24° DECLINATION **SAME** NAME AS LATITUDE 24°

LAT.	40°		41°		42°		43°		44°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
90	15 12+37	71	15 32+37	71	15 50+38	72	16 09+39	72	16 27+40	72	270
91	14 29 37	71	14 49 37	71	15 08 38	71	15 28 38	71	15 47 39	72	269
92	13 46 37	70	14 06 38	70	14 26 39	70	14 46 39	71	15 06 40	71	268
93	13 03 37	69	13 24 38	70	13 45 38	70	14 05 39	70	14 25 40	70	267
94	12 20 37	69	12 42 38	69	13 03 39	69	13 24 39	69	13 45 40	70	266
95	11 38+37	68	12 00+38	68	12 22+38	69	12 43+40	69	13 05+40	69	265
96	10 55 38	68	11 18 38	68	11 40 39	68	12 03 39	68	12 25 40	68	264
97	10 13+38	67	10 36+39	67	10 59 40	67	11 22 40	68	11 45 41	68	263
98	...		...		10 19+39	67	10 42 40	67	11 05 41	67	262
99	...		...		...		10 02+40	66	10 26+41	67	261
100	...		...		...		...		...		260

24° DECLINATION **CONTRARY** NAME TO LATITUDE 24°

LAT.	40°		41°		42°		43°		44°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
45	13 33−49	138	12 49−50	139	12 04−51	139	11 19−51	139	10 34−51	139	315
46	13 03 50	138	12 18 49	138	11 34 50	138	10 50 50	138	10 06−51	138	314
47	12 32 49	137	11 48 49	137	11 04 49	137	10 21−50	137	...		313
48	12 00 49	136	11 17 49	136	10 34 49	136	...		...		312
49	11 28 48	135	10 46 49	135	10 03−49	136	...		...		311
50	10 56−48	135	10 14−48	135	...		...		...		310
51	10 23−47	134	...		...		...		...		309
52	...		...		...		...		...		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.	40°			41°			42°			43°			44°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
0	26 02	−60	180	25 02	−60	180	24 02	−60	180	23 02	−60	180	22 02	−60	180	360
1	26 01	60	179	25 01	60	179	24 01	59	179	23 02	60	179	22 02	60	179	359
2	26 00	60	178	25 00	60	178	24 00	60	178	23 00	59	178	22 01	60	178	358
3	25 58	60	177	24 58	60	177	23 58	60	177	22 59	60	177	21 59	60	177	357
4	25 55	60	176	24 55	59	176	23 56	60	176	22 56	60	176	21 56	60	176	356
5	25 52	−60	175	24 52	−60	175	23 52	−60	175	22 52	−59	175	21 53	−60	175	355
6	25 47	60	174	24 47	59	174	23 48	60	174	22 48	59	174	21 49	60	174	354
7	25 42	60	173	24 42	59	173	23 43	60	173	22 43	59	173	21 44	60	173	353
8	25 36	60	172	24 36	59	172	23 37	59	172	22 38	60	172	21 38	59	172	352
9	25 29	60	171	24 30	60	171	23 30	59	171	22 31	59	171	21 32	59	171	351
10	25 21	−59	170	24 22	−59	170	23 23	−59	170	22 24	−59	170	21 25	−59	170	350
11	25 13	59	169	24 14	59	169	23 15	59	169	22 16	59	169	21 17	59	169	349
12	25 03	59	168	24 05	59	168	23 06	59	168	22 08	59	168	21 09	59	168	348
13	24 53	58	167	23 55	59	167	22 57	59	167	21 58	59	167	21 00	59	167	347
14	24 43	59	166	23 45	59	166	22 46	58	166	21 48	59	166	20 50	59	166	346
15	24 31	−58	165	23 33	−58	165	22 35	−58	165	21 37	−58	165	20 40	−59	165	345
16	24 19	58	164	23 21	58	164	22 24	59	164	21 26	59	164	20 28	58	164	344
17	24 06	58	163	23 08	58	163	22 11	58	163	21 14	59	163	20 16	58	163	343
18	23 52	58	162	22 55	58	162	21 58	58	162	21 01	58	162	20 04	58	163	342
19	23 37	57	161	22 41	58	161	21 44	58	161	20 47	58	161	19 50	58	162	341
20	23 22	−57	160	22 26	−58	160	21 29	−57	160	20 33	−58	161	19 37	−58	161	340
21	23 06	57	159	22 10	57	159	21 14	57	159	20 18	57	160	19 22	58	160	339
22	22 50	57	158	21 54	57	158	20 58	57	159	20 02	57	159	19 07	58	159	338
23	22 32	57	157	21 37	57	157	20 42	57	158	19 46	57	158	18 51	57	158	337
24	22 14	56	156	21 19	56	157	20 24	56	157	19 29	57	157	18 34	57	157	336
25	21 55	−56	155	21 01	−56	156	20 06	−56	156	19 12	−57	156	18 17	−57	156	335
26	21 36	56	154	20 42	56	155	19 48	57	155	18 53	56	155	17 59	56	155	334
27	21 16	56	154	20 22	56	154	19 28	56	154	18 35	56	154	17 41	56	154	333
28	20 55	55	153	20 02	56	153	19 09	56	153	18 15	56	153	17 22	56	153	332
29	20 34	55	152	19 41	55	152	18 48	55	152	17 55	55	152	17 02	56	152	331
30	20 12	−55	151	19 19	−55	151	18 27	−55	151	17 34	−55	151	16 42	−56	152	330
31	19 49	54	150	18 57	54	150	18 05	55	150	17 13	55	151	16 21	55	151	329
32	19 26	54	149	18 34	54	149	17 43	55	149	16 51	54	150	16 00	55	150	328
33	19 02	54	148	18 11	54	148	17 20	54	149	16 29	55	149	15 38	55	149	327
34	18 38	54	147	17 47	54	148	16 57	54	148	16 06	54	148	15 15	54	148	326
35	18 13	−54	147	17 23	−54	147	16 33	−54	147	15 42	−53	147	14 52	−54	147	325
36	17 47	53	146	16 58	54	146	16 08	53	146	15 18	53	146	14 29	54	146	324
37	17 21	53	145	16 32	53	145	15 43	53	145	14 54	54	145	14 05	54	145	323
38	16 54	52	144	16 06	53	144	15 17	52	144	14 29	53	145	13 40	53	145	322
39	16 27	52	143	15 39	52	143	14 51	52	144	14 03	53	144	13 15	53	144	321
40	15 59	−51	142	15 12	−52	143	14 24	−52	143	13 37	−53	143	12 49	−52	143	320
41	15 31	51	142	14 44	51	142	13 57	51	142	13 10	52	142	12 23	52	142	319
42	15 02	50	141	14 16	51	141	13 30	52	141	12 43	52	141	11 56	51	141	318
43	14 33	50	140	13 47	50	140	13 01	51	140	12 15	51	140	11 29	51	141	317
44	14 03	50	139	13 18	50	139	12 33	51	139	11 47	51	140	11 02	51	140	316
45	13 33	−49	138	12 49	−50	139	12 04	−51	139	11 19	−51	139	10 34	−51	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.	40°		41°		42°		43°		44°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
0	75 00+60	180	74 00+60	180	73 00+60	180	72 00+60	180	71 00+60	180	360
1	74 59 60	177	73 59 60	177	72 59 60	177	71 59 60	177	70 59 60	177	359
2	74 55 59	173	73 55 60	173	72 55 60	174	71 56 60	174	70 56 60	174	358
3	74 48 59	170	73 49 59	170	72 49 60	171	71 50 60	171	70 51 59	172	357
4	74 38 59	166	73 40 59	167	72 41 59	168	71 42 60	168	70 44 59	169	356
5	74 26+58	163	73 28+59	164	72 31+58	165	71 33+58	166	70 34+59	166	355
6	74 11 57	160	73 15 57	161	72 18 58	162	71 21 58	163	70 23 59	164	354
7	73 54 56	157	72 59 56	158	72 03 57	159	71 07 57	160	70 10 58	161	353
8	73 34 56	154	72 40 56	155	71 46 56	156	70 51 57	157	69 55 57	158	352
9	73 13 54	151	72 20 55	152	71 27 56	154	70 33 56	155	69 38 57	156	351
10	72 49+54	148	71 58+54	149	71 06+55	151	70 13+56	152	69 20+56	154	350
11	72 24 52	145	71 34 53	147	70 44 54	148	69 52 55	150	69 00 55	151	349
12	71 57 51	143	71 09 52	144	70 19 53	146	69 29 54	147	68 38 55	149	348
13	71 28 50	140	70 42 51	142	69 54 52	144	69 05 53	145	68 15 54	147	347
14	70 58 49	138	70 13 50	140	69 27 51	141	68 39 52	143	67 51 53	144	346
15	70 26+48	136	69 43+49	137	68 58+50	139	68 12+51	141	67 25+52	142	345
16	69 54 46	133	69 12 48	135	68 28 50	137	67 44 50	139	66 58 52	140	344
17	69 20 46	131	68 39 48	133	67 58 48	135	67 14 50	137	66 30 51	138	343
18	68 45 45	129	68 06 46	131	67 26 47	133	66 44 49	135	66 01 50	136	342
19	68 09 44	128	67 31 46	130	66 53 46	131	66 12 48	133	65 31 49	135	341
20	67 32+43	126	66 56+45	128	66 19+46	130	65 40+47	131	65 00+48	133	340
21	66 54 43	124	66 20 44	126	65 44 45	128	65 06 47	130	64 27 48	131	339
22	66 16 41	123	65 43 43	124	65 08 45	126	64 32 46	128	63 55 47	129	338
23	65 37 40	121	65 05 42	123	64 32 44	125	63 57 45	126	63 21 46	128	337
24	64 57 40	119	64 27 41	121	63 55 43	123	63 21 45	125	62 46 46	126	336
25	64 17+39	118	63 48+41	120	63 17+43	122	62 45+44	123	62 11+45	125	335
26	63 36 39	117	63 08 41	118	62 39 42	120	62 08 43	122	61 36 44	123	334
27	62 55 38	115	62 28 40	117	62 00 41	119	61 30 43	120	60 59 44	122	333
28	62 13 38	114	61 48 39	116	61 21 40	117	60 52 42	119	60 22 44	121	332
29	61 31 37	113	61 07 38	115	60 41 40	116	60 14 41	118	59 45 43	119	331
30	60 48+37	112	60 25+38	113	60 01+39	115	59 35+41	117	59 07+43	118	330
31	60 06 36	111	59 44 37	112	59 20 39	114	58 55 41	115	58 29 42	117	329
32	59 22 36	110	59 02 37	111	58 39 39	113	58 15 41	114	57 50 42	116	328
33	58 39 35	108	58 19 37	110	57 58 38	112	57 35 40	113	57 11 41	114	327
34	57 55 35	107	57 36 37	109	57 16 38	110	56 55 39	112	56 32 40	113	326
35	57 11+35	106	56 54+36	108	56 34+38	109	56 14+39	111	55 52+40	112	325
36	56 27 34	105	56 10 36	107	55 52 37	108	55 33 38	110	55 12 40	111	324
37	55 43 34	105	55 27 35	106	55 10 37	107	54 51 38	109	54 31 40	110	323
38	54 58 34	104	54 43 35	105	54 27 37	106	54 10 37	108	53 51 39	109	322
39	54 13 34	103	53 59 35	104	53 44 37	105	53 28 37	107	53 10 39	108	321
40	53 29+33	102	53 16+34	103	53 01+36	104	52 46+37	106	52 29+38	107	320
41	52 43 34	101	52 31 35	102	52 18 36	104	52 03 37	105	51 47 39	106	319
42	51 58 33	100	51 47 34	101	51 35 35	103	51 21 37	104	51 06 38	105	318
43	51 13 33	99	51 03 34	101	50 51 35	102	50 38 37	103	50 24 38	104	317
44	50 28 32	99	50 18 34	100	50 07 35	101	49 55 37	102	49 42 38	103	316
45	49 42+33	98	49 33+34	99	49 23+35	100	49 12+37	101	49 00+37	102	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.	40°			41°			42°			43°			44°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
45	49 42	+33	98	49 33	+34	99	49 23	+35	100	49 12	+37	101	49 00	+37	102	315
46	48 57	32	97	48 49	33	98	48 40	34	99	48 29	36	100	48 18	37	102	314
47	48 11	32	96	48 04	33	97	47 55	35	99	47 46	36	100	47 35	38	101	313
48	47 25	32	96	47 19	33	97	47 11	35	98	47 03	36	99	46 53	37	100	312
49	46 40	32	95	46 34	33	96	46 27	35	97	46 19	36	98	46 10	37	99	311
50	45 54	+32	94	45 49	+33	95	45 43	+34	96	45 36	+35	97	45 28	+37	98	310
51	45 08	32	93	45 04	33	94	44 59	34	95	44 52	36	96	44 45	37	97	309
52	44 22	32	93	44 19	33	94	44 14	34	95	44 09	35	96	44 02	37	97	308
53	43 36	32	92	43 33	33	93	43 30	34	94	43 25	35	95	43 19	37	96	307
54	42 50	32	91	42 48	33	92	42 45	34	93	42 41	36	94	42 36	37	95	306
55	42 04	+32	91	42 03	+33	92	42 01	+34	93	41 58	+35	94	41 53	+37	94	305
56	41 18	32	90	41 18	33	91	41 16	34	92	41 14	35	93	41 10	37	94	304
57	40 32	32	90	40 33	32	90	40 32	34	91	40 30	35	92	40 27	37	93	303
58	39 47	31	89	39 47	33	90	39 47	34	91	39 46	35	91	39 44	36	92	302
59	39 01	31	88	39 02	33	89	39 03	34	90	39 02	35	91	39 01	36	92	301
60	38 15	+32	88	38 17	+33	88	38 18	+34	89	38 18	+36	90	38 18	+36	91	300
61	37 29	32	87	37 32	33	88	37 33	35	89	37 35	35	89	37 35	36	90	299
62	36 43	32	86	36 46	33	87	36 49	34	88	36 51	35	89	36 52	36	89	298
63	35 57	32	86	36 01	33	87	36 04	35	87	36 07	35	88	36 09	36	89	297
64	35 11	32	85	35 16	33	86	35 20	34	87	35 23	35	87	35 26	36	88	296
65	34 26	+32	85	34 31	+33	85	34 35	+35	86	34 39	+36	87	34 42	+37	87	295
66	33 40	32	84	33 46	33	85	33 51	34	85	33 56	35	86	33 59	37	87	294
67	32 54	33	83	33 01	33	84	33 07	34	85	33 12	35	85	33 16	37	86	293
68	32 09	32	83	32 16	33	83	32 22	35	84	32 28	36	85	32 33	37	85	292
69	31 23	33	82	31 31	33	83	31 38	35	83	31 44	36	84	31 50	37	85	291
70	30 38	+32	82	30 46	+34	82	30 54	+34	83	31 01	+36	83	31 07	+37	84	290
71	29 52	33	81	30 01	34	82	30 10	34	82	30 17	36	83	30 25	36	83	289
72	29 07	33	81	29 16	34	81	29 25	35	82	29 34	36	82	29 42	37	83	288
73	28 22	33	80	28 32	34	80	28 41	35	81	28 51	35	82	28 59	37	82	287
74	27 36	34	79	27 47	34	80	27 57	36	80	28 07	36	81	28 16	37	81	286
75	26 51	+34	79	27 03	+34	79	27 14	+35	80	27 24	+36	80	27 34	+37	81	285
76	26 06	34	78	26 18	35	79	26 30	35	79	26 41	36	80	26 51	37	80	284
77	25 22	33	78	25 34	35	78	25 46	36	79	25 58	36	79	26 09	37	80	283
78	24 37	34	77	24 50	35	78	25 03	35	78	25 15	36	78	25 26	38	79	282
79	23 52	34	77	24 06	35	77	24 19	36	77	24 32	36	78	24 44	38	78	281
80	23 07	+35	76	23 22	+35	76	23 36	+36	77	23 49	+37	77	24 02	+38	78	280
81	22 23	34	75	22 38	35	76	22 52	36	76	23 06	37	77	23 20	38	77	279
82	21 39	34	75	21 54	35	75	22 09	36	76	22 24	37	76	22 38	38	76	278
83	20 54	35	74	21 10	36	75	21 26	36	75	21 41	38	75	21 56	38	76	277
84	20 10	35	74	20 27	36	74	20 43	37	74	20 59	37	75	21 14	39	75	276
85	19 26	+35	73	19 43	+36	74	20 00	+37	74	20 17	+37	74	20 33	+38	75	275
86	18 42	36	73	19 00	36	73	19 18	37	73	19 35	37	74	19 51	39	74	274
87	17 59	35	72	18 17	36	72	18 35	37	73	18 53	38	73	19 10	39	73	273
88	17 15	36	71	17 34	37	72	17 53	37	72	18 11	38	72	18 29	39	73	272
89	16 32	36	71	16 51	37	71	17 10	38	71	17 29	39	72	17 48	39	72	271
90	15 49	+36	70	16 09	+37	71	16 28	+38	71	16 48	+38	71	17 07	+39	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.

