Oct. 1 :

G.H.A. ♈	($18^h\ 50^m$)	.	292° 06′
Increment	($8^m\ 19^s$)	.	2 05
S.H.A.	(No. 35)	.	253 31
G.H.A. of star		.	547 42
Long. of ass. position		.	+ 148 18
			696 00
			−360
			H.A. 336°

From page 201 :

Lat. of ass. position 35° N. Dec. 26° 18′ S. CONTRARY name

Tab. Alt.	. . .	24° 56′	*d* . .	−56
Correction (Table XV)		− 17	Minutes of dec.	18
Corr. Tab. Alt.	. .	24 39		
Corr. Sext. Rdg..	.	24 23		
Intercept	. . .	16′ *away*		

Tab. Az. 156°

Assumed position : Lat. 35° N. Long. 148° 18′ E.

From Table III, page 90 : True Az. 156° T.

IVa.—CHANGE OF SEXTANT READING WITH TIME

Due to motion of body observed

True Azimuth of body	Latitude 35°	37°	39°	True Azimuth of body
°	′	′	′	°
090	+37	+36	+35	090
095	37	36	35	085
100	36	35	34	080
105	36	35	34	075
110	35	34	33	070
115	33	33	32	065
120	+32	+31	+30	060
125	30	29	29	055
130	28	28	27	050
135	26	25	25	045
140	24	23	22	040
145	21	21	20	035
150	+18	+18	+17	030
155	16	15	15	025
160	13	12	12	020
165	10	9	9	015
170	6	6	6	010
175	+3	+3	+3	005
180	0	0	0	000
185	−3	−3	−3	355
190	6	6	6	350
195	10	9	9	345
200	13	12	12	340
205	16	15	15	335
210	−18	−18	−17	330
215	21	21	20	325
220	24	23	22	320
225	26	25	25	315
230	28	28	27	310
235	30	29	29	305
240	−32	−31	−30	300
245	33	33	32	295
250	35	34	33	290
255	36	35	34	285
260	36	35	34	280
265	37	36	35	275
270	−37	−36	−35	270

Due to motion of observer

Difference between True Az. of body and Track	Ground speed in m.p.h. 100	130	160	190	220	250	280	310	340	Difference between True Az. of body and Track
°	′	′	′	′	′	′	′	′	′	°
000	+4	+6	+7	+8	+10	+11	+12	+13	+15	360
005	4	6	7	8	10	11	12	13	15	355
010	4	6	7	8	9	11	12	13	15	350
015	4	5	7	8	9	10	12	13	14	345
020	4	5	7	8	9	10	11	13	14	340
025	4	5	6	7	9	10	11	12	13	335
030	+4	+5	+6	+7	+8	+9	+11	+12	+13	330
035	4	5	6	7	8	9	10	11	12	325
040	3	4	5	6	7	8	9	10	11	320
045	3	4	5	6	7	8	9	10	10	315
050	3	4	4	5	6	7	8	9	9	310
055	2	3	4	5	5	6	7	8	8	305
060	+2	+3	+3	+4	+5	+5	+6	+7	+7	300
065	2	2	3	3	4	5	5	6	6	295
070	1	2	2	3	3	4	4	5	5	290
075	1	1	2	2	2	3	3	3	4	285
080	+1	+1	1	1	2	2	2	2	3	280
085	0	0	+1	+1	+1	+1	+1	+1	+1	275
090	0	0	0	0	0	0	0	0	0	270
095	0	0	−1	−1	−1	−1	−1	−1	−1	265
100	−1	−1	1	1	2	2	2	2	3	260
105	1	1	2	2	2	3	3	3	4	255
110	1	2	2	3	3	4	4	5	5	250
115	2	2	3	3	4	5	5	6	6	245
120	−2	−3	−3	−4	−5	−5	−6	−7	−7	240
125	2	3	4	5	5	6	7	8	8	235
130	3	4	4	5	6	7	8	9	9	230
135	3	4	5	6	7	8	9	10	10	225
140	3	4	5	6	7	8	9	10	11	220
145	4	5	6	7	8	9	10	11	12	215
150	−4	−5	−6	−7	−8	−9	−11	−12	−13	210
155	4	5	6	7	9	10	11	12	13	205
160	4	5	7	8	9	10	11	13	14	200
165	4	5	7	8	9	10	12	13	14	195
170	4	6	7	8	9	11	12	13	15	190
175	4	6	7	8	10	11	12	13	15	185
180	−4	−6	−7	−8	−10	−11	−12	−13	−15	180

The theoretical change of sextant reading in any interval of time depends partly on the motion of the body observed across the sky and partly on the motion of the observer over the Earth's surface.

The two tables above give this change, in an interval of three minutes of time, due to each of these causes; a + sign denotes that the sextant reading is increasing, and a − sign that it is decreasing. The theoretical change of sextant reading in three minutes of time is obtained by combining the appropriate entries from each table.

IVb.—CHANGE OF SEXTANT READING WITH TIME

Interval of time	Change in 3m (from Table IVa)																												Interval of time
	0′	3′	6′	9′	12′	15′	18′	21′	24′	27′	30′	33′	36′	39′	42′	45′	48′	51′	54′	57′	60′								
m s	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′								m s
0 00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								0 00
05	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	2	2	2								05
10	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	2	3	3	3	3	3								10
15	0	0	0	1	1	1	2	2	2	2	2	3	3	3	4	4	4	4	4	5	5								15
20	0	0	1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6	6	7								20
25	0	0	1	1	2	2	2	3	3	4	4	5	5	5	6	6	7	7	8	8	8								25
0 30	0	0	1	2	2	2	3	4	4	4	5	6	6	6	7	8	8	8	9	10	10								0 30
35	0	1	1	2	2	3	4	4	5	5	6	6	7	8	8	9	9	10	10	11	12								35
40	0	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10	11	11	12	13	13								40
45	0	1	2	2	3	4	4	5	6	7	8	8	9	10	10	11	12	13	14	14	15								45
50	0	1	2	2	3	4	5	6	7	8	8	9	10	11	12	12	13	14	15	16	17								50
0 55	0	1	2	3	4	5	6	6	7	8	9	10	11	12	13	14	15	16	16	17	18								0 55
1 00	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20								1 00
05	0	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	20	21	22								05
10	0	1	2	4	5	6	7	8	9	10	12	13	14	15	16	18	19	20	21	22	23								10
15	0	1	2	4	5	6	8	9	10	11	12	14	15	16	18	19	20	21	22	24	25								15
20	0	1	3	4	5	7	8	9	11	12	13	15	16	17	19	20	21	23	24	25	27								20
25	0	1	3	4	6	7	8	10	11	13	14	16	17	18	20	21	23	24	26	27	28								25
1 30	0	2	3	4	6	8	9	10	12	14	15	16	18	20	21	22	24	26	27	28	30								1 30
35	0	2	3	5	6	8	10	11	13	14	16	17	19	21	22	24	25	27	28	30	32								35
40	0	2	3	5	7	8	10	12	13	15	17	18	20	22	23	25	27	28	30	32	33								40
45	0	2	4	5	7	9	10	12	14	16	18	19	21	23	24	26	28	30	32	33	35								45
50	0	2	4	6	7	9	11	13	15	16	18	20	22	24	26	28	29	31	33	35	37								50
1 55	0	2	4	6	8	10	12	13	15	17	19	21	23	25	27	29	31	33	34	36	38								1 55
2 00	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40								2 00
05	0	2	4	6	8	10	12	15	17	19	21	23	25	27	29	31	33	35	38	40	42								05
10	0	2	4	6	9	11	13	15	17	20	22	24	26	28	30	32	35	37	39	41	43								10
15	0	2	4	7	9	11	14	16	18	20	22	25	27	29	32	34	36	38	40	43	45								15
20	0	2	5	7	9	12	14	16	19	21	23	26	28	30	33	35	37	40	42	44	47								20
25	0	2	5	7	10	12	14	17	19	22	24	27	29	31	34	36	39	41	44	46	48								25
2 30	0	2	5	8	10	12	15	18	20	22	25	28	30	32	35	38	40	42	45	48	50								2 30
35	0	3	5	8	10	13	16	18	21	23	26	28	31	34	36	39	41	44	46	49	52								35
40	0	3	5	8	11	13	16	19	21	24	27	29	32	35	37	40	43	45	48	51	53								40
45	0	3	6	8	11	14	16	19	22	25	28	30	33	36	38	41	44	47	50	52	55								45
50	0	3	6	8	11	14	17	20	23	26	28	31	34	37	40	42	45	48	51	54	57								50
2 55	0	3	6	9	12	15	18	20	23	26	29	32	35	38	41	44	47	50	52	55	58								2 55
3 00	0	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60								3 00

This table gives the theoretical change of sextant reading in any interval of time up to 3m, in terms of the change in 3m obtained from the tables on the opposite page. If the interval is greater than 3m, it may be split into multiples of 3m and a residue, and the corresponding entries from the table added together.

A knowledge of this change enables sights on different objects taken at slightly different times to be adjusted to a specified exact time, which may be either the exact time of one of them or a moment when a fix is required for a particular reason.

NOTES

V.—DIFFERENCE BETWEEN RHUMB LINE AND GREAT CIRCLE DISTANCES

N. 35°-39° **S. 35°-39°**

Latitude of Destination	Change of Longitude																		Latitude of Destination
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	
°																			°
N. 60	0	1	2	5	8	12	17	24	33	44	57	72	92	113	139	168	201	238	S. 60
55	0	1	2	4	6	10	15	21	30	40	52	67	85	106	131	159	191	229	55
50	0	1	1	3	5	8	13	19	26	36	48	62	79	99	123	150	182	218	50
45	0	0	1	2	4	7	11	17	24	33	44	57	74	93	115	141	172	206	45
40	0	0	1	2	4	6	10	15	22	30	41	53	68	86	108	132	161	194	40
N. 35	0	0	1	2	3	6	9	14	20	28	38	49	63	80	100	123	150	182	S. 35
30	0	0	1	2	3	6	9	13	19	26	35	46	59	74	92	114	139	168	30
25	0	0	1	2	3	5	8	12	17	24	32	42	54	68	85	104	127	154	25
20	0	0	1	2	3	5	8	11	16	22	29	38	49	62	77	94	115	140	20
15	0	0	1	2	3	5	7	10	15	20	26	34	44	55	69	84	103	125	15
N. 10	0	0	1	2	3	4	7	10	13	18	24	30	39	49	60	74	91	110	S. 10
N. 5	0	0	1	2	3	4	6	9	12	16	21	27	34	42	52	64	78	95	S. 5
0	0	0	1	1	2	4	5	8	10	14	18	23	29	36	45	55	66	80	0
S. 5	0	0	1	1	2	3	5	6	9	12	15	19	24	30	37	45	55	66	N. 5
10	0	0	1	1	2	3	4	5	7	10	12	16	20	24	30	37	44	53	10
S. 15	0	0	0	1	2	2	3	4	6	8	10	13	16	19	24	29	35	42	N. 15
20	0	0	0	1	1	2	3	4	5	6	8	10	12	15	18	22	27	32	20
25	0	0	0	1	1	2	2	3	4	5	6	8	10	12	14	17	21	25	25
30	0	0	0	1	1	1	2	3	3	4	6	7	8	10	12	15	17	20	30
35	0	0	0	1	1	1	2	3	4	5	6	7	8	10	12	14	17	20	35
S. 40	0	0	0	1	1	2	2	3	4	5	7	8	10	12	15	17	20	23	N. 40
45	0	0	1	1	2	2	3	5	6	8	9	12	14	17	20	24	28	32	45
50	0	0	1	2	2	4	5	7	9	11	14	17	20	25	29	34	40	47	50
55	0	1	1	2	4	5	7	10	13	16	20	25	30	36	43	50	59	69	55
S. 60	0	1	2	3	5	8	11	14	18	23	29	35	43	51	60	71	84	98	N. 60

This table gives the difference, in nautical miles, between the distance from one place to another by the Rhumb Line track and the distance by the Great Circle track. It is based on a *Latitude of Departure* of 37°, but may be used for any place of departure between latitudes 35° and 39°. Of the two argument columns headed *Latitude of Destination*, the one on the left is to be used when the place of departure lies between N. 35° and N. 39°, and the one on the right when the place of departure lies between S. 35° and S. 39°.

The table is intended to give only the approximate difference of distance between the two tracks. For intermediate values of the arguments *Latitude of Destination* and *Change of Longitude*, the figures in the table should be interpolated by inspection. If the *Latitude of Departure* differs by the maximum of 2½° from that on which the table is based, the error in the result will not exceed 2 miles up to a *Change of Longitude* of 50°, but may reach 5 miles for a change of 70°, and 11 miles for a change of 90°.

Example.—Required the difference in distance between the Rhumb Line track and the Great Circle track from Lisbon (Lat. 38° 42′ N., Long. 9° 08′ W.) to Boston (Lat. 42° 21′ N., Long. 71° 03′ W.).

Entering the argument column on the left with the *Latitude of Destination* of 42° 21′ N., and interpolating by inspection for the *Change of Longitude* of 61° 55′, it will be seen that the difference in distance is about 60 nautical miles.

VI.—ADJUSTMENT TO REFRACTION IN SPECIAL CONDITIONS

Height in feet	Observed Altitude 10°	15°	20°	30°	45°	60°	Height in metres
	′	′	′	′	′	′	
0	−1	0	0	0	0	0	0
5000	0	0	0	0	0	0	1500
10000	+1	0	0	0	0	0	3000
15000	1	+1	+1	0	0	0	4600
20000	2	1	1	+1	0	0	6100
25000	2	1	1	1	0	0	7600
30000	3	2	1	1	0	0	9100
35000	3	2	1	1	+1	0	10700
40000	+3	+2	+2	+1	+1	0	12200

This table gives the additional correction for refraction to be applied to the *observed* altitude beyond that already included in the altitude tabulated in the main tables. It is only intended for use by an observer at great heights when special accuracy is required.

VII.—TRUE AZIMUTH OF THE POLE STAR

1940–1960 L.H.A. ♈	True Azimuth	1960–1980 L.H.A. ♈	True Azimuth	1980–2000 L.H.A. ♈	True Azimuth
°	°	°	°	°	°
0	001	0	001	0	001
2	000	3	000	4	000
51	359	58	359	66	359
182	000	183	000	184	000
231	001	238	001	246	001
360		360		360	

These tables give the True Azimuth of the Pole Star, over various periods of time, for an observer between latitudes N. 35° and N. 39°. The argument L.H.A.♈ is obtained from G.H.A.♈ by *subtracting west* longitude or *adding east* longitude.

VIII.—DIP OF THE SEA HORIZON

Height in feet	Dip	Height in metres	Height in feet	Dip	Height in metres	Height in feet	Dip	Height in metres	Height in feet	Dip	Height in metres	Height in feet	Dip	Height in metres
	′			′			′			′			′	
0	1	0	437	21	133	1700	41	520	3810	61	1160	6740	81	2050
2	2		481	22	146	1790	42	546	3930	62	1200	6910	82	2100
6	3	1	527	23	160	1880	43	573	4060	63	1230	7080	83	2160
12	4	3	575	24	175	1970	44	600	4190	64	1270	7250	84	2210
21	5	6	625	25	190	2060	45	628	4330	65	1320	7430	85	2260
31	6	9	677	26	206	2150	46	657	4460	66	1360	7610	86	2320
43	7	13	731	27	222	2250	47	686	4600	67	1400	7790	87	2370
58	8	17	787	28	240	2340	48	716	4740	68	1440	7970	88	2420
75	9	22	845	29	257	2440	49	746	4880	69	1480	8150	89	2480
93	10	28	906	30	276	2550	50	777	5020	70	1530	8340	90	2540
114	11	34	968	31	295	2650	51	809	5170	71	1570	8520	91	2590
137	12	41	1030	32	314	2760	52	841	5320	72	1620	8710	92	2650
162	13	49	1090	33	335	2860	53	874	5470	73	1660	8900	93	2710
189	14	57	1160	34	356	2980	54	908	5620	74	1710	9100	94	2770
218	15	66	1230	35	377	3090	55	942	5770	75	1760	9290	95	2830
250	16	76	1310	36	399	3200	56	977	5930	76	1800	9490	96	2890
283	17	86	1380	37	422	3320	57	1010	6090	77	1850	9690	97	2950
318	18	97	1460	38	446	3440	58	1040	6250	78	1900	9890	98	3010
356	19	108	1540	39	470	3560	59	1080	6410	79	1950	10100	99	3070
395	20	120	1620	40	495	3680	60	1120	6580	80	2000	10300	100	3140
437		133	1700		520	3810		1160	6740		2050	10500		3200

This table gives the dip of the sea horizon, in minutes of arc, with argument height of eye of the observer in feet or in metres. It is only required when the altitude is measured from the sea horizon. The dip is to be *subtracted* from the observed altitude.