25° DECLINATION **SAME** NAME AS LATITUDE 25°

LAT.	40°		41°		42°		43°		44°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
90	15 49+36	70	16 09+37	71	16 28+38	71	16 48+38	71	17 07+39	71	270
91	15 06 36	70	15 26 37	70	15 46 38	70	16 06 39	71	16 26 40	71	269
92	14 23 36	69	14 44 37	69	15 05 38	70	15 25 39	70	15 46 39	70	268
93	13 40 37	69	14 02 37	69	14 23 38	69	14 44 39	69	15 05 40	70	267
94	12 57 37	68	13 20 37	68	13 42 38	68	14 03 40	69	14 25 40	69	266
95	12 15+37	67	12 38+38	68	13 00+39	68	13 23+39	68	13 45+40	68	265
96	11 33 37	67	11 56 39	67	12 19 39	67	12 42 40	67	13 05 41	68	264
97	10 51 38	66	11 15 38	66	11 39 39	67	12 02 40	67	12 26 40	67	263
98	10 09+38	66	10 34+38	66	10 58 39	66	11 22 40	66	11 46 41	66	262
99	...		...		10 18+39	65	10 42 41	66	11 07 41	66	261
100	....		...		...		10 03+40	65	10 28+41	65	260

25° DECLINATION **CONTRARY** NAME TO LATITUDE 25°

LAT.	40°		41°		42°		43°		44°	LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.		H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°		°
45	12 44−50	139	11 59−51	139	11 13−50	139	10 28−50	139	...	315
46	12 13 49	138	11 29 50	138	10 44 50	138	10 00−51	139	...	314
47	11 43 49	137	10 59 50	138	10 15−50	138	...		...	313
48	11 11 48	137	10 28−49	137	...		...		...	312
49	10 40 48	136	...		...		...		...	311
50	10 08−48	135	...		...		...		...	310