IX.—DISTANCE TO THE SEA HORIZON IN NAUTICAL MILES

Height in feet	Dist.	Height in metres	Height in feet	Dist.	Height in metres	Height in feet	Dist.	Height in metres	Height in feet	Dist.	Height in metres	Height in feet	Dist.	Height in metres	Height in feet	Dist.	Height in metres
0		0	287		87	1120		341	2500		762	4420		1340	6890		2100
1	1		317	20	96	1170	39	359	2580	58	788	4540	77	1380	7040	96	2140
4	2	1	349	21	106	1240	40	378	2670	59	815	4650	78	1420	7180	97	2190
9	3	2	382	22	116	1300	41	396	2760	60	843	4770	79	1450	7330	98	2230
15	4	4	417	23	127	1360	42	416	2850	61	871	4900	80	1490	7480	99	2280
22	5	6	453	24	138	1430	43	436	2950	62	900	5020	81	1530	7630	100	2320
31	6	9	491	25	149	1490	44	456	3040	63	929	5140	82	1560	7780	101	2370
42	7	12	531	26	161	1560	45	477	3140	64	958	5270	83	1600	7940	102	2420
54	8	16	571	27	174	1630	46	498	3240	65	988	5390	84	1640	8100	103	2460
68	9	20	614	28	187	1700	47	520	3340	66	1010	5520	85	1680	8250	104	2510
83	10	25	658	29	200	1770	48	542	3440	67	1050	5650	86	1720	8410	105	2560
100	11	30	703	30	214	1850	49	564	3540	68	1080	5780	87	1760	8570	106	2610
118	12	36	750	31	228	1920	50	587	3650	69	1110	5920	88	1800	8730	107	2660
137	13	42	798	32	243	2000	51	611	3750	70	1140	6050	89	1840	8900	108	2710
158	14	48	848	33	258	2080	52	635	3860	71	1170	6190	90	1880	9060	109	2760
181	15	55	900	34	274	2160	53	659	3970	72	1210	6330	91	1920	9230	110	2810
205	16	62	953	35	290	2240	54	684	4080	73	1240	6460	92	1970	9400	111	2860
231	17	70	1000	36	307	2320	55	709	4190	74	1270	6610	93	2010	9560	112	2910
258	18	78	1060	37	324	2410	56	735	4310	75	1310	6750	94	2050	9740	113	2960
287	19	87	1120	38	341	2500	57	762	4420	76	1340	6890	95	2100	9910	114	3020

IX.—DISTANCE TO THE SEA HORIZON IN STATUTE MILES

Height in feet	Dist.	Height in metres	Height in feet	Dist.	Height in metres	Height in feet	Dist.	Height in metres	Height in feet	Dist.	Height in metres	Height in feet	Dist.	Height in metres	Height in feet	Dist.	Height in metres
0		0	288		87	1120		344	2520		768	4460		1360	6960		2120
1	1		314	23	95	1180	45	359	2590	67	791	4560	89	1390	7080	111	2160
3	2	1	342	24	104	1230	46	375	2670	68	815	4670	90	1420	7210	112	2190
6	3	2	370	25	113	1280	47	392	2750	69	839	4770	91	1450	7340	113	2230
11	4	3	400	26	122	1340	48	408	2830	70	863	4870	92	1480	7470	114	2270
17	5	5	431	27	131	1390	49	425	2910	71	888	4980	93	1510	7600	115	2310
24	6	7	463	28	141	1450	50	443	2990	72	913	5090	94	1550	7730	116	2350
32	7	9	496	29	151	1510	51	460	3080	73	938	5200	95	1580	7870	117	2390
41	8	12	530	30	161	1570	52	479	3160	74	964	5310	96	1610	8000	118	2440
51	9	15	565	31	172	1630	53	497	3250	75	990	5420	97	1650	8140	119	2480
62	10	19	602	32	183	1690	54	516	3330	76	1010	5530	98	1680	8280	120	2520
75	11	22	639	33	195	1750	55	535	3420	77	1040	5640	99	1720	8410	121	2560
89	12	27	678	34	206	1820	56	554	3510	78	1070	5750	100	1750	8550	122	2600
103	13	31	718	35	219	1880	57	574	3600	79	1090	5870	101	1790	8690	123	2650
119	14	36	759	36	231	1950	58	594	3690	80	1120	5990	102	1820	8830	124	2690
137	15	41	801	37	244	2010	59	615	3780	81	1150	6100	103	1860	8980	125	2730
155	16	47	845	38	257	2080	60	636	3880	82	1180	6220	104	1890	9120	126	2780
174	17	53	889	39	271	2150	61	657	3970	83	1210	6340	105	1930	9270	127	2820
195	18	59	935	40	285	2220	62	678	4070	84	1240	6460	106	1970	9410	128	2870
216	19	66	982	41	299	2290	63	700	4160	85	1270	6580	107	2000	9560	129	2910
239	20	73	1030	42	313	2370	64	723	4260	86	1300	6710	108	2040	9710	130	2960
263	21	80	1070	43	328	2440	65	745	4360	87	1330	6830	109	2080	9860	131	3000
288	22	87	1120	44	344	2520	66	768	4460	88	1360	6960	110	2120	10000	132	3050

These tables give the distance to the sea horizon, in nautical miles and in statute miles, with argument height of eye of the observer in feet or in metres.

At the moment when an object of known height is just appearing or disappearing over the sea horizon, its distance may be found by adding the distance corresponding to its height to the distance corresponding to the height of eye of the observer.

X.—TABLE OF RANGES IN NAUTICAL MILES

The tables below and on the opposite page give the distance, to the nearest 5 nautical miles, of an object, whose height is known and is *greater* than the height of the observer. The arguments of the table are the observed *angle of elevation* to the object, and the *difference in height* between the object and the observer, expressed in feet or in metres.

Example.—An observer, whose height is 1,500 feet, finds that the angle of elevation to the summit of a mountain, whose height is known to be 7,000 feet, is 0° 48′. Required the distance away of the mountain.

The difference in height between the mountain and the observer is 7,000 − 1,500 = 5,500 feet. Entering on the opposite page the column headed 0° 50′ (the nearest tabulated value to 0° 48′), and choosing the left-hand of the two argument columns since the height is measured in feet, it is seen that 5,500 lies in the interval between 5,130 and 5,910, so that the distance of the mountain, to the nearest 5 miles, is 45 nautical miles.

The tables on pages 226 to 228 give the distance of an object, whose height is known, and is *less* than the height of the observer. The arguments of the table are the observed *angle of depression* to the object, and the *difference in height* between the observer and the object, expressed in feet or in metres. The distance is given to the nearest mile up to 10 nautical miles, and to the nearest 5 miles from 10 to 60 nautical miles.

Example.—An observer, whose height is 1,500 metres, finds that the angle of depression to a ship is 5° 37′. Required the distance away of the ship.

Entering on page 228 the column headed 5° 30′, and choosing the right-hand of the two argument columns, it is seen that 1,500 is an exact tabulated value, so that the distance away of the ship is 8 nautical miles.

On page 226, figures in *italics* represent the difference in height, *when the object observed is beyond the sea horizon.* If it is uncertain whether the object is beyond the horizon or not, and the two parts of the table give widely different results, there should be no doubt which is the correct one, while in doubtful cases the error will not be serious.

These tables are intended to give only the approximate range. They should prove a more reliable guide for large angles of elevation and depression than for small ones.

Height of object *greater* than height of observer

Angle of elevation												
4° 00′			3° 40′			3° 20′			3° 00′			2° 40′			2° 20′		
Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres
0		0	0		0	0		0	0		0	0		0	0		0
1060	0	325	978	0	298	890	0	271	801	0	244	712	0	217	624	0	190
3230	5	985	2960	5	904	2690	5	822	2430	5	741	2160	5	660	1900	5	579
5430	10	1650	4990	10	1520	4540	10	1380	4100	10	1250	3650	10	1110	3210	10	980
7670	15	2330	7050	15	2140	6430	15	1960	5810	15	1770	5190	15	1580	4570	15	1390
9950	20	3030	9150	20	2790	8350	20	2540	7550	20	2300	6750	20	2050	5960	20	1810
12200	25	3740	11200	25	3440	10300	25	3140	9340	25	2840	8360	25	2540	7390	25	2250
14600	30	4450	13400	30	4100	12300	30	3750	11100	30	3400	10000	30	3050	8850	30	2690
17000	35	5180	15600	35	4780	14300	35	4370	13000	35	3960	11600	35	3560	10300	35	3150
19400	40	5920	17900	40	5460	16400	40	5000	14900	40	4540	13400	40	4080	11900	40	3620
21900	45	6680	20200	45	6160	18500	45	5650	16800	45	5130	15100	45	4620	13400	45	4110
24400	50	7440	22500	50	6870	20600	50	6300	18800	50	5730	16900	50	5170	15100	50	4600
26900	55	8210	24900	55	7590	22800	55	6970	20800	55	6350	18800	55	5730	16700	55	5100
29500	60	9000	27300	60	8320	25100	60	7650	22800	60	6970	20600	60	6300	18400	60	5620

X.—TABLE OF RANGES IN NAUTICAL MILES

Height of object *greater* than height of observer

Angle of elevation

2° 00′			1° 50′			1° 40′			1° 30′			1° 20′			1° 10′		
Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres
0		0	0		0	0		0	0		0	0		0	0		0
535	0	163	491	0	149	447	0	136	402	0	122	358	0	109	314	0	95
1630	5	498	1500	5	458	1370	5	417	1230	5	377	1100	5	336	971	5	296
2770	10	845	2550	10	777	2330	10	710	2100	10	643	1880	10	575	1660	10	508
3940	15	1200	3630	15	1100	3320	15	1010	3020	15	920	2710	15	826	2400	15	731
5160	20	1570	4760	20	1450	4360	20	1330	3960	20	1200	3570	20	1080	3170	20	966
6410	25	1950	5920	25	1800	5440	25	1650	4950	25	1510	4460	25	1360	3980	25	1210
7700	30	2340	7130	30	2170	6550	30	1990	5970	30	1820	5400	30	1640	4820	30	1470
9030	35	2750	8360	35	2550	7700	35	2340	7040	35	2140	6370	35	1940	5710	35	1740
10400	40	3160	9640	40	2940	8890	40	2710	8140	40	2480	7390	40	2250	6630	40	2020
11800	45	3590	10900	45	3340	10100	45	3080	9280	45	2820	8440	45	2570	7590	45	2310
13200	50	4030	12300	50	3750	11300	50	3470	10400	50	3180	9520	50	2900	8590	50	2620
14700	55	4480	13700	55	4170	12600	55	3860	11600	55	3550	10600	55	3240	9630	55	2930
16200	60	4950	15100	60	4610	14000	60	4270	12900	60	3930	11800	60	3600	10700	60	3260

Angle of elevation

1° 00′			0° 55′			0° 50′			0° 45′			0° 40′			0° 35′		
Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres
0		0	0		0	0		0	0		0	0		0	0		0
270	0	82	247	0	75	225	0	68	203	0	62	181	0	55	159	0	48
839	5	255	772	5	235	706	5	215	640	5	195	573	5	174	507	5	154
1440	10	440	1330	10	406	1220	10	373	1110	10	339	1000	10	305	893	10	272
2090	15	637	1930	15	590	1780	15	542	1620	15	495	1470	15	448	1310	15	401
2770	20	845	2570	20	784	2370	20	724	2170	20	663	1970	20	602	1770	20	542
3490	25	1060	3250	25	991	3000	25	916	2760	25	842	2520	25	768	2270	25	694
4250	30	1290	3960	30	1200	3670	30	1120	3390	30	1030	3100	30	945	2810	30	858
5050	35	1530	4710	35	1430	4380	35	1330	4050	35	1230	3720	35	1130	3390	35	1030
5880	40	1790	5500	40	1670	5130	40	1560	4750	40	1450	4380	40	1330	4000	40	1220
6750	45	2060	6330	45	1930	5910	45	1800	5490	45	1670	5070	45	1540	4650	45	1410
7670	50	2330	7200	50	2190	6740	50	2050	6270	50	1910	5810	50	1770	5340	50	1620
8610	55	2620	8100	55	2470	7600	55	2310	7090	55	2160	6580	55	2000	6070	55	1850
9600	60	2920	9050	60	2750	8500	60	2590	7940	60	2420	7390	60	2250	6840	60	2080

Angle of elevation

0° 30′			0° 25′			0° 20′			0° 15′			0° 10′			0° 05′		
Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres
0		0	0		0	0		0	0		0	0		0	0		0
137	0	41	115	0	35	93	0	28	71	0	21	48	0	14	26	0	8
440	5	134	374	5	114	308	5	93	241	5	73	175	5	53	109	5	33
782	10	238	671	10	204	561	10	171	450	10	137	339	10	103	229	10	69
1160	15	354	1000	15	306	852	15	259	697	15	212	542	15	165	387	15	118
1570	20	481	1380	20	420	1180	20	360	982	20	299	783	20	238	584	20	178
2030	25	620	1790	25	546	1540	25	471	1300	25	397	1060	25	323	818	25	249
2520	30	770	2240	30	683	1950	30	595	1660	30	507	1370	30	420	1090	30	332
3060	35	932	2720	35	831	2390	35	730	2060	35	629	1730	35	528	1400	35	427
3620	40	1100	3250	40	991	2870	40	877	2500	40	762	2120	40	648	1750	40	533
4230	45	1290	3810	45	1160	3390	45	1030	2970	45	907	2550	45	779	2130	45	651
4880	50	1480	4410	50	1340	3950	50	1200	3480	50	1060	3020	50	922	2560	50	780
5560	55	1690	5050	55	1540	4540	55	1380	4040	55	1230	3530	55	1070	3020	55	921
6280	60	1910	5730	60	1740	5180	60	1570	4620	60	1410	4070	60	1240	3520	60	1070

X.—TABLE OF RANGES IN NAUTICAL MILES

Height of object *less* than height of observer

Angle of depression

0° 05′			0° 10′			0° 15′			0° 20′			0° 25′			0° 30′		
Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	1	1	9	1	2	13	1	4	17	1	5	21	1	6	26	1	8
11	2	3	24	2	7	38	2	11	51	2	15	64	2	19	77	2	23
17	3	5	39	3	12	61	3	18	83	3	25	106	3	32	127	3	39
21	4	6	52	4	15	83	4	25	114	4	34	145	4	44	176	4	53
24	5	7	64	5	19	103	5	31	143	5	43	183	5	55	223	5	68
25	6	8	74	6	22	122	6	37	171	6	52	220	6	67	268	6	81
26	7	*24*	82	7	25	140	7	42	197	7	60	255	7	77	312	7	95
24	8	*21*	89	8	27	156	8	47	222	8	67	288	8	88	355	8	108
21	9	*16*	95	9	29	170	9	52	245	9	74	320	9	97	396	9	120
16	10	*0*	99	10	30	183	10	55	267	10	81	351	10	107	435	10	132
0			*103*	15	*32*	212	15	64	323	15	98	434	15	132	544	15	166
			77	20	*24*	231	20	70	386	20	117	541	20	164	695	20	212
			13	25	*4*	*213*	25	*65*	411	25	125	609	25	185	808	25	246
			0		*0*	*155*	30	*48*	*398*	30	*122*	640	30	195	884	30	269
						59	35	*18*	*346*	35	*106*	*634*	35	*194*	921	35	280
						0		*0*	*258*	40	*79*	*590*	40	*180*	*921*	40	*281*
									130	45	*40*	*506*	45	*155*	*882*	45	*269*
									0		*0*	*385*	50	*118*	*805*	50	*246*
												226	55	*69*	*690*	55	*211*
												28	60	*9*	*537*	60	*164*
												0		*0*	*346*		*106*