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.	40°			41°			42°			43°			44°			LAT.
H.A.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	Alt.		Az.	H.A.
	° ′	d	°	° ′	d	°	° ′	d	°	° ′	d	°	° ′	d	°	°
0	25 02	−60	180	24 02	−60	180	23 02	−60	180	22 02	−60	180	21 02	−60	180	360
1	25 01	60	179	24 01	59	179	23 02	60	179	22 02	60	179	21 02	60	179	359
2	25 00	60	178	24 00	60	178	23 00	59	178	22 01	60	178	21 01	60	178	358
3	24 58	60	177	23 58	60	177	22 58	59	177	21 59	60	177	20 59	60	177	357
4	24 55	59	176	23 56	60	176	22 56	60	176	21 56	60	176	20 56	60	176	356
5	24 52	−60	175	23 52	−60	175	22 52	−59	175	21 53	−60	175	20 53	−60	175	355
6	24 47	59	174	23 48	60	174	22 48	60	174	21 49	60	174	20 49	60	174	354
7	24 42	59	173	23 43	60	173	22 43	59	173	21 44	60	173	20 44	59	173	353
8	24 36	59	172	23 37	60	172	22 38	60	172	21 38	59	172	20 39	60	172	352
9	24 29	59	171	23 30	59	171	22 31	59	171	21 32	60	171	20 33	60	171	351
10	24 22	−59	170	23 23	−59	170	22 24	−59	170	21 25	−60	170	20 26	−60	170	350
11	24 14	60	169	23 15	59	169	22 16	59	169	21 17	59	169	20 18	59	169	349
12	24 04	59	168	23 06	59	168	22 07	59	168	21 09	60	168	20 10	59	168	348
13	23 55	59	167	22 56	59	167	21 58	59	167	20 59	59	167	20 01	59	167	347
14	23 44	59	166	22 46	59	166	21 48	59	166	20 49	58	166	19 51	59	167	346
15	23 33	−59	165	22 35	−59	165	21 37	−59	165	20 39	−59	165	19 41	−59	166	345
16	23 21	59	164	22 23	58	164	21 25	58	164	20 27	58	165	19 30	59	165	344
17	23 08	58	163	22 10	58	163	21 13	58	163	20 15	58	164	19 18	58	164	343
18	22 54	58	162	21 57	58	162	21 00	58	163	20 03	58	163	19 06	59	163	342
19	22 40	58	161	21 43	58	161	20 46	58	162	19 49	58	162	18 52	58	162	341
20	22 25	−58	160	21 28	−57	161	20 32	−58	161	19 35	−57	161	18 39	−58	161	340
21	22 09	57	159	21 13	57	160	20 17	58	160	19 21	58	160	18 24	57	160	339
22	21 53	57	159	20 57	57	159	20 01	57	159	19 05	57	159	18 09	57	159	338
23	21 35	56	158	20 40	57	158	19 45	57	158	18 49	57	158	17 54	58	158	337
24	21 18	57	157	20 23	57	157	19 28	57	157	18 32	56	157	17 37	57	157	336
25	20 59	−56	156	20 05	−57	156	19 10	−57	156	18 15	−57	156	17 20	−56	156	335
26	20 40	56	155	19 46	56	155	18 51	56	155	17 57	56	155	17 03	57	155	334
27	20 20	55	154	19 26	55	154	18 32	55	154	17 39	57	154	16 45	57	155	333
28	20 00	56	153	19 06	55	153	18 13	56	153	17 19	56	154	16 26	56	154	332
29	19 39	55	152	18 46	56	152	17 53	56	153	17 00	56	153	16 06	55	153	331
30	19 17	−55	151	18 24	−54	151	17 32	−55	152	16 39	−55	152	15 46	−55	152	330
31	18 55	55	150	18 03	55	151	17 10	54	151	16 18	55	151	15 26	55	151	329
32	18 32	54	150	17 40	54	150	16 48	54	150	15 57	55	150	15 05	55	150	328
33	18 08	54	149	17 17	54	149	16 26	54	149	15 34	54	149	14 43	55	149	327
34	17 44	53	148	16 53	53	148	16 03	54	148	15 12	54	148	14 21	55	148	326
35	17 19	−53	147	16 29	−53	147	15 39	−54	147	14 49	−54	147	13 58	−54	148	325
36	16 54	53	146	16 04	53	146	15 15	54	147	14 25	54	147	13 35	54	147	324
37	16 28	52	145	15 39	53	146	14 50	53	146	14 00	53	146	13 11	53	146	323
38	16 02	52	145	15 13	52	145	14 25	53	145	13 36	53	145	12 47	54	145	322
39	15 35	52	144	14 47	52	144	13 59	53	144	13 10	52	144	12 22	53	144	321
40	15 08	−52	143	14 20	−52	143	13 32	−52	143	12 44	−52	143	11 57	−53	143	320
41	14 40	51	142	13 53	52	142	13 06	52	142	12 18	52	143	11 31	52	143	319
42	14 12	51	141	13 25	51	141	12 38	51	142	11 51	51	142	11 05	52	142	318
43	13 43	51	141	12 57	51	141	12 10	51	141	11 24	51	141	10 38	52	141	317
44	13 13	50	140	12 28	51	140	11 42	51	140	10 56	51	140	10 11	−52	140	316
45	12 44	−50	139	11 59	−51	139	11 13	−50	139	10 28	−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.	40°		41°		42°		43°		44°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° , d	°	° , d	°	° , d	°	° , d	°	° , d	°	°
0	76 00+60	180	75 00+60	180	74 00+60	180	73 00+60	180	72 00+60	180	360
1	75 59 60	176	74 59 60	177	73 59 60	177	72 59 60	177	71 59 60	177	359
2	75 54 60	173	74 55 59	173	73 55 60	174	72 56 59	174	71 56 60	174	358
3	75 47 59	169	74 48 59	170	73 49 59	170	72 50 59	171	71 50 60	171	357
4	75 37 58	165	74 39 58	166	73 40 59	167	72 42 59	168	71 43 59	168	356
5	75 24+57	162	74 27+58	163	73 29+58	164	72 31+59	165	71 33+59	166	355
6	75 08 57	159	74 12 57	160	73 16 57	161	72 19 58	162	71 22 58	163	354
7	74 50 56	155	73 55 57	157	73 00 57	158	72 04 57	159	71 08 58	160	353
8	74 30 54	152	73 36 56	154	72 42 56	155	71 48 56	156	70 52 57	158	352
9	74 07 54	149	73 15 55	151	72 23 55	152	71 29 56	154	70 35 56	155	351
10	73 43+52	146	72 52+54	148	72 01+54	150	71 09+55	151	70 16+55	152	350
11	73 16 51	143	72 27 53	145	71 38 53	147	70 47 54	149	69 55 55	150	349
12	72 48 50	141	72 01 51	143	71 12 53	145	70 23 53	146	69 33 54	148	348
13	72 18 49	138	71 33 50	140	70 46 51	142	69 58 52	144	69 09 53	145	347
14	71 47 48	136	71 03 49	138	70 18 50	140	69 31 52	142	68 44 52	143	346
15	71 14+47	134	70 32+48	136	69 48+50	138	69 03+51	139	68 17+52	141	345
16	70 40 46	132	70 00 47	134	69 18 48	136	68 34 50	137	67 50 50	139	344
17	70 06 44	130	69 27 46	132	68 46 47	134	68 04 49	135	67 21 50	137	343
18	69 30 43	128	68 52 45	130	68 13 47	132	67 33 48	133	66 51 49	135	342
19	68 53 42	126	68 17 44	128	67 39 46	130	67 00 47	132	66 20 48	133	341
20	68 15+42	124	67 41+43	126	67 05+44	128	66 27+46	130	65 48+47	131	340
21	67 37 40	122	67 04 42	124	66 29 44	126	65 53 45	128	65 15 47	130	339
22	66 57 40	121	66 26 42	123	65 53 43	125	65 18 45	126	64 42 46	128	338
23	66 17 40	119	65 47 41	121	65 16 42	123	64 42 44	125	64 07 46	126	337
24	65 37 39	118	65 08 41	120	64 38 42	121	64 06 43	123	63 32 45	125	336
25	64 56+38	116	64 29+39	118	64 00+41	120	63 29+43	122	62 56+45	123	335
26	64 15 37	115	63 49 39	117	63 21 40	119	62 51 42	120	62 20 44	122	334
27	63 33 37	114	63 08 38	115	62 41 40	117	62 13 42	119	61 43 43	121	333
28	62 51 36	112	62 27 38	114	62 01 40	116	61 34 41	118	61 06 42	119	332
29	62 08 36	111	61 45 38	113	61 21 39	115	60 55 41	116	60 28 42	118	331
30	61 25+35	110	61 03+37	112	60 40+39	113	60 16+40	115	59 50+41	117	330
31	60 42 35	109	60 21 37	111	59 59 38	112	59 36 39	114	59 11 41	115	329
32	59 58 35	108	59 39 36	110	59 18 38	111	58 56 39	113	58 32 40	114	328
33	59 14 34	107	58 56 36	108	58 36 37	110	58 15 39	112	57 52 40	113	327
34	58 30 34	106	58 13 35	107	57 54 37	109	57 34 38	110	57 12 40	112	326
35	57 46+33	105	57 30+35	106	57 12+36	108	56 53+38	109	56 32+39	111	325
36	57 01 34	104	56 46 35	105	56 29 37	107	56 11 38	108	55 52 39	110	324
37	56 17 33	103	56 02 35	105	55 47 36	106	55 29 38	107	55 11 39	109	323
38	55 32 32	102	55 18 35	104	55 04 35	105	54 47 37	106	54 30 38	108	322
39	54 47 32	101	54 34 34	103	54 21 35	104	54 05 37	105	53 49 38	107	321
40	54 02+32	100	53 50+34	102	53 37+35	103	53 23+36	104	53 07+38	106	320
41	53 17 32	100	53 06 33	101	52 54 35	102	52 40 37	104	52 26 37	105	319
42	52 31 32	99	52 21 34	100	52 10 35	101	51 58 36	103	51 44 37	104	318
43	51 46 31	98	51 37 33	99	51 26 35	101	51 15 36	102	51 02 37	103	317
44	51 00 32	97	50 52 33	99	50 42 35	100	50 32 35	101	50 20 37	102	316
45	50 15+31	97	50 07+33	98	49 58+35	99	49 49+35	100	49 37+37	101	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.	40°			41°			42°			43°			44°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
45	50 15	+31	97	50 07	+33	98	49 58	+35	99	49 49	+35	100	49 37	+37	101	315
46	49 29	31	96	49 22	33	97	49 14	34	98	49 05	36	99	48 55	37	100	314
47	48 43	31	95	48 37	33	96	48 30	34	97	48 22	35	98	48 13	36	100	313
48	47 57	32	94	47 52	33	95	47 46	34	97	47 39	35	98	47 30	36	99	312
49	47 12	31	94	47 07	33	95	47 02	33	96	46 55	35	97	46 47	37	98	311
50	46 26	+31	93	46 22	+32	94	46 17	+34	95	46 11	+35	96	46 05	+36	97	310
51	45 40	31	92	45 37	32	93	45 33	33	94	45 28	35	95	45 22	36	96	309
52	44 54	31	92	44 52	32	93	44 48	34	94	44 44	35	95	44 39	36	96	308
53	44 08	31	91	44 06	33	92	44 04	33	93	44 00	35	94	43 56	36	95	307
54	43 22	31	90	43 21	32	91	43 19	34	92	43 17	34	93	43 13	36	94	306
55	42 36	+31	90	42 36	+32	91	42 35	+33	92	42 33	+34	92	42 30	+36	93	305
56	41 50	31	89	41 51	32	90	41 50	34	91	41 49	35	92	41 47	35	93	304
57	41 04	31	88	41 05	33	89	41 06	33	90	41 05	35	91	41 04	35	92	303
58	40 18	31	88	40 20	32	89	40 21	34	89	40 21	35	90	40 20	36	91	302
59	39 32	32	87	39 35	32	88	39 37	33	89	39 37	35	90	39 37	36	90	301
60	38 47	+31	87	38 50	+32	87	38 52	+34	88	38 54	+34	89	38 54	+36	90	300
61	38 01	31	86	38 05	32	87	38 08	33	88	38 10	34	88	38 11	36	89	299
62	37 15	31	85	37 19	33	86	37 23	34	87	37 26	35	88	37 28	36	88	298
63	36 29	32	85	36 34	33	85	36 39	33	86	36 42	35	87	36 45	36	88	297
64	35 43	32	84	35 49	33	85	35 54	34	86	35 58	35	86	36 02	36	87	296
65	34 58	+31	84	35 04	+33	84	35 10	+33	85	35 15	+34	86	35 19	+36	86	295
66	34 12	32	83	34 19	33	84	34 25	34	84	34 31	35	85	34 36	36	86	294
67	33 27	31	82	33 34	33	83	33 41	34	84	33 47	35	84	33 53	36	85	293
68	32 41	32	82	32 49	33	82	32 57	34	83	33 04	35	84	33 10	36	84	292
69	31 56	32	81	32 04	34	82	32 13	34	83	32 20	35	83	32 27	36	84	291
70	31 10	+32	81	31 20	+33	81	31 28	+35	82	31 37	+35	83	31 44	+36	83	290
71	30 25	32	80	30 35	33	81	30 44	35	81	30 53	35	82	31 01	37	82	289
72	29 40	32	80	29 50	34	80	30 00	35	81	30 10	35	81	30 19	36	82	288
73	28 55	32	79	29 06	33	80	29 16	35	80	29 26	36	81	29 36	36	81	287
74	28 10	32	78	28 21	34	79	28 33	34	80	28 43	36	80	28 53	37	81	286
75	27 25	+33	78	27 37	+34	78	27 49	+35	79	28 00	+36	79	28 11	+37	80	285
76	26 40	33	77	26 53	34	78	27 05	35	78	27 17	36	79	27 28	37	79	284
77	25 55	33	77	26 09	34	77	26 22	35	78	26 34	36	78	26 46	37	79	283
78	25 11	33	76	25 25	34	77	25 38	35	77	25 51	36	78	26 04	37	78	282
79	24 26	34	76	24 41	34	76	24 55	35	77	25 08	37	77	25 22	37	77	281
80	23 42	+33	75	23 57	+34	76	24 12	+35	76	24 26	+36	76	24 40	+37	77	280
81	22 57	34	75	23 13	35	75	23 28	36	75	23 43	37	76	23 58	37	76	279
82	22 13	34	74	22 29	36	74	22 45	36	75	23 01	37	75	23 16	38	76	278
83	21 29	34	73	21 46	35	74	22 02	37	74	22 19	37	75	22 34	38	75	277
84	20 45	35	73	21 03	35	73	21 20	36	74	21 36	38	74	21 53	38	74	276
85	20 01	+35	72	20 19	+36	73	20 37	+37	73	20 54	+38	73	21 11	+39	74	275
86	19 18	35	72	19 36	36	72	19 55	36	72	20 12	38	73	20 30	38	73	274
87	18 34	36	71	18 53	36	72	19 12	37	72	19 31	37	72	19 49	38	73	273
88	17 51	35	71	18 11	36	71	18 30	37	71	18 49	38	72	19 08	39	72	272
89	17 08	35	70	17 28	37	70	17 48	37	71	18 08	38	71	18 27	39	71	271
90	16 25	+36	70	16 46	+36	70	17 06	+38	70	17 26	+39	70	17 46	+39	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.