Angle of depression

0° 35′			0° 40′			0° 45′			0° 50′			0° 55′			1° 00′		
Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	1	9	35	1	10	39	1	12	44	1	13	48	1	14	52	1	16
91	2	27	104	2	31	117	2	35	130	2	39	144	2	43	157	2	47
150	3	45	172	3	52	194	3	59	216	3	65	238	3	72	260	3	79
207	4	63	238	4	72	269	4	82	300	4	91	331	4	100	362	4	110
263	5	80	302	5	92	342	5	104	382	5	116	422	5	128	462	5	140
317	6	96	366	6	111	414	6	126	463	6	141	512	6	156	560	6	170
370	7	112	427	7	130	485	7	147	542	7	165	600	7	182	657	7	200
421	8	128	488	8	148	554	8	168	620	8	189	687	8	209	753	8	229
471	9	143	546	9	166	621	9	189	696	9	212	772	9	235	847	9	258
519	10	158	603	10	183	687	10	209	771	10	235	855	10	260	939	10	286
655	15	199	765	15	233	876	15	267	986	15	300	1090	15	334	1200	15	368
850	20	259	1000	20	306	1160	20	353	1310	20	400	1470	20	448	1620	20	495
1000	25	307	1200	25	367	1400	25	428	1600	25	489	1800	25	549	2000	25	610
1120	30	343	1370	30	417	1610	30	491	1850	30	566	2100	30	640	2340	30	714
1200	35	368	1490	35	456	1780	35	543	2070	35	631	2350	35	719	2640	35	806
1250	40	381	1580	40	482	1910	40	583	2240	40	685	2570	40	786	2910	40	887
1260	45	*384*	1630	45	497	2000	45	612	2380	45	727	2760	45	841	3130	45	956
1230	50	*374*	*1650*	50	*502*	2060	50	629	2480	50	757	2900	50	885	3320	50	1010
1160	55	*352*	*1620*	55	*494*	2080	55	634	2540	55	776	3010	55	918	3470	55	1050
1050	60	*319*	*1560*	60	*474*	*2070*	60	*629*	2570	60	783	3080	60	938	3580	60	1090
899		*274*	*1460*		*443*	*2010*		*611*	*2560*		*780*	3110		947	3660		1110

For explanation, see page 224.

X.—TABLE OF RANGES IN NAUTICAL MILES

Height of object *less* than height of observer

Angle of depression												
1° 10′			1° 20′			1° 30′			1° 40′			1° 50′			2° 00′		
Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	1	18	70	1	21	79	1	24	88	1	26	97	1	29	106	1	32
183	2	56	210	2	64	237	2	72	263	2	80	290	2	88	316	2	96
305	3	92	349	3	106	393	3	119	437	3	133	481	3	146	526	3	160
424	4	129	486	4	148	548	4	167	610	4	185	672	4	204	734	4	223
541	5	165	621	5	189	701	5	213	780	5	238	860	5	262	940	5	286
658	6	200	755	6	230	852	6	259	950	6	289	1040	6	319	1140	6	349
772	7	235	887	7	270	1000	7	305	1110	7	340	1230	7	375	1340	7	410
886	8	270	1010	8	310	1150	8	351	1280	8	391	1410	8	432	1550	8	472
997	9	304	1140	9	350	1290	9	395	1440	9	441	1590	9	487	1750	9	533
1100	10	337	1270	10	388	1440	10	440	1610	10	491	1780	10	542	1940	10	594
1430	15	435	1650	15	503	1870	15	570	2090	15	638	2310	15	705	2530	15	772
1930	20	589	2240	20	684	2550	20	778	2860	20	872	3170	20	967	3480	20	1060
2400	25	732	2790	25	853	3190	25	974	3590	25	1090	3990	25	1210	4390	25	1330
2830	30	862	3310	30	1010	3800	30	1150	4290	30	1300	4770	30	1450	5260	30	1600
3220	35	982	3790	35	1150	4370	35	1330	4940	35	1500	5520	35	1680	6090	35	1850
3570	40	1080	4230	40	1290	4900	40	1490	5560	40	1690	6230	40	1890	6890	40	2100
3880	45	1180	4640	45	1410	5390	45	1640	6140	45	1870	6890	45	2100	7650	45	2330
4160	50	1270	5000	50	1520	5840	50	1780	6680	50	2030	7530	50	2290	8370	50	2550
4400	55	1340	5330	55	1620	6260	55	1900	7190	55	2190	8120	55	2470	9050	55	2750
4600	60	1400	5620	60	1710	6640	60	2020	7660	60	2330	8670	60	2640	9690	60	2950
4760		1450	5870		1790	6980		2120	8080		2460	9190		2800	10300		3140

Angle of depression												
2° 20′			2° 40′			3° 00′			3° 20′			3° 40′			4° 00′		
Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
123	1	37	141	1	43	159	1	48	176	1	53	194	1	59	212	1	64
369	2	112	422	2	128	476	2	145	529	2	161	582	2	177	636	2	193
614	3	187	703	3	214	792	3	241	880	3	268	969	3	295	1050	3	322
858	4	261	982	4	299	1100	4	337	1230	4	375	1350	4	412	1470	4	450
1090	5	335	1250	5	383	1410	5	432	1570	5	481	1730	5	529	1890	5	578
1340	6	408	1530	6	467	1730	6	527	1920	6	586	2120	6	646	2310	6	706
1570	7	481	1800	7	551	2040	7	621	2270	7	692	2500	7	762	2730	7	832
1810	8	553	2080	8	634	2340	8	715	2610	8	796	2880	8	877	3140	8	959
2050	9	625	2350	9	717	2650	9	809	2950	9	901	3250	9	993	3560	9	1080
2280	10	696	2620	10	799	2950	10	902	3290	10	1000	3630	10	1100	3970	10	1210
2970	15	908	3420	15	1040	3860	15	1170	4300	15	1310	4750	15	1440	5190	15	1580
4100	20	1250	4720	20	1430	5340	20	1620	5960	20	1810	6580	20	2000	7200	20	2190
5190	25	1580	5980	25	1820	6780	25	2060	7580	25	2310	8380	25	2550	9180	25	2790
6230	30	1900	7210	30	2190	8180	30	2490	9160	30	2790	10100	30	3090	11100	30	3380
7250	35	2210	8400	35	2560	9550	35	2910	10700	35	3260	11800	35	3610	13000	35	3960
8220	40	2500	9550	40	2910	10800	40	3310	12200	40	3720	13500	40	4120	14800	40	4530
9150	45	2790	10600	45	3250	12100	45	3710	13600	45	4170	15100	45	4620	16700	45	5090
10000	50	3060	11700	50	3570	13400	50	4090	15100	50	4600	16700	50	5120	18400	50	5630
10900	55	3320	12700	55	3890	14600	55	4460	16400	55	5020	18300	55	5590	20200	55	6160
11700	60	3570	13700	60	4190	15800	60	4810	17800	60	5440	19900	60	6060	21900	60	6680
12500		3810	14700		4490	16900		5160	19100		5840	21300		6510	23600		7190

For explanation, see page 224.

X.—TABLE OF RANGES IN NAUTICAL MILES

Height of object *less* than height of observer

Angle of depression

4° 30′			5° 00′			5° 30′			6° 00′			6° 30′			7° 00′		
Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
238	1	72	265	1	81	292	1	89	319	1	97	346	1	105	373	1	113
716	2	218	796	2	242	876	2	267	956	2	291	1030	2	316	1110	2	340
1190	3	363	1320	3	404	1450	3	444	1590	3	485	1720	3	526	1860	3	567
1660	4	507	1850	4	564	2040	4	621	2220	4	679	2410	4	736	2600	4	793
2130	5	651	2370	5	725	2610	5	798	2860	5	872	3100	5	945	3340	5	1010
2600	6	795	2900	6	885	3190	6	974	3490	6	1060	3780	6	1150	4080	6	1240
3070	7	938	3420	7	1040	3770	7	1150	4120	7	1250	4470	7	1360	4820	7	1460
3540	8	1080	3940	8	1200	4340	8	1320	4750	8	1440	5150	8	1570	5550	8	1690
4010	9	1220	4460	9	1360	4920	9	1500	5370	9	1630	5830	9	1770	6290	9	1910
4470	10	1360	4980	10	1510	5490	10	1670	6000	10	1830	6510	10	1980	7020	10	2140
5860	15	1780	6530	15	1990	7200	15	2190	7870	15	2390	8540	15	2600	9210	15	2800
8140	20	2480	9070	20	2760	10000	20	3050	10900	20	3330	11800	20	3620	12800	20	3910
10300	25	3160	11500	25	3530	12700	25	3890	14000	25	4260	15200	25	4630	16400	25	5000
12500	30	3830	14000	30	4280	15500	30	4730	16900	30	5180	18400	30	5630	19900	30	6080
14700	35	4490	16400	35	5020	18200	35	5550	19900	35	6080	21700	35	6620	23400	35	7150
16800	40	5140	18800	40	5750	20800	40	6360	22800	40	6980	24900	40	7590	26900	40	8210
18900	45	5780	21200	45	6470	23500	45	7160	25800	45	7860	28000	45	8550	30300	45	9250
21000	50	6400	23500	50	7180	26000	50	7950	28600	50	8730	31100	50	9510	33700	50	10200
23000	55	7020	25800	55	7870	28600	55	8730	31400	55	9590	34200	55	10400	37100	55	11300
25000	60	7620	28000	60	8550	31100	60	9490	34200	60	10400	37300	60	11300	40400	60	12300
26900		8210	30200		9230	33600		10200	36900		11200	40300		12200	43600		13300

Angle of depression

7° 30′			8° 00′			8° 30′			9° 00′			9° 30′			10° 00′		
Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres	Height in feet	Range	Height in metres
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
399	1	121	427	1	130	454	1	138	481	1	146	508	1	154	535	1	163
1190	2	365	1270	2	390	1360	2	415	1440	2	439	1520	2	464	1600	2	489
1990	3	608	2130	3	649	2260	3	691	2400	3	732	2540	3	774	2670	3	815
2790	4	851	2980	4	909	3170	4	966	3360	4	1020	3550	4	1080	3740	4	1140
3580	5	1090	3830	5	1160	4070	5	1240	4310	5	1310	4560	5	1390	4810	5	1460
4380	6	1330	4670	6	1420	4970	6	1510	5270	6	1600	5570	6	1690	5870	6	1790
5170	7	1570	5520	7	1680	5870	7	1790	6220	7	1890	6580	7	2000	6930	7	2110
5960	8	1810	6360	8	1940	6770	8	2060	7180	8	2180	7580	8	2310	8000	8	2430
6750	9	2050	7210	9	2190	7670	9	2330	8130	9	2470	8590	9	2610	9060	9	2760
7530	10	2290	8050	10	2450	8560	10	2610	9080	10	2760	9600	10	2920	10100	10	3080
9880	15	3010	10500	15	3220	11200	15	3420	11900	15	3630	12600	15	3840	13200	15	4050
13700	20	4200	14700	20	4480	15600	20	4770	16600	20	5060	17500	20	5350	18500	20	5640
17600	25	5370	18800	25	5740	20000	25	6110	21200	25	6480	22500	25	6860	23700	25	7230
21400	30	6530	22900	30	6980	24400	30	7440	25900	30	7890	27400	30	8350	28900	30	8810
25200	35	7680	26900	35	8220	28700	35	8760	30500	35	9290	32200	35	9830	34000	35	10300
28900	40	8820	30900	40	9440	33000	40	10000	35000	40	10600	37000	35	11300	39100	40	11900
32600	45	9950	34900	45	10600	37200	45	11300	39500	45	12000	41800	40	12700	44200	45	13400
36300	50	11000	38800	50	11800	41400	50	12600	44000	50	13400	46600	45	14200	49200	50	15000
39900	55	12100	42700	55	13000	45600	55	13900	48400	55	14700	51300	50	15600	54200	55	16500
43500	60	13200	46600	60	14200	49700	60	15100	52800	60	16100	56000	55	17000	59100	60	18000
47000		14300	50400		15300	53800		16400	57200		17400	60600	60	18400	64000		19500

For explanation, see page 224.

XI.—TEMPERATURE CONVERSION

FAHRENHEIT AND CENTIGRADE

°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C
−52		−14		+23		+61		+99		+137		+175	
50	−46	13	−25	25	−4	63	+17	101	+38	139	+59	176	+80
49	45	11	24	27	3	65	18	103	39	140	60	178	81
47	44	9	23	29	2	67	19	104	40	142	61	180	82
45	43	7	22	31	−1	68	20	106	41	144	62	182	83
43	42	5	21	32	0	70	21	108	42	146	63	184	84
41	41	4	20	34	+1	72	22	110	43	148	64	185	85
40	40	−2	19	36	2	74	23	112	44	149	65	187	86
38	39	0	18	38	3	76	24	113	45	151	66	189	87
36	38	+2	17	40	4	77	25	115	46	153	67	191	88
34	37	4	16	41	5	79	26	117	47	155	68	193	89
32	36	5	15	43	6	81	27	119	48	157	69	194	90
31	35	7	14	45	7	83	28	121	49	158	70	196	91
29	34	9	13	47	8	85	29	122	50	160	71	198	92
27	33	11	12	49	9	86	30	124	51	162	72	200	93
25	32	13	11	50	10	88	31	126	52	164	73	202	94
23	31	14	10	52	11	90	32	128	53	166	74	203	95
22	30	16	9	54	12	92	33	130	54	167	75	205	96
20	29	18	8	56	13	94	34	131	55	169	76	207	97
18	28	20	7	58	14	95	35	133	56	171	77	209	98
16	27	22	6	59	15	97	36	135	57	173	78	211	99
−14	−26	+23	−5	+61	+16	+99	+37	+137	+58	+175	+79	+212	+100

XII.—CONVERSION FACTORS

Conversion	Ratio	Factor	Reciprocal
DISTANCE			
Statute Miles to Nautical Miles ...	66 to 76	0·8684	1·1515
Statute Miles „ Kilometres	66 „ 41	1·6093	0·6214
Nautical Miles „ Kilometres	76 „ 41	1·8531	0·5396
Feet „ Metres	25 „ 82	0·3048	3·2808
Yards „ Metres	32 „ 35	0·9144	1·0936
Fathoms „ Feet	6 „ 1	6·0	0·1667
SPEED			
Miles per hour to Knots	66 to 76	0·8684	1·1515
Miles per hour „ Metres per second ...	38 „ 85	0·4470	2·2369
Knots „ Metres per second ...	35 „ 68	0·5148	1·9426
Miles per hour „ Feet per second ...	22 „ 15	1·4667	0·6818
LIQUID MEASURE			
Gallons to Litres	50 to 11	4·5460	0·2200
WEIGHT			
Pounds to Kilograms	44 to 97	0·4536	2·2046
PRESSURE			
Inches of Mercury to Millibars ...	2100 to 62	33·87	0·02953