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

LAT.	40°		41°		42°		43°		44°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
90	16 25+36	70	16 46+36	70	17 06+38	70	17 26+39	70	17 46+39	71	270
91	15 42 36	69	16 03 37	69	16 24 38	69	16 45 39	70	17 06 39	70	269
92	14 59 37	68	15 21 37	69	15 43 38	69	16 04 39	69	16 25 40	69	268
93	14 17 36	68	14 39 38	68	15 01 39	68	15 23 39	69	15 45 40	69	267
94	13 34 37	67	13 57 38	67	14 20 39	68	14 43 39	68	15 05 40	68	266
95	12 52+37	67	13 16+38	67	13 39+39	67	14 02+40	67	14 25+40	68	265
96	12 10 38	66	12 35 38	66	12 58 39	67	13 22 40	67	13 46 40	67	264
97	11 29 37	66	11 53 39	66	12 18 39	66	12 42 40	66	13 06 41	66	263
98	10 47 38	65	11 12 39	65	11 37 40	65	12 02 40	65	12 27 41	66	262
99	10 06+38	64	10 32+39	65	10 57 40	65	11 23 40	65	11 48 41	65	261
100	...		...		10 17+40	64	10 43+41	64	11 09+41	64	260
101	...		...		...		10 04+41	64	10 31+41	64	259
102	...		...		...		...		...		258
103	...		...		...		...		...		257
104	...		...		...		...		...		256
105	...		...		...		...		...		255

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

LAT.	40°		41°		42°		43°	44°	LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.			H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°			°
45	11 54−50	140	11 08−50	140	10 23−50	140	...	...	315
46	11 24 49	139	10 39 50	139	...		...	...	314
47	10 54 49	138	10 09−49	138	...		...	...	313
48	10 23−49	137	...		...		...	...	312
49	...		...		...		...	...	311
50	...		...		...		...	...	310

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.	40°			41°			42°			43°			44°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
0	24 02	−60	180	23 02	−60	180	22 02	−60	180	21 02	−60	180	20 02	−60	180	360
1	24 01	59	179	23 02	60	179	22 02	60	179	21 02	60	179	20 02	60	179	359
2	24 00	60	178	23 00	60	178	22 01	60	178	21 01	60	178	20 01	60	178	358
3	23 58	60	177	22 58	59	177	21 59	60	177	20 59	60	177	19 59	60	177	357
4	23 56	60	176	22 56	60	176	21 56	60	176	20 56	60	176	19 56	59	176	356
5	23 52	−60	175	22 52	−59	175	21 53	−60	175	20 53	−60	175	19 53	−59	175	355
6	23 48	60	174	22 48	60	174	21 48	59	174	20 49	60	174	19 49	59	174	354
7	23 43	60	173	22 43	60	173	21 44	60	173	20 44	59	173	19 45	60	173	353
8	23 37	60	172	22 37	59	172	21 38	60	172	20 39	60	172	19 39	59	172	352
9	23 30	59	171	22 31	60	171	21 32	60	171	20 32	59	171	19 33	59	171	351
10	23 23	−60	170	22 24	−60	170	21 25	−60	170	20 25	−59	170	19 26	−59	170	350
11	23 14	59	169	22 16	60	169	21 17	59	169	20 18	59	169	19 19	59	170	349
12	23 05	59	168	22 07	59	168	21 08	59	168	20 09	59	169	19 11	59	169	348
13	22 56	59	167	21 57	59	167	20 59	59	167	20 00	59	168	19 02	59	168	347
14	22 45	58	166	21 47	59	166	20 49	59	167	19 51	59	167	18 52	58	167	346
15	22 34	−58	165	21 36	−58	166	20 38	−58	166	19 40	−58	166	18 42	−59	166	345
16	22 22	58	164	21 25	59	165	20 27	59	165	19 29	58	165	18 31	58	165	344
17	22 10	59	164	21 12	58	164	20 15	59	164	19 17	58	164	18 20	59	164	343
18	21 56	58	163	20 59	58	163	20 02	58	163	19 05	58	163	18 07	58	163	342
19	21 42	58	162	20 45	58	162	19 48	58	162	18 51	58	162	17 54	58	162	341
20	21 27	−57	161	20 31	−58	161	19 34	−57	161	18 38	−58	161	17 41	−58	161	340
21	21 12	57	160	20 16	58	160	19 19	57	160	18 23	57	160	17 27	58	160	339
22	20 56	57	159	20 00	57	159	19 04	57	159	18 08	57	159	17 12	58	159	338
23	20 39	57	158	19 43	57	158	18 48	57	158	17 52	57	158	16 56	57	158	337
24	20 21	56	157	19 26	57	157	18 31	57	157	17 36	57	157	16 40	57	158	336
25	20 03	−56	156	19 08	−56	156	18 13	−56	156	17 18	−56	157	16 24	−57	157	335
26	19 44	56	155	18 50	56	155	17 55	56	156	17 01	57	156	16 06	56	156	334
27	19 25	56	154	18 31	56	155	17 37	56	155	16 42	56	155	15 48	56	155	333
28	19 04	55	153	18 11	56	154	17 17	56	154	16 23	55	154	15 30	56	154	332
29	18 44	55	153	17 50	55	153	16 57	55	153	16 04	56	153	15 11	56	153	331
30	18 22	−55	152	17 30	−55	152	16 37	−55	152	15 44	−56	152	14 51	−56	152	330
31	18 00	54	151	17 08	55	151	16 16	55	151	15 23	55	151	14 31	56	151	329
32	17 38	55	150	16 46	55	150	15 54	55	150	15 02	55	150	14 10	55	151	328
33	17 14	53	149	16 23	54	149	15 32	55	149	14 40	54	150	13 48	54	150	327
34	16 51	54	148	16 00	54	148	15 09	54	149	14 18	55	149	13 26	54	149	326
35	16 26	−53	147	15 36	−54	148	14 45	−53	148	13 55	−54	148	13 04	−54	148	325
36	16 01	52	147	15 11	53	147	14 21	53	147	13 31	53	147	12 41	54	147	324
37	15 36	53	146	14 46	52	146	13 57	53	146	13 07	53	146	12 18	54	146	323
38	15 10	52	145	14 21	53	145	13 32	53	145	12 43	53	145	11 53	53	146	322
39	14 43	51	144	13 55	52	144	13 06	52	145	12 18	53	145	11 29	53	145	321
40	14 16	−51	143	13 28	−51	144	12 40	−52	144	11 52	−52	144	11 04	−53	144	320
41	13 49	51	143	13 01	51	143	12 14	52	143	11 26	52	143	10 39	53	143	319
42	13 21	51	142	12 34	51	142	11 47	52	142	11 00	52	142	10 13	−52	142	318
43	12 52	50	141	12 06	51	141	11 19	51	141	10 33	52	141	...			317
44	12 23	50	140	11 37	50	140	10 51	50	141	10 05	−51	141	...			316
45	11 54	−50	140	11 08	−50	140	10 23	−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.	40°			41°			42°			43°			44°			LAT.
H.A.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	Alt.	d	Az.	H.A.
°	° ′		°	° ′		°	° ′		°	° ′		°	° ′		°	°
0	77 00	+60	180	76 00	+60	180	75 00	+60	180	74 00	+60	180	73 00	+60	180	360
1	76 59	59	176	75 59	60	176	74 59	60	177	73 59	60	177	72 59	60	177	359
2	76 54	59	172	75 54	60	173	74 55	60	173	73 55	60	174	72 56	59	174	358
3	76 46	59	168	75 47	59	169	74 48	60	170	73 49	60	170	72 50	59	171	357
4	76 35	58	164	75 37	59	166	74 39	59	166	73 41	59	167	72 42	59	168	356
5	76 21	+58	161	75 25	+57	162	74 27	+58	163	73 30	+58	164	72 32	+59	165	355
6	76 05	56	157	75 09	57	159	74 13	58	160	73 17	57	161	72 20	58	162	354
7	75 46	55	154	74 52	56	155	73 57	56	157	73 01	57	158	72 06	57	159	353
8	75 24	54	151	74 32	55	152	73 38	56	154	72 44	56	155	71 49	57	157	352
9	75 01	52	147	74 10	53	149	73 18	54	151	72 25	55	153	71 31	56	154	351
10	74 35	+51	144	73 46	+52	146	72 55	+54	148	72 04	+54	150	71 11	+55	151	350
11	74 07	50	142	73 20	51	144	72 31	52	146	71 41	53	147	70 50	54	149	349
12	73 38	49	139	72 52	50	141	72 05	51	143	71 16	53	145	70 27	53	146	348
13	73 07	48	136	72 23	49	139	71 37	51	141	70 50	52	142	70 02	53	144	347
14	72 35	46	134	71 52	48	136	71 08	49	138	70 23	50	140	69 36	52	142	346
15	72 01	+45	132	71 20	+47	134	70 38	+48	136	69 54	+50	138	69 09	+51	140	345
16	71 26	44	130	70 47	46	132	70 06	48	134	69 24	49	136	68 40	50	138	344
17	70 50	43	128	70 13	44	130	69 33	47	132	68 53	48	134	68 11	49	136	343
18	70 13	42	126	69 37	44	128	69 00	45	130	68 21	46	132	67 40	48	134	342
19	69 35	42	124	69 01	43	126	68 25	45	128	67 47	46	130	67 08	48	132	341
20	68 57	+40	122	68 24	+42	124	67 49	+44	126	67 13	+45	128	66 35	+47	130	340
21	68 17	40	120	67 46	41	122	67 13	43	124	66 38	45	126	66 02	46	128	339
22	67 37	39	119	67 08	40	121	66 36	42	123	66 03	43	125	65 28	45	127	338
23	66 57	38	117	66 28	40	119	65 58	42	121	65 26	43	123	64 53	44	125	337
24	66 16	37	116	65 49	39	118	65 20	41	120	64 49	43	122	64 17	44	123	336
25	65 34	+37	114	65 08	+39	116	64 41	+40	118	64 12	+41	120	63 41	+43	122	335
26	64 52	36	113	64 28	37	115	64 01	40	117	63 33	41	119	63 04	42	120	334
27	64 10	35	112	63 46	38	114	63 21	39	116	62 55	40	117	62 26	42	119	333
28	63 27	35	111	63 05	37	113	62 41	38	114	62 15	40	116	61 48	42	118	332
29	62 44	34	110	62 23	36	111	62 00	38	113	61 36	39	115	61 10	41	116	331
30	62 00	+34	108	61 40	+36	110	61 19	+37	112	60 56	+39	114	60 31	+40	115	330
31	61 17	33	107	60 58	35	109	60 37	37	111	60 15	39	112	59 52	40	114	329
32	60 33	33	106	60 15	35	108	59 56	36	110	59 35	38	111	59 12	40	113	328
33	59 48	33	105	59 32	34	107	59 13	37	109	58 54	37	110	58 32	39	112	327
34	59 04	32	104	58 48	34	106	58 31	36	107	58 12	38	109	57 52	39	111	326
35	58 19	+33	103	58 05	+34	105	57 48	+36	106	57 31	+37	108	57 11	+39	109	325
36	57 35	32	102	57 21	33	104	57 06	35	105	56 49	36	107	56 31	38	108	324
37	56 50	31	102	56 37	33	103	56 23	34	105	56 07	36	106	55 50	37	107	323
38	56 04	32	101	55 53	33	102	55 39	35	104	55 24	37	105	55 08	38	106	322
39	55 19	32	100	55 08	33	101	54 56	34	103	54 42	36	104	54 27	37	105	321
40	54 34	+31	99	54 24	+32	100	54 12	+34	102	53 59	+36	103	53 45	+37	104	320
41	53 49	30	98	53 39	33	100	53 29	34	101	53 17	35	102	53 03	37	104	319
42	53 03	31	97	52 55	32	99	52 45	34	100	52 34	35	101	52 21	37	103	318
43	52 17	31	97	52 10	32	98	52 01	33	99	51 51	35	100	51 39	36	102	317
44	51 32	30	96	51 25	32	97	51 17	33	98	51 07	35	100	50 57	36	101	316
45	50 46	+31	95	50 40	+32	96	50 33	+33	98	50 24	+35	99	50 14	+36	100	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.	40°		41°		42°		43°		44°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° , d	°	° , d	°	° , d	°	° , d	°	° , d	°	°
45	50 46+31	95	50 40+32	96	50 33+33	98	50 24+35	99	50 14+36	100	315
46	50 00 31	94	49 55 32	96	49 48 34	97	49 41 34	98	49 32 36	99	314
47	49 14 31	94	49 10 32	95	49 04 33	96	48 57 35	97	48 49 36	98	313
48	48 29 30	93	48 25 31	94	48 20 33	95	48 14 34	96	48 06 36	98	312
49	47 43 30	92	47 40 31	93	47 35 33	95	47 30 34	96	47 24 35	97	311
50	46 57+30	92	46 54+32	93	46 51+33	94	46 46+34	95	46 41+35	96	310
51	46 11 30	91	46 09 32	92	46 06 33	93	46 03 34	94	45 58 35	95	309
52	45 25 30	90	45 24 31	91	45 22 33	92	45 19 34	93	45 15 35	94	308
53	44 39 30	90	44 39 31	91	44 37 33	92	44 35 34	93	44 32 35	94	307
54	43 53 30	89	43 53 32	90	43 53 33	91	43 51 34	92	43 49 35	93	306
55	43 07+30	88	43 08+32	89	43 08+33	90	43 07+34	91	43 06+35	92	305
56	42 21 30	88	42 23 31	89	42 24 32	90	42 24 33	91	42 22 36	92	304
57	41 35 31	87	41 38 31	88	41 39 33	89	41 40 34	90	41 39 35	91	303
58	40 49 31	87	40 52 32	88	40 55 32	88	40 56 34	89	40 56 35	90	302
59	40 04 30	86	40 07 32	87	40 10 33	88	40 12 34	89	40 13 35	89	301
60	39 18+30	85	39 22+32	86	39 26+32	87	39 28+34	88	39 30+35	89	300
61	38 32 31	85	38 37 32	86	38 41 33	86	38 44 34	87	38 47 35	88	299
62	37 46 31	84	37 52 32	85	37 57 33	86	38 01 34	87	38 04 35	87	298
63	37 01 30	84	37 07 32	84	37 12 33	85	37 17 34	86	37 21 35	87	297
64	36 15 31	83	36 22 32	84	36 28 33	85	36 33 34	85	36 38 35	86	296
65	35 29+31	83	35 37+32	83	35 43+34	84	35 49+35	85	35 55+35	85	295
66	34 44 31	82	34 52 32	83	34 59 33	83	35 06 34	84	35 12 35	85	294
67	33 58 32	81	34 07 32	82	34 15 33	83	34 22 35	83	34 29 35	84	293
68	33 13 31	81	33 22 33	81	33 31 33	82	33 39 34	83	33 46 35	83	292
69	32 28 31	80	32 38 32	81	32 47 33	82	32 55 35	82	33 03 36	83	291
70	31 42+32	80	31 53+33	80	32 03+33	81	32 12+35	82	32 20+36	82	290
71	30 57 32	79	31 08 33	80	31 19 34	80	31 28 35	81	31 38 35	82	289
72	30 12 32	79	30 24 33	79	30 35 34	80	30 45 35	80	30 55 36	81	288
73	29 27 33	78	29 39 34	79	29 51 34	79	30 02 35	80	30 12 36	80	287
74	28 42 33	78	28 55 33	78	29 07 35	79	29 19 35	79	29 30 36	80	286
75	27 58+32	77	28 11+33	77	28 24+34	78	28 36+35	79	28 48+36	79	285
76	27 13 33	76	27 27 34	77	27 40 35	77	27 53 36	78	28 05 37	78	284
77	26 28 33	76	26 43 34	76	26 57 35	77	27 10 36	77	27 23 37	78	283
78	25 44 33	75	25 59 34	76	26 13 35	76	26 27 36	77	26 41 37	77	282
79	25 00 33	75	25 15 34	75	25 30 35	76	25 45 36	76	25 59 37	77	281
80	24 15+34	74	24 31+35	75	24 47+35	75	25 02+37	76	25 17+37	76	280
81	23 31 34	74	23 48 35	74	24 04 36	75	24 20 36	75	24 35 38	75	279
82	22 47 34	73	23 05 34	74	23 21 36	74	23 38 36	74	23 54 37	75	278
83	22 03 35	73	22 21 35	73	22 39 35	73	22 56 36	74	23 12 38	74	277
84	21 20 34	72	21 38 35	72	21 56 36	73	22 14 37	73	22 31 38	74	276
85	20 36+35	71	20 55+36	72	21 14+36	72	21 32+37	73	21 50+37	73	275
86	19 53 35	71	20 12 36	71	20 31 37	72	20 50 37	72	21 08 39	72	274
87	19 10 35	70	19 29 36	71	19 49 37	71	20 08 38	71	20 27 39	72	273
88	18 26 36	70	18 47 36	70	19 07 37	70	19 27 38	71	19 47 38	71	272
89	17 43 36	69	18 05 36	70	18 25 37	70	18 46 38	70	19 06 39	70	271
90	17 01+35	69	17 22+37	69	17 44+37	69	18 05+38	70	18 25+39	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.