XIII.—CONVERSION OF TIME TO ARC

For Intervals of 10ᵐ

h m	° ′	h m	° ′	h m	° ′
00 00	0 00	08 00	120 00	16 00	240 00
10	2 30	10	122 30	10	242 30
20	5 00	20	125 00	20	245 00
30	7 30	30	127 30	30	247 30
40	10 00	40	130 00	40	250 00
50	12 30	50	132 30	50	252 30
01 00	15 00	09 00	135 00	17 00	255 00
10	17 30	10	137 30	10	257 30
20	20 00	20	140 00	20	260 00
30	22 30	30	142 30	30	262 30
40	25 00	40	145 00	40	265 00
50	27 30	50	147 30	50	267 30
02 00	30 00	10 00	150 00	18 00	270 00
10	32 30	10	152 30	10	272 30
20	35 00	20	155 00	20	275 00
30	37 30	30	157 30	30	277 30
40	40 00	40	160 00	40	280 00
50	42 30	50	162 30	50	282 30
03 00	45 00	11 00	165 00	19 00	285 00
10	47 30	10	167 30	10	287 30
20	50 00	20	170 00	20	290 00
30	52 30	30	172 30	30	292 30
40	55 00	40	175 00	40	295 00
50	57 30	50	177 30	50	297 30
04 00	60 00	12 00	180 00	20 00	300 00
10	62 30	10	182 30	10	302 30
20	65 00	20	185 00	20	305 00
30	67 30	30	187 30	30	307 30
40	70 00	40	190 00	40	310 00
50	72 30	50	192 30	50	312 30
05 00	75 00	13 00	195 00	21 00	315 00
10	77 30	10	197 30	10	317 30
20	80 00	20	200 00	20	320 00
30	82 30	30	202 30	30	322 30
40	85 00	40	205 00	40	325 00
50	87 30	50	207 30	50	327 30
06 00	90 00	14 00	210 00	22 00	330 00
10	92 30	10	212 30	10	332 30
20	95 00	20	215 00	20	335 00
30	97 30	30	217 30	30	337 30
40	100 00	40	220 00	40	340 00
50	102 30	50	222 30	50	342 30
07 00	105 00	15 00	225 00	23 00	345 00
10	107 30	10	227 30	10	347 30
20	110 00	20	230 00	20	350 00
30	112 30	30	232 30	30	352 30
40	115 00	40	235 00	40	355 00
50	117 30	50	237 30	50	357 30

Interpolation Table

m s	° ′
00 00	0 00
02	0 01
05	0 02
10	0 03
13	0 04
18	0 05
21	0 06
26	0 07
29	0 08
34	0 09
37	0 10
42	0 11
45	0 12
50	0 13
53	0 14
00 58	0 15
01 01	0 16
06	0 17
09	0 18
14	0 19
17	0 20
22	0 21
25	0 22
30	0 23
33	0 24
38	0 25
41	0 26
46	0 27
49	0 28
54	0 29
01 57	0 30
02 02	0 31
05	0 32
10	0 33
13	0 34
18	0 35
21	0 36
26	0 37
29	0 38
34	0 39
37	0 40
42	0 41
45	0 42
50	0 43
53	0 44
02 58	0 45
03 01	0 46
06	0 47
09	0 48
14	0 49
17	0 50
03 22	0 51
25	0 52
30	0 53
33	0 54
38	0 55
41	0 56
46	0 57
49	0 58
54	0 59
03 57	1 00
04 02	1 01
05	1 02
10	1 03
13	1 04
18	1 05
21	1 06
26	1 07
29	1 08
34	1 09
37	1 10
42	1 11
45	1 12
50	1 13
53	1 14
04 58	1 15
05 01	1 16
06	1 17
09	1 18
14	1 19
17	1 20
22	1 21
25	1 22
30	1 23
33	1 24
38	1 25
41	1 26
46	1 27
49	1 28
54	1 29
05 57	1 30
06 02	1 31
05	1 32
10	1 33
13	1 34
18	1 35
21	1 36
26	1 37
29	1 38
34	1 39
37	1 40
06 42	1 41
06 37	1 40
42	1 41
45	1 42
50	1 43
53	1 44
06 58	1 45
07 01	1 46
06	1 47
09	1 48
14	1 49
17	1 50
22	1 51
25	1 52
30	1 53
33	1 54
38	1 55
41	1 56
46	1 57
49	1 58
54	1 59
07 57	2 00
08 02	2 01
05	2 02
10	2 03
13	2 04
18	2 05
21	2 06
26	2 07
29	2 08
34	2 09
37	2 10
42	2 11
45	2 12
50	2 13
53	2 14
08 58	2 15
09 01	2 16
06	2 17
09	2 18
14	2 19
17	2 20
22	2 21
25	2 22
30	2 23
33	2 24
38	2 25
41	2 26
46	2 27
49	2 28
54	2 29
09 57	2 30
10 00	

When the argument is an exact tabulated value, the *upper* of the two possible values of the result should be taken.

XIV.—CONVERSION OF ARC TO TIME

DEGREES														MINUTES	
°	h m	°	h m	°	h m	°	h m	°	h m	°	h m	°	h m	′	m s
0	0 00	60	4 00	120	8 00	180	12 00	240	16 00	300	20 00	0	0 00	0	0 00
1	0 04	61	4 04	121	8 04	181	12 04	241	16 04	301	20 04	1	0 04	1	0 04
2	0 08	62	4 08	122	8 08	182	12 08	242	16 08	302	20 08	2	0 08	2	0 08
3	0 12	63	4 12	123	8 12	183	12 12	243	16 12	303	20 12	3	0 12	3	0 12
4	0 16	64	4 16	124	8 16	184	12 16	244	16 16	304	20 16	4	0 16	4	0 16
5	0 20	65	4 20	125	8 20	185	12 20	245	16 20	305	20 20	5	0 20	5	0 20
6	0 24	66	4 24	126	8 24	186	12 24	246	16 24	306	20 24	6	0 24	6	0 24
7	0 28	67	4 28	127	8 28	187	12 28	247	16 28	307	20 28	7	0 28	7	0 28
8	0 32	68	4 32	128	8 32	188	12 32	248	16 32	308	20 32	8	0 32	8	0 32
9	0 36	69	4 36	129	8 36	189	12 36	249	16 36	309	20 36	9	0 36	9	0 36
10	0 40	70	4 40	130	8 40	190	12 40	250	16 40	310	20 40	10	0 40	10	0 40
11	0 44	71	4 44	131	8 44	191	12 44	251	16 44	311	20 44	11	0 44	11	0 44
12	0 48	72	4 48	132	8 48	192	12 48	252	16 48	312	20 48	12	0 48	12	0 48
13	0 52	73	4 52	133	8 52	193	12 52	253	16 52	313	20 52	13	0 52	13	0 52
14	0 56	74	4 56	134	8 56	194	12 56	254	16 56	314	20 56	14	0 56	14	0 56
15	1 00	75	5 00	135	9 00	195	13 00	255	17 00	315	21 00	15	1 00	15	1 00
16	1 04	76	5 04	136	9 04	196	13 04	256	17 04	316	21 04	16	1 04	16	1 04
17	1 08	77	5 08	137	9 08	197	13 08	257	17 08	317	21 08	17	1 08	17	1 08
18	1 12	78	5 12	138	9 12	198	13 12	258	17 12	318	21 12	18	1 12	18	1 12
19	1 16	79	5 16	139	9 16	199	13 16	259	17 16	319	21 16	19	1 16	19	1 16
20	1 20	80	5 20	140	9 20	200	13 20	260	17 20	320	21 20	20	1 20	20	1 20
21	1 24	81	5 24	141	9 24	201	13 24	261	17 24	321	21 24	21	1 24	21	1 24
22	1 28	82	5 28	142	9 28	202	13 28	262	17 28	322	21 28	22	1 28	22	1 28
23	1 32	83	5 32	143	9 32	203	13 32	263	17 32	323	21 32	23	1 32	23	1 32
24	1 36	84	5 36	144	9 36	204	13 36	264	17 36	324	21 36	24	1 36	24	1 36
25	1 40	85	5 40	145	9 40	205	13 40	265	17 40	325	21 40	25	1 40	25	1 40
26	1 44	86	5 44	146	9 44	206	13 44	266	17 44	326	21 44	26	1 44	26	1 44
27	1 48	87	5 48	147	9 48	207	13 48	267	17 48	327	21 48	27	1 48	27	1 48
28	1 52	88	5 52	148	9 52	208	13 52	268	17 52	328	21 52	28	1 52	28	1 52
29	1 56	89	5 56	149	9 56	209	13 56	269	17 56	329	21 56	29	1 56	29	1 56
30	2 00	90	6 00	150	10 00	210	14 00	270	18 00	330	22 00	30	2 00	30	2 00
31	2 04	91	6 04	151	10 04	211	14 04	271	18 04	331	22 04	31	2 04	31	2 04
32	2 08	92	6 08	152	10 08	212	14 08	272	18 08	332	22 08	32	2 08	32	2 08
33	2 12	93	6 12	153	10 12	213	14 12	273	18 12	333	22 12	33	2 12	33	2 12
34	2 16	94	6 16	154	10 16	214	14 16	274	18 16	334	22 16	34	2 16	34	2 16
35	2 20	95	6 20	155	10 20	215	14 20	275	18 20	335	22 20	35	2 20	35	2 20
36	2 24	96	6 24	156	10 24	216	14 24	276	18 24	336	22 24	36	2 24	36	2 24
37	2 28	97	6 28	157	10 28	217	14 28	277	18 28	337	22 28	37	2 28	37	2 28
38	2 32	98	6 32	158	10 32	218	14 32	278	18 32	338	22 32	38	2 32	38	2 32
39	2 36	99	6 36	159	10 36	219	14 36	279	18 36	339	22 36	39	2 36	39	2 36
40	2 40	100	6 40	160	10 40	220	14 40	280	18 40	340	22 40	40	2 40	40	2 40
41	2 44	101	6 44	161	10 44	221	14 44	281	18 44	341	22 44	41	2 44	41	2 44
42	2 48	102	6 48	162	10 48	222	14 48	282	18 48	342	22 48	42	2 48	42	2 48
43	2 52	103	6 52	163	10 52	223	14 52	283	18 52	343	22 52	43	2 52	43	2 52
44	2 56	104	6 56	164	10 56	224	14 56	284	18 56	344	22 56	44	2 56	44	2 56
45	3 00	105	7 00	165	11 00	225	15 00	285	19 00	345	23 00	45	3 00	45	3 00
46	3 04	106	7 04	166	11 04	226	15 04	286	19 04	346	23 04	46	3 04	46	3 04
47	3 08	107	7 08	167	11 08	227	15 08	287	19 08	347	23 08	47	3 08	47	3 08
48	3 12	108	7 12	168	11 12	228	15 12	288	19 12	348	23 12	48	3 12	48	3 12
49	3 16	109	7 16	169	11 16	229	15 16	289	19 16	349	23 16	49	3 16	49	3 16
50	3 20	110	7 20	170	11 20	230	15 20	290	19 20	350	23 20	50	3 20	50	3 20
51	3 24	111	7 24	171	11 24	231	15 24	291	19 24	351	23 24	51	3 24	51	3 24
52	3 28	112	7 28	172	11 28	232	15 28	292	19 28	352	23 28	52	3 28	52	3 28
53	3 32	113	7 32	173	11 32	233	15 32	293	19 32	353	23 32	53	3 32	53	3 32
54	3 36	114	7 36	174	11 36	234	15 36	294	19 36	354	23 36	54	3 36	54	3 36
55	3 40	115	7 40	175	11 40	235	15 40	295	19 40	355	23 40	55	3 40	55	3 40
56	3 44	116	7 44	176	11 44	236	15 44	296	19 44	356	23 44	56	3 44	56	3 44
57	3 48	117	7 48	177	11 48	237	15 48	297	19 48	357	23 48	57	3 48	57	3 48
58	3 52	118	7 52	178	11 52	238	15 52	298	19 52	358	23 52	58	3 52	58	3 52
59	3 56	119	7 56	179	11 56	239	15 56	299	19 56	359	23 56	59	3 56	59	3 56