LAT.	40°		41°		42°		43°		44°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
90	17 01+35	69	17 22+37	69	17 44+37	69	18 05+38	70	18 25+39	70	270
91	16 18 36	68	16 40 37	68	17 02 38	69	17 24 38	69	17 45 39	69	269
92	15 36 36	68	15 58 37	68	16 21 38	68	16 43 39	68	17 05 39	69	268
93	14 53 37	67	15 17 37	67	15 40 38	68	16 02 39	68	16 25 39	68	267
94	14 11 37	66	14 35 38	67	14 59 38	67	15 22 39	67	15 45 40	67	266
95	13 29+37	66	13 54+38	66	14 18+38	66	14 42+39	67	15 05+40	67	265
96	12 48 37	65	13 13 38	66	13 37 39	66	14 02 39	66	14 26 40	66	264
97	12 06 38	65	12 32 38	65	12 57 39	65	13 22 40	65	13 47 40	66	263
98	11 25 38	64	11 51 39	64	12 17 39	65	12 42 40	65	13 08 40	65	262
99	10 44 38	64	11 11 38	64	11 37 39	64	12 03 40	64	12 29 41	64	261
100	10 03+39	63	10 30+39	63	10 57+40	63	11 24+40	64	11 50+42	64	260
101	...		...		10 18+40	63	10 45 41	63	11 12 41	63	259
102	...		...		...		10 06+41	62	10 34+42	62	258
103	...		...		...		...		...		257
104	...		...		...		...		...		256
105	...		...		...		...		...		255

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

LAT.	40°		41°		42°	43°	44°	LAT.
H.A.	Alt.	Az.	Alt.	Az.				H.A.
°	° ′ d	°	° ′ d	°				°
45	11 04−50	140	10 18−50	140	...	...	...	315
46	10 35 50	139	...		...	...	...	314
47	10 05−49	139	...		...	...	...	313
48	...		...		...	...	...	312
49	...		...		...	...	...	311
50	...		...		...	...	...	310

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

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.	40°		41°		42°		43°		44°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
0	78 00+60	180	77 00+60	180	76 00+60	180	75 00+60	180	74 00+60	180	360
1	77 58 60	176	76 59 60	176	75 59 60	176	74 59 60	177	73 59 60	177	359
2	77 53 60	172	76 54 60	172	75 55 59	173	74 55 60	173	73 55 60	174	358
3	77 45 59	167	76 46 59	168	75 48 59	169	74 49 59	170	73 49 60	170	357
4	77 33 58	163	76 36 58	165	75 38 58	166	74 40 58	167	73 41 59	167	356
5	77 19+57	159	76 22+58	161	75 25+58	162	74 28+58	163	73 31+58	164	355
6	77 01 56	156	76 06 57	157	75 11 57	159	74 14 58	160	73 18 58	161	354
7	76 41 55	152	75 48 55	154	74 53 56	156	73 58 57	157	73 03 57	158	353
8	76 18 54	149	75 27 54	151	74 34 55	153	73 40 56	154	72 46 56	156	352
9	75 53 52	146	75 03 53	148	74 12 54	150	73 20 55	151	72 27 56	153	351
10	75 26+51	142	74 38+52	145	73 49+52	147	72 58+54	148	72 06+55	150	350
11	74 57 49	140	74 11 50	142	73 23 52	144	72 34 53	146	71 44 54	147	349
12	74 27 47	137	73 42 49	139	72 56 51	141	72 09 51	143	71 20 53	145	348
13	73 55 46	134	73 12 48	137	72 28 49	139	71 42 50	141	70 55 51	143	347
14	73 21 45	132	72 40 47	134	71 57 49	136	71 13 50	138	70 28 51	140	346
15	72 46+44	130	72 07+46	132	71 26+47	134	70 44+48	136	70 00+49	138	345
16	72 10 43	127	71 33 44	130	70 54 46	132	70 13 47	134	69 30 49	136	344
17	71 33 42	125	70 57 44	128	70 20 45	130	69 41 46	132	69 00 48	134	343
18	70 55 41	123	70 21 43	126	69 45 44	128	69 07 46	130	68 28 47	132	342
19	70 17 39	122	69 44 42	124	69 10 43	126	68 33 45	128	67 56 46	130	341
20	69 37+39	120	69 06+41	122	68 33+43	124	67 58+45	126	67 22+46	128	340
21	68 57 38	118	68 27 40	121	67 56 42	123	67 23 43	125	66 48 45	127	339
22	68 16 37	117	67 48 39	119	67 18 41	121	66 46 43	123	66 13 44	125	338
23	67 35 36	115	67 08 39	117	66 40 40	119	66 09 42	121	65 37 43	123	337
24	66 53 36	114	66 28 37	116	66 01 39	118	65 32 41	120	65 01 42	122	336
25	66 11+35	113	65 47+37	115	65 21+39	117	64 53+41	118	64 24+42	120	335
26	65 28 35	111	65 05 37	113	64 41 38	115	64 14 40	117	63 46 42	119	334
27	64 45 34	110	64 24 36	112	64 00 38	114	63 35 39	116	63 08 41	118	333
28	64 02 33	109	63 42 35	111	63 19 37	113	62 55 39	114	62 30 40	116	332
29	63 18 33	108	62 59 35	110	62 38 37	111	62 15 39	113	61 51 40	115	331
30	62 34+33	107	62 16+35	108	61 56+37	110	61 35+38	112	61 11+40	114	330
31	61 50 32	106	61 33 34	107	61 14 36	109	60 54 37	111	60 32 39	112	329
32	61 06 32	105	60 50 33	106	60 32 35	108	60 13 37	110	59 52 38	111	328
33	60 21 32	104	60 06 34	105	59 50 35	107	59 31 37	109	59 11 39	110	327
34	59 36 32	103	59 22 33	104	59 07 34	106	58 50 36	108	58 31 37	109	326
35	58 52+31	102	58 39+32	103	58 24+34	105	58 08+36	106	57 50+37	108	325
36	58 07 30	101	57 54 33	102	57 41 34	104	57 25 36	105	57 09 37	107	324
37	57 21 31	100	57 10 32	102	56 57 34	103	56 43 35	105	56 27 37	106	323
38	56 36 30	99	56 26 32	101	56 14 33	102	56 01 35	104	55 46 36	105	322
39	55 51 30	98	55 41 32	100	55 30 34	101	55 18 35	103	55 04 36	104	321
40	55 05+30	98	54 56+32	99	54 46+34	100	54 35+35	102	54 22+36	103	320
41	54 19 30	97	54 12 31	98	54 03 32	100	53 52 34	101	53 40 36	102	319
42	53 34 30	96	53 27 31	97	53 19 32	99	53 09 34	100	52 58 35	101	318
43	52 48 30	95	52 42 31	97	52 34 33	98	52 26 34	99	52 15 36	100	317
44	52 02 30	95	51 57 31	96	51 50 33	97	51 42 34	98	51 33 35	100	316
45	51 17+29	94	51 12+31	95	51 06+32	96	50 59+34	98	50 50+35	99	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.	40°		41°		42°		43°		44°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
45	51 17+29	94	51 12+31	95	51 06+32	96	50 59+34	98	50 50+35	99	315
46	50 31 29	93	50 27 31	94	50 22 32	96	50 15 34	97	50 08 35	98	314
47	49 45 29	92	49 42 30	94	49 37 32	95	49 32 33	96	49 25 35	97	313
48	48 59 29	92	48 56 31	93	48 53 32	94	48 48 33	95	48 42 35	96	312
49	48 13 29	91	48 11 31	92	48 08 32	93	48 04 34	94	47 59 35	96	311
50	47 27+29	90	47 26+31	92	47 24+32	93	47 20+34	94	47 16+35	95	310
51	46 41 29	90	46 41 30	91	46 39 32	92	46 37 33	93	46 33 35	94	309
52	45 55 30	89	45 55 31	90	45 55 32	91	45 53 33	92	45 50 35	93	308
53	45 09 30	89	45 10 31	90	45 10 32	91	45 09 33	92	45 07 34	93	307
54	44 23 30	88	44 25 31	89	44 26 32	90	44 25 33	91	44 24 34	92	306
55	43 37+30	87	43 40+30	88	43 41+32	89	43 41+34	90	43 41+34	91	305
56	42 51 30	87	42 54 31	88	42 56 33	89	42 57 34	89	42 58 34	90	304
57	42 06 29	86	42 09 31	87	42 12 32	88	42 14 33	89	42 14 35	90	303
58	41 20 30	86	41 24 31	86	41 27 33	87	41 30 33	88	41 31 35	89	302
59	40 34 30	85	40 39 31	86	40 43 32	87	40 46 33	87	40 48 35	88	301
60	39 48+30	84	39 54+31	85	39 58+33	86	40 02+34	87	40 05+35	88	300
61	39 03 30	84	39 09 31	85	39 14 32	85	39 18 34	86	39 22 35	87	299
62	38 17 30	83	38 24 31	84	38 30 32	85	38 35 33	86	38 39 35	86	298
63	37 31 31	83	37 39 31	83	37 45 33	84	37 51 34	85	37 56 35	86	297
64	36 46 30	82	36 54 31	83	37 01 33	84	37 07 34	84	37 13 35	85	296
65	36 00+31	81	36 09+32	82	36 17+32	83	36 24+33	84	36 30+35	84	295
66	35 15 31	81	35 24 32	82	35 32 33	82	35 40 34	83	35 47 35	84	294
67	34 30 30	80	34 39 32	81	34 48 33	82	34 57 34	82	35 04 35	83	293
68	33 44 31	80	33 55 32	80	34 04 33	81	34 13 34	82	34 21 35	82	292
69	32 59 31	79	33 10 32	80	33 20 33	81	33 30 34	81	33 39 35	82	291
70	32 14+31	79	32 26+32	79	32 36+34	80	32 47+34	81	32 56+35	81	290
71	31 29 32	78	31 41 33	79	31 53 33	79	32 03 35	80	32 13 36	81	289
72	30 44 32	78	30 57 32	78	31 09 33	79	31 20 35	79	31 31 35	80	288
73	30 00 31	77	30 13 32	78	30 25 34	78	30 37 35	79	30 48 36	79	287
74	29 15 32	77	29 28 33	77	29 42 34	78	29 54 35	78	30 06 36	79	286
75	28 30+32	76	28 44+34	77	28 58+34	77	29 11+35	78	29 24+36	78	285
76	27 46 32	75	28 01 33	76	28 15 34	76	28 29 35	77	28 42 36	78	284
77	27 01 33	75	27 17 33	75	27 32 34	76	27 46 35	76	28 00 36	77	283
78	26 17 33	74	26 33 34	75	26 48 35	75	27 03 36	76	27 18 36	76	282
79	25 33 33	74	25 49 34	74	26 05 35	75	26 21 36	75	26 36 37	76	281
80	24 49+33	73	25 06+34	74	25 22+35	74	25 39+35	75	25 54+37	75	280
81	24 05 33	73	24 23 34	73	24 40 35	74	24 56 36	74	25 13 37	75	279
82	23 21 34	72	23 39 35	73	23 57 35	73	24 14 37	73	24 31 37	74	278
83	22 38 33	72	22 56 35	72	23 14 36	72	23 32 37	73	23 50 37	73	277
84	21 54 34	71	22 13 35	72	22 32 36	72	22 51 36	72	23 09 37	73	276
85	21 11+34	71	21 31+35	71	21 50+36	71	22 09+37	72	22 27+38	72	275
86	20 28 34	70	20 48 35	70	21 08 36	71	21 27 37	71	21 47 37	71	274
87	19 45 34	69	20 05 36	70	20 26 36	70	20 46 37	71	21 06 38	71	273
88	19 02 35	69	19 23 36	69	19 44 37	70	20 05 37	70	20 25 38	70	272
89	18 19 35	68	18 41 36	69	19 02 37	69	19 24 37	69	19 45 38	70	271
90	17 36+36	68	17 59+36	68	18 21+37	68	18 43+38	69	19 04+39	69	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.