XV.—CORRECTION TO TABULATED ALTITUDE FOR MINUTES OF DECLINATION

d	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	d
00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	00
01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01
02	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	02
03	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	03
04	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	04
05	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	05
06	0	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	06
07	0	0	0	0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	4	07
08	0	0	0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	4	4	4	4	08
09	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	2	3	3	3	3	3	3	3	4	4	4	4	4	4	4	09
10	0	0	0	1	1	1	1	1	2	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	4	4	5	5	5	10
11	0	0	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	11
12	0	0	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	12
13	0	0	1	1	1	1	2	2	2	2	2	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	13
14	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	4	5	5	5	5	6	6	6	6	7	7	7	14
15	0	0	1	1	1	2	2	2	2	2	3	3	3	4	4	4	4	4	5	5	5	6	6	6	6	6	7	7	7	8	15
16	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	5	5	5	5	6	6	6	7	7	7	7	7	8	8	16
17	0	1	1	1	1	2	2	2	3	3	3	3	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8	8	8	8	17
18	0	1	1	1	2	2	2	2	3	3	3	4	4	4	4	5	5	5	6	6	6	7	7	7	8	8	8	8	9	9	18
19	0	1	1	1	2	2	2	3	3	3	3	4	4	4	5	5	5	6	6	6	7	7	7	8	8	8	9	9	9	10	19
20	0	1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6	6	7	7	7	8	8	8	9	9	9	10	10	20
21	0	1	1	1	2	2	2	3	3	4	4	4	5	5	5	6	6	6	7	7	7	8	8	8	9	9	9	10	10	10	21
22	0	1	1	1	2	2	3	3	3	4	4	4	5	5	6	6	6	7	7	7	8	8	8	9	9	10	10	10	11	11	22
23	0	1	1	2	2	2	3	3	3	4	4	5	5	5	6	6	7	7	7	8	8	8	9	9	10	10	10	11	11	12	23
24	0	1	1	2	2	2	3	3	4	4	4	5	5	6	6	6	7	7	8	8	8	9	9	10	10	10	11	11	12	12	24
25	0	1	1	2	2	2	3	3	4	4	5	5	5	6	6	7	7	8	8	8	9	9	10	10	10	11	11	12	12	12	25
26	0	1	1	2	2	3	3	3	4	4	5	5	6	6	6	7	7	8	8	9	9	10	10	10	11	11	12	12	13	13	26
27	0	1	1	2	2	3	3	4	4	4	5	5	6	6	7	7	8	8	9	9	9	10	10	11	11	12	12	13	13	14	27
28	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	28
29	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	14	29
30	0	1	2	2	2	3	4	4	4	5	6	6	6	7	8	8	8	9	10	10	10	11	12	12	12	13	14	14	14	15	30
31	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15	16	31
32	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	32
33	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10	10	11	12	12	13	13	14	14	15	15	16	16	33
34	1	1	2	2	3	3	4	5	5	6	6	7	7	8	8	9	10	10	11	11	12	12	13	14	14	15	15	16	16	17	34
35	1	1	2	2	3	4	4	5	5	6	6	7	8	8	9	9	10	10	11	12	12	13	13	14	15	15	16	16	17	18	35
36	1	1	2	2	3	4	4	5	5	6	7	7	8	8	9	10	10	11	11	12	13	13	14	14	15	16	16	17	17	18	36
37	1	1	2	2	3	4	4	5	6	6	7	7	8	9	9	10	10	11	12	12	13	14	14	15	15	16	17	17	18	18	37
38	1	1	2	3	3	4	4	5	6	6	7	8	8	9	10	10	11	11	12	13	13	14	15	15	16	16	17	18	18	19	38
39	1	1	2	3	3	4	5	5	6	6	7	8	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19	20	39
40	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19	19	20	40
41	1	1	2	3	3	4	5	5	6	7	8	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20	41
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XV.—CORRECTION TO TABULATED ALTITUDE FOR MINUTES OF DECLINATION

d	31 32 33	34 35 36	37 38 39	40 41 42	43 44 45	46 47 48	49 50 51	52 53 54	55 56 57	58 59 60	d
°	′	′	′	′	′	′	′	′	′	′	°
00	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	00
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02	1 1 1	1 1 1	1 1 1	1 1 1	1 1 2	2 2 2	2 2 2	2 2 2	2 2 2	2 2 2	02
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04	2 2 2	2 2 2	2 3 3	3 3 3	3 3 3	3 3 3	3 3 3	3 4 4	4 4 4	4 4 4	04
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