LAT.	40°		41°		42°		43°		44°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
45	51 17+29	94	51 12+31	95	51 06+32	96	50 59+34	98	50 50+35	99	315
46	50 31 29	93	50 27 31	94	50 22 32	96	50 15 34	97	50 08 35	98	314
47	49 45 29	92	49 42 30	94	49 37 32	95	49 32 33	96	49 25 35	97	313
48	48 59 29	92	48 56 31	93	48 53 32	94	48 48 33	95	48 42 35	96	312
49	48 13 29	91	48 11 31	92	48 08 32	93	48 04 34	94	47 59 35	96	311
50	47 27+29	90	47 26+31	92	47 24+32	93	47 20+34	94	47 16+35	95	310
51	46 41 29	90	46 41 30	91	46 39 32	92	46 37 33	93	46 33 35	94	309
52	45 55 30	89	45 55 31	90	45 55 32	91	45 53 33	92	45 50 35	93	308
53	45 09 30	89	45 10 31	90	45 10 32	91	45 09 33	92	45 07 34	93	307
54	44 23 30	88	44 25 31	89	44 26 32	90	44 25 33	91	44 24 34	92	306
55	43 37+30	87	43 40+30	88	43 41+32	89	43 41+34	90	43 41+34	91	305
56	42 51 30	87	42 54 31	88	42 56 33	89	42 57 34	89	42 58 34	90	304
57	42 06 29	86	42 09 31	87	42 12 32	88	42 14 33	89	42 14 35	90	303
58	41 20 30	86	41 24 31	86	41 27 33	87	41 30 33	88	41 31 35	89	302
59	40 34 30	85	40 39 31	86	40 43 32	87	40 46 33	87	40 48 35	88	301
60	39 48+30	84	39 54+31	85	39 58+33	86	40 02+34	87	40 05+35	88	300
61	39 03 30	84	39 09 31	85	39 14 32	85	39 18 34	86	39 22 35	87	299
62	38 17 30	83	38 24 31	84	38 30 32	85	38 35 33	86	38 39 35	86	298
63	37 31 31	83	37 39 31	83	37 45 33	84	37 51 34	85	37 56 35	86	297
64	36 46 30	82	36 54 31	83	37 01 33	84	37 07 34	84	37 13 35	85	296
65	36 00+31	81	36 09+32	82	36 17+32	83	36 24+33	84	36 30+35	84	295
66	35 15 31	81	35 24 32	82	35 32 33	82	35 40 34	83	35 47 35	84	294
67	34 30 30	80	34 39 32	81	34 48 33	82	34 57 34	82	35 04 35	83	293
68	33 44 31	80	33 55 32	80	34 04 33	81	34 13 34	82	34 21 35	82	292
69	32 59 31	79	33 10 32	80	33 20 33	81	33 30 34	81	33 39 35	82	291
70	32 14+31	79	32 26+32	79	32 36+34	80	32 47+34	81	32 56+35	81	290
71	31 29 32	78	31 41 33	79	31 53 33	79	32 03 35	80	32 13 36	81	289
72	30 44 32	78	30 57 32	78	31 09 33	79	31 20 35	79	31 31 35	80	288
73	30 00 31	77	30 13 32	78	30 25 34	78	30 37 35	79	30 48 36	79	287
74	29 15 32	77	29 28 33	77	29 42 34	78	29 54 35	78	30 06 36	79	286
75	28 30+32	76	28 44+34	77	28 58+34	77	29 11+35	78	29 24+36	78	285
76	27 46 32	75	28 01 33	76	28 15 34	76	28 29 35	77	28 42 36	78	284
77	27 01 33	75	27 17 33	75	27 32 34	76	27 46 35	76	28 00 36	77	283
78	26 17 33	74	26 33 34	75	26 48 35	75	27 03 36	76	27 18 36	76	282
79	25 33 33	74	25 49 34	74	26 05 35	75	26 21 36	75	26 36 37	76	281
80	24 49+33	73	25 06+34	74	25 22+35	74	25 39+35	75	25 54+37	75	280
81	24 05 33	73	24 23 34	73	24 40 35	74	24 56 36	74	25 13 37	75	279
82	23 21 34	72	23 39 35	73	23 57 35	73	24 14 37	73	24 31 37	74	278
83	22 38 33	72	22 56 35	72	23 14 36	72	23 32 37	73	23 50 37	73	277
84	21 54 34	71	22 13 35	72	22 32 36	72	22 51 36	72	23 09 37	73	276
85	21 11+34	71	21 31+35	71	21 50+36	71	22 09+37	72	22 27+38	72	275
86	20 28 34	70	20 48 35	70	21 08 36	71	21 27 37	71	21 47 37	71	274
87	19 45 34	69	20 05 36	70	20 26 36	70	20 46 37	71	21 06 38	71	273
88	19 02 35	69	19 23 36	69	19 44 37	70	20 05 37	70	20 25 38	70	272
89	18 19 35	68	18 41 36	69	19 02 37	69	19 24 37	69	19 45 38	70	271
90	17 36+36	68	17 59+36	68	18 21+37	68	18 43+38	69	19 04+39	69	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.

LAT.	40°		41°		42°		43°		44°		LAT.
H.A.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	Alt.	Az.	H.A.
°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	° ′ d	°	°
90	17 36+36	68	17 59+36	68	18 21+37	68	18 43+38	69	19 04+39	69	270
91	16 54 36	67	17 17 37	68	17 40 37	68	18 02 38	68	18 24 39	68	269
92	16 12 36	67	16 35 37	67	16 59 37	67	17 22 38	68	17 44 39	68	268
93	15 30 36	66	15 54 37	66	16 18 38	67	16 41 39	67	17 04 40	67	267
94	14 48 37	66	15 13 37	66	15 37 38	66	16 01 39	66	16 25 40	67	266
95	14 06+37	65	14 32+37	65	14 56+39	66	15 21+39	66	15 45+40	66	265
96	13 25 37	64	13 51 37	65	14 16 39	65	14 41 40	65	15 06 40	65	264
97	12 44 37	64	13 10 38	64	13 36 39	64	14 02 39	65	14 27 41	65	263
98	12 03 37	63	12 30 38	64	12 56 39	64	13 22 40	64	13 48 41	64	262
99	11 22 38	63	11 49 39	63	12 16 40	63	12 43 40	63	13 10 41	64	261
100	10 42+38	62	11 09+39	62	11 37+39	63	12 04+41	63	12 32+41	63	260
101	10 01+39	62	10 30+39	62	10 58 40	62	11 26 40	62	11 53 42	62	259
102	...		...		10 19+40	61	10 47 41	62	11 16 41	62	258
103	...		...		...		10 09+41	61	10 38 42	61	257
104	...		...		...		...		10 00+42	60	256
105	...		...		...		...		...		255

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. 99

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

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. 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 0′·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 twelve 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 hemispbere. 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 April 30, local date, about two hours after sunset, in dead reckoning position latitude 43° 17′ N., longitude 125° 20′ W., star number 10 (Capella) was observed to obtain a position line. Corrected sextant reading 26° 38′; G.M.T. of observation $05^h\ 18^m\ 14^s$.

From Table IV, page 92 :

Long. 120° W. (approx.)

Approx.	Hrs.	Date
L.M.T.	2100	Apr. 30
G.M.T.	0500	May 1

From *Air Almanac*, 1939 May 1 :

		°	′
G.H.A. ♈	($05^h\ 10^m$)	295	44
Increment	($8^m\ 14^s$)	2	04
S.H.A.	(No. 10)	281	57
G.H.A. of star		579	45
Long. of ass. position		−125	45
		454	00
		−360	

From page 40 :

Lat. of ass. position 43° NORTH

Star No. 10 — H.A. 94° — Tab. Az. 51°

	°	′
Tab. Alt.	27	04
Correction		—
Corr. Tab. Alt.	27	04
Corr. Sext. Rdg.	26	38
Intercept	26′ *away*	

No correction for date is necessary in 1939.

Assumed position : Lat. 43° N., Long. 125° 45′ W.

From Table III, page 90 : True Az. 309° T.

Example 2.—On 1950 August 17, Greenwich date, in dead reckoning position latitude 40° 52′ S., longitude 26° 29′ E., star number 13 (Fomalhaut) 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 69° 11′.

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

From page 51 :

Lat. of ass. position 41° SOUTH

Star No. 13 — H.A. 22° — Tab. Az. 115°

	°	′
Tab. Alt.	69	02
Correction (Table I)	−	2
Corr. Tab. Alt.	69	00
Corr. Sext. Rdg.	69	11
Intercept	11′ *towards*	

t . . −12

Year . . 1950

Assumed position : Lat. 41° S., Long. 26° 46′ E.

From Table III, page 91 : True Az. 295° T.

Example 3.—On 1939 May 1, local date, at approximate local noon, in dead reckoning position latitude 43° 40′ S., longitude 51° 47′ W., the Sun was observed to obtain a position line. Corrected sextant reading 31° 19′; G.M.T. of observation $15^h\ 11^m\ 27^s$.

From Table IV, page 92:

Long. 45° W. (approx.)

Approx.	Hrs.	Date
L.M.T.	1200	May 1
G.M.T.	1500	May 1

From *Air Almanac*, 1939 May 1:

G.H.A.	($15^h\ 10^m$)	.	48° 13′
Increment	($1^m\ 27^s$)	.	22
G.H.A. of Sun		.	48 35
Long. of ass. position		.	− 51 35
			− 3 00
			+360

From page 152:

Lat. of ass. position 44° S. Dec. 14° 56′ N. CONTRARY name H.A. 357°

Tab. Alt.	. . .	31° 57′	*d* . .	−59	Tab. Az. 177°
Correction (Table XV)	−	55	Minutes of dec.	56	
Corr. Tab. Alt.	. .	31 02			
Corr. Sext. Rdg.	. .	31 19	Assumed position:		From Table III, page 91:
Intercept	. . .	17′ *towards*	Lat. 44° S.		
			Long. 51° 35′ W.		True Az. 003° T.

Since there is a double border rule opposite the entry on page 152, 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 May 2, local date, shortly before sunrise, in dead reckoning position latitude 39° 38′ N., longitude 152° 58′ E., Venus was observed to obtain a position line. Corrected sextant reading 11° 24′; G.M.T. of observation $18^h\ 38^m\ 17^s$.

From Table IV, page 93:

Long. 150° E. (approx.)

Approx.	Hrs.	Date
L.M.T.	0500	May 2
G.M.T.	*1900*	*May 1*

From *Air Almanac*, 1939 May 1:

G.H.A.	(18^h)	. .	121° 21′
Increment	($38^m\ 17^s$)	.	9 36
G.H.A. of Venus		. .	130 57
Long. of ass. position		.	+153 03

From page 99:

Lat. of ass. position 40° N. Dec. 1° 25′ N. SAME name H.A. 284°

Tab. Alt.	. . .	11° 24′	*d* . .	+39	Tab. Az. 98°
Correction (Table XV)	+	16	Minutes of dec.	25	
Corr. Tab. Alt.	. .	11 40			
Corr. Sext. Rdg.	. .	11 24	Assumed position:		From Table III, page 90:
Intercept	. . .	16′ *away*	Lat. 40° N.		
			Long. 153° 03′ E.		True Az. 098° T.

IVa.—CHANGE OF SEXTANT READING WITH TIME

Due to motion of body observed

True Azimuth of body	Latitude 40°	42°	44°	True Azimuth of body
°	′	′	′	°
090	+34	+33	+32	090
095	34	33	32	085
100	34	33	32	080
105	33	32	31	075
110	32	31	30	070
115	31	30	29	065
120	+30	+29	+28	060
125	28	27	27	055
130	26	26	25	050
135	24	24	23	045
140	22	21	21	040
145	20	19	19	035
150	+17	+17	+16	030
155	15	14	14	025
160	12	11	11	020
165	9	9	8	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	9	9	8	345
200	12	11	11	340
205	15	14	14	335
210	−17	−17	−16	330
215	20	19	19	325
220	22	21	21	320
225	24	24	23	315
230	26	26	25	310
235	28	27	27	305
240	−30	−29	−28	300
245	31	30	29	295
250	32	31	30	290
255	33	32	31	285
260	34	33	32	280
265	34	33	32	275
270	−34	−33	−32	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

NOTES

V.—DIFFERENCE BETWEEN RHUMB LINE AND GREAT CIRCLE DISTANCES

N. 40°-44° **S. 40°-44°**

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	4	7	11	16	23	32	42	55	71	90	111	136	165	198	236	S. 60°
55	0	1	2	3	6	9	14	20	29	39	52	67	85	106	131	159	192	230	55
50	0	0	1	3	5	8	13	19	26	36	48	63	80	101	125	153	186	222	50
45	0	0	1	2	4	7	11	17	25	34	46	60	76	96	120	147	178	214	45
40	0	0	1	2	4	7	11	16	23	32	43	57	73	92	114	140	170	205	40
N. 35	0	0	1	2	4	7	10	16	22	31	41	54	69	87	108	133	162	195	S. 35
30	0	0	1	2	4	7	10	15	21	29	39	51	65	82	102	126	153	184	30
25	0	0	1	2	4	6	10	14	20	28	37	48	61	77	96	117	143	172	25
20	0	0	1	2	4	6	10	14	19	26	34	45	57	72	89	109	132	160	20
15	0	1	1	2	4	6	9	13	18	24	32	41	52	66	81	100	121	146	15
N. 10	0	1	1	2	4	6	9	12	17	23	29	38	48	60	74	90	110	132	S. 10
N. 5	0	1	1	2	4	6	8	11	15	20	27	34	43	54	66	81	98	118	S. 5
0	0	0	1	2	3	5	7	10	14	18	24	30	38	47	58	71	86	103	0
S. 5	0	0	1	2	3	5	7	9	12	16	21	26	33	41	50	61	74	88	N. 5
10	0	0	1	2	3	4	6	8	11	14	18	22	28	35	42	51	62	74	10
S. 15	0	0	1	1	2	4	5	7	9	12	15	19	23	29	35	42	51	61	N. 15
20	0	0	1	1	2	3	4	6	8	10	12	16	19	24	29	34	41	49	20
25	0	0	1	1	2	3	4	5	6	8	10	13	16	19	23	28	33	39	25
30	0	0	0	1	1	2	3	4	5	7	9	11	13	16	19	23	27	31	30
35	0	0	0	1	1	2	3	4	5	6	8	10	12	14	17	20	23	27	35
S. 40	0	0	1	1	1	2	3	4	5	6	8	10	12	14	17	20	23	27	N. 40
45	0	0	1	1	2	3	4	5	6	8	9	12	14	17	20	23	27	31	45
50	0	0	1	1	2	3	5	6	8	10	13	15	19	22	26	31	36	42	50
55	0	1	1	2	3	5	7	9	11	14	18	22	26	31	37	44	51	59	55
S. 60	0	1	2	3	5	7	9	13	16	20	25	31	37	45	53	62	72	84	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 42°, but may be used for any place of departure between latitudes 40° and 44°. 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. 40° and N. 44°, and the one on the right when the place of departure lies between S. 40° and S. 44°.

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 3 miles up to a *Change of Longitude* of 50°, but may reacb 6 miles for a change of 70°, and 12 miles for a change of 90°.

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

Entering the argument column on the left with the *Latitude of Destination* of 38° 42′ 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						Height in metres
	10°	15°	20°	30°	45°	60°	
	′	′	′	′	′	′	
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		1960-1980		1980-2000	
L.H.A. ♈	True Azimuth	L.H.A. ♈	True Azimuth	L.H.A. ♈	True Azimuth
°	°	°	°	°	°
0	001	0	001	0	001
4	000	5	000	6	000
49	359	56	359	63	359
184	000	185	000	186	000
229	001	236	001	243	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. 40° and N. 44°. 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			481		146	1790		546	3930		1200	6910		2100
6	2	1	527	22	160	1880	42	573	4060	62	1230	7080	82	2160
12	3	3	575	23	175	1970	43	600	4190	63	1270	7250	83	2210
21	4	6	625	24	190	2060	44	628	4330	64	1320	7430	84	2260
31	5	9	677	25	206	2150	45	657	4460	65	1360	7610	85	2320
43	6	13	731	26	222	2250	46	686	4600	66	1400	7790	86	2370
58	7	17	787	27	240	2340	47	716	4740	67	1440	7970	87	2420
75	8	22	845	28	257	2440	48	746	4880	68	1480	8150	88	2480
93	9	28	906	29	276	2550	49	777	5020	69	1530	8340	89	2540
114	10	34	968	30	295	2650	50	809	5170	70	1570	8520	90	2590
137	11	41	1030	31	314	2760	51	841	5320	71	1620	8710	91	2650
162	12	49	1090	32	335	2860	52	874	5470	72	1660	8900	92	2710
189	13	57	1160	33	356	2980	53	908	5620	73	1710	9100	93	2770
218	14	66	1230	34	377	3090	54	942	5770	74	1760	9290	94	2830
250	15	76	1310	35	399	3200	55	977	5930	75	1800	9490	95	2890
283	16	86	1380	36	422	3320	56	1010	6090	76	1850	9690	96	2950
318	17	97	1460	37	446	3440	57	1040	6250	77	1900	9890	97	3010
356	18	108	1540	38	470	3560	58	1080	6410	78	1950	10100	98	3070
395	19	120	1620	39	495	3680	59	1120	6580	79	2000	10300	99	3140
437	20	133	1700	40	520	3810	60	1160	6740	80	2050	10500	100	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	1	0	287	20	87	1120	39	341	2500	58	762	4420	77	1340	6890	96	2100
1	2		317	21	96	1170	40	359	2580	59	788	4540	78	1380	7040	97	2140
4	3	1	349	22	106	1240	41	378	2670	60	815	4650	79	1420	7180	98	2190
9	4	2	382	23	116	1300	42	396	2760	61	843	4770	80	1450	7330	99	2230
15	5	4	417	24	127	1360	43	416	2850	62	871	4900	81	1490	7480	100	2280
22	6	6	453	25	138	1430	44	436	2950	63	900	5020	82	1530	7630	101	2320
31	7	9	491	26	149	1490	45	456	3040	64	929	5140	83	1560	7780	102	2370
42	8	12	531	27	161	1560	46	477	3140	65	958	5270	84	1600	7940	103	2420
54	9	16	571	28	174	1630	47	498	3240	66	988	5390	85	1640	8100	104	2460
68	10	20	614	29	187	1700	48	520	3340	67	1010	5520	86	1680	8250	105	2510
83	11	25	658	30	200	1770	49	542	3440	68	1050	5650	87	1720	8410	106	2560
100	12	30	703	31	214	1850	50	564	3540	69	1080	5780	88	1760	8570	107	2610
118	13	36	750	32	228	1920	51	587	3650	70	1110	5920	89	1800	8730	108	2660
137	14	42	798	33	243	2000	52	611	3750	71	1140	6050	90	1840	8900	109	2710
158	15	48	848	34	258	2080	53	635	3860	72	1170	6190	91	1880	9060	110	2760
181	16	55	900	35	274	2160	54	659	3970	73	1210	6330	92	1920	9230	111	2810
205	17	62	953	36	290	2240	55	684	4080	74	1240	6460	93	1970	9400	112	2860
231	18	70	1000	37	307	2320	56	709	4190	75	1270	6610	94	2010	9560	113	2910
258	19	78	1060	38	324	2410	57	735	4310	76	1310	6750	95	2050	9740	114	2960
287		87	1120		341	2500		762	4420		1340	6890		2100	9910		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	1	0	288	23	87	1120	45	344	2520	67	768	4460	89	1360	6960	111	2120
1	2		314	24	95	1180	46	359	2590	68	791	4560	90	1390	7080	112	2160
3	3	1	342	25	104	1230	47	375	2670	69	815	4670	91	1420	7210	113	2190
6	4	2	370	26	113	1280	48	392	2750	70	839	4770	92	1450	7340	114	2230
11	5	3	400	27	122	1340	49	408	2830	71	863	4870	93	1480	7470	115	2270
17	6	5	431	28	131	1390	50	425	2910	72	888	4980	94	1510	7600	116	2310
24	7	7	463	29	141	1450	51	443	2990	73	913	5090	95	1550	7730	117	2350
32	8	9	496	30	151	1510	52	460	3080	74	938	5200	96	1580	7870	118	2390
41	9	12	530	31	161	1570	53	479	3160	75	964	5310	97	1610	8000	119	2440
51	10	15	565	32	172	1630	54	497	3250	76	990	5420	98	1650	8140	120	2480
62	11	19	602	33	183	1690	55	516	3330	77	1010	5530	99	1680	8280	121	2520
75	12	22	639	34	195	1750	56	535	3420	78	1040	5640	100	1720	8410	122	2560
89	13	27	678	35	206	1820	57	554	3510	79	1070	5750	101	1750	8550	123	2600
103	14	31	718	36	219	1880	58	574	3600	80	1090	5870	102	1790	8690	124	2650
119	15	36	759	37	231	1950	59	594	3690	81	1120	5990	103	1820	8830	125	2690
137	16	41	801	38	244	2010	60	615	3780	82	1150	6100	104	1860	8980	126	2730
155	17	47	845	39	257	2080	61	636	3880	83	1180	6220	105	1890	9120	127	2780
174	18	53	889	40	271	2150	62	657	3970	84	1210	6340	106	1930	9270	128	2820
195	19	59	935	41	285	2220	63	678	4070	85	1240	6460	107	1970	9410	129	2870
216	20	66	982	42	299	2290	64	700	4160	86	1270	6580	108	2000	9560	130	2910
239	21	73	1030	43	313	2370	65	723	4260	87	1300	6710	109	2040	9710	131	2960
263	22	80	1070	44	328	2440	66	745	4360	88	1330	6830	110	2080	9860	132	3000
288		87	1120		344	2520		768	4460		1360	6960		2120	10000		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	0	0	0	0	0	0
1060		325	978		298	890		271	801		244	712		217	624		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	8	82	7	25	140	7	42	197	7	60	255	7	77	312	7	95
24	8	7	89	8	27	156	8	47	222	8	67	288	8	88	355	8	108
21	9	5	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
238	0	72	265	0	81	292	0	89	319	0	97	346	0	105	373	0	113
716	1	218	796	1	242	876	1	267	956	1	291	1030	1	316	1110	1	340
1190	2	363	1320	2	404	1450	2	444	1590	2	485	1720	2	526	1860	2	567
1660	3	507	1850	3	564	2040	3	621	2220	3	679	2410	3	736	2600	3	793
2130	4	651	2370	4	725	2610	4	798	2860	4	872	3100	4	945	3340	4	1010
2600	5	795	2900	5	885	3190	5	974	3490	5	1060	3780	5	1150	4080	5	1240
3070	6	938	3420	6	1040	3770	6	1150	4120	6	1250	4470	6	1360	4820	6	1460
3540	7	1080	3940	7	1200	4340	7	1320	4750	7	1440	5150	7	1570	5550	7	1690
4010	8	1220	4460	8	1360	4920	8	1500	5370	8	1630	5830	8	1770	6290	8	1910
4470	9	1360	4980	9	1510	5490	9	1670	6000	9	1830	6510	9	1980	7020	9	2140
5860	10	1780	6530	10	1990	7200	10	2190	7870	10	2390	8540	10	2600	9210	10	2800
8140	15	2480	9070	15	2760	10000	15	3050	10900	15	3330	11800	15	3620	12800	15	3910
10300	20	3160	11500	20	3530	12700	20	3890	14000	20	4260	15200	20	4630	16400	20	5000
12500	25	3830	14000	25	4280	15500	25	4730	16900	25	5180	18400	25	5630	19900	25	6080
14700	30	4490	16400	30	5020	18200	30	5550	19900	30	6080	21700	30	6620	23400	30	7150
16800	35	5140	18800	35	5750	20800	35	6360	22800	35	6980	24900	35	7590	26900	35	8210
18900	40	5780	21200	40	6470	23500	40	7160	25800	40	7860	28000	40	8550	30300	40	9250
21000	45	6400	23500	45	7180	26000	45	7950	28600	45	8730	31100	45	9510	33700	45	10200
23000	50	7020	25800	50	7870	28600	50	8730	31400	50	9590	34200	50	10400	37100	50	11300
25000	55	7620	28000	55	8550	31100	55	9490	34200	55	10400	37300	55	11300	40400	55	12300
26900	60	8210	30200	60	9230	33600	60	10200	36900	60	11200	40300	60	12200	43600	60	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
399	0	121	427	0	130	454	0	138	481	0	146	508	0	154	535	0	163
1190	1	365	1270	1	390	1360	1	415	1440	1	439	1520	1	464	1600	1	489
1990	2	608	2130	2	649	2260	2	691	2400	2	732	2540	2	774	2670	2	815
2790	3	851	2980	3	909	3170	3	966	3360	3	1020	3550	3	1080	3740	3	1140
3580	4	1090	3830	4	1160	4070	4	1240	4310	4	1310	4560	4	1390	4810	4	1460
4380	5	1330	4670	5	1420	4970	5	1510	5270	5	1600	5570	5	1690	5870	5	1790
5170	6	1570	5520	6	1680	5870	6	1790	6220	6	1890	6580	6	2000	6930	6	2110
5960	7	1810	6360	7	1940	6770	7	2060	7180	7	2180	7580	7	2310	8000	7	2430
6750	8	2050	7210	8	2190	7670	8	2330	8130	8	2470	8590	8	2610	9060	8	2760
7530	9	2290	8050	9	2450	8560	9	2610	9080	9	2760	9600	9	2920	10100	9	3080
9880	10	3010	10500	10	3220	11200	10	3420	11900	10	3630	12600	10	3840	13200	10	4050
13700	15	4200	14700	15	4480	15600	15	4770	16600	15	5060	17500	15	5350	18500	15	5640
17600	20	5370	18800	20	5740	20000	20	6110	21200	20	6480	22500	20	6860	23700	20	7230
21400	25	6530	22900	25	6980	24400	25	7440	25900	25	7890	27400	25	8350	28900	25	8810
25200	30	7680	26900	30	8220	28700	30	8760	30500	30	9290	32200	30	9830	34000	30	10300
28900	35	8820	30900	35	9440	33000	35	10000	35000	35	10600	37000	35	11300	39100	35	11900
32600	40	9950	34900	40	10600	37200	40	11300	39500	40	12000	41800	40	12700	44200	40	13400
36300	45	11000	38800	45	11800	41400	45	12600	44000	45	13400	46600	45	14200	49200	45	15000
39900	50	12100	42700	50	13000	45600	50	13900	48400	50	14700	51300	50	15600	54200	50	16500
43500	55	13200	46600	55	14200	49700	55	15100	52800	55	16100	56000	55	17000	59100	55	18000
47000	60	14300	50400	60	15300	53800	60	16400	57200	60	17400	60600	60	18400	64000	60	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	−46	−14	−25	+23	−4	+61	+17	+99	+38	+137	+59	+175	+80
50	45	13	24	25	3	63	18	101	39	139	60	176	81
49	44	11	23	27	2	65	19	103	40	140	61	178	82
47	43	9	22	29	−1	67	20	104	41	142	62	180	83
45	42	7	21	31	0	68	21	106	42	144	63	182	84
43	41	5	20	32	+1	70	22	108	43	146	64	184	85
41	40	4	19	34	2	72	23	110	44	148	65	185	86
40	39	−2	18	36	3	74	24	112	45	149	66	187	87
38	38	0	17	38	4	76	25	113	46	151	67	189	88
36	37	+2	16	40	5	77	26	115	47	153	68	191	89
34	36	4	15	41	6	79	27	117	48	155	69	193	90
32	35	5	14	43	7	81	28	119	49	157	70	194	91
31	34	7	13	45	8	83	29	121	50	158	71	196	92
29	33	9	12	47	9	85	30	122	51	160	72	198	93
27	32	11	11	49	10	86	31	124	52	162	73	200	94
25	31	13	10	50	11	88	32	126	53	164	74	202	95
23	30	14	9	52	12	90	33	128	54	166	75	203	96
22	29	16	8	54	13	92	34	130	55	167	76	205	97
20	28	18	7	56	14	94	35	131	56	169	77	207	98
18	27	20	6	58	15	95	36	133	57	171	78	209	99
16	−26	22	−5	59	+16	97	+37	135	+58	173	+79	211	+100
−14		+23		+61		+99		+137		+175		+212	

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	

m s	° ′
03 17	0 50
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	

m s	° ′
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	0	0	0	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	3	3	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	3	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	6	6	6	6	12
13	0	0	1	1	1	1	2	2	2	2	2	3	3	3	3	3	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	6	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
42	1	1	2	3	4	4	5	6	6	7	8	8	9	10	10	11	12	13	13	14	15	15	16	17	18	18	19	20	20	21	42
43	1	1	2	3	4	4	5	6	6	7	8	9	9	10	11	11	12	13	14	14	15	16	16	17	18	19	19	20	21	22	43
44	1	1	2	3	4	4	5	6	7	7	8	9	10	10	11	12	12	13	14	15	15	16	17	18	18	19	20	21	21	22	44
45	1	2	2	3	4	4	5	6	7	8	8	9	10	10	11	12	13	14	14	15	16	16	17	18	19	20	20	21	22	22	45
46	1	2	2	3	4	5	5	6	7	8	8	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	21	21	22	23	46
47	1	2	2	3	4	5	5	6	7	8	9	9	10	11	12	13	13	14	15	16	16	17	18	19	20	20	21	22	23	24	47
48	1	2	2	3	4	5	6	6	7	8	9	10	10	11	12	13	14	14	15	16	17	18	18	19	20	21	22	22	23	24	48
49	1	2	2	3	4	5	6	7	7	8	9	10	11	11	12	13	14	15	16	16	17	18	19	20	20	21	22	23	24	24	49
50	1	2	2	3	4	5	6	7	8	8	9	10	11	12	12	13	14	15	16	17	18	18	19	20	21	22	22	23	24	25	50
51	1	2	3	3	4	5	6	7	8	8	9	10	11	12	13	14	14	15	16	17	18	19	20	20	21	22	23	24	25	26	51
52	1	2	3	3	4	5	6	7	8	9	10	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	23	24	25	26	52
53	1	2	3	4	4	5	6	7	8	9	10	11	11	12	13	14	15	16	17	18	19	19	20	21	22	23	24	25	26	26	53
54	1	2	3	4	4	5	6	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	22	22	23	24	25	26	27	54
55	1	2	3	4	5	6	6	7	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24	25	26	27	28	55
56	1	2	3	4	5	6	7	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	21	22	23	24	25	26	27	28	56
57	1	2	3	4	5	6	7	8	9	10	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	28	57
58	1	2	3	4	5	6	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	58
59	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	59

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
01	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	01
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
03	2 2 2	2 2 2	2 2 2	2 2 2	2 2 2	2 2 2	2 2 3	3 3 3	3 3 3	3 3 3	03
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
05	3 3 3	3 3 3	3 3 3	3 3 4	4 4 4	4 4 4	4 4 4	4 4 4	5 5 5	5 5 5	05
06	3 3 3	3 4 4	4 4 4	4 4 4	4 4 4	5 5 5	5 5 5	5 5 5	6 6 6	6 6 6	06
07	4 4 4	4 4 4	4 4 5	5 5 5	5 5 5	5 5 6	6 6 6	6 6 6	6 7 7	7 7 7	07
08	4 4 4	5 5 5	5 5 5	5 5 6	6 6 6	6 6 6	7 7 7	7 7 7	7 7 8	8 8 8	08
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