GRADIENT WIND TABLES

METEOROLOGICAL OFFICE

SIMPLIFIED TABLE

The following table contains extracts (rounded to the nearest 5 Kt) from the preceding tables for the particular case of C cos A=0, i.e. a stationary system, or at points in a moving system where the isobars are at right angles to the direction of motion of the system.

Radius of curvature (n.mile)

Lat										
70	160	330	490	650	820	1220	1630	2040	2450	3260
60	180	350	530	710	880	1330	1770	2210	2650	3540
50	200	400	600	800	1000	1500	2000	2500	3000	4000
40	240	480	720	960	1190	1790	2380	2980	3580	4760
30	310	610	920	1230	1530	2300	3060	3830	4600	6130

Cyclonic Curvature - Subtract

G(kt)										
20	5	0	0	0	0	0	0	0	0	0
40	10	5	5	5	5	0	0	0	0	0
60	20	15	10	10	5	5	5	5	5	0
80	30	20	15	15	10	10	5	5	5	5
100	40	30	25	20	15	15	10	10	5	5
120	55	40	30	25	25	15	15	10	10	10
140	65	50	40	35	30	25	20	20	15	10
160	80	60	50	45	35	30	25	20	15	15
180	95	70	60	50	45	35	30	25	20	15
200	105	85	70	60	55	40	35	30	25	20

Anticyclonic Curvature - Add

G(kt)										
20	20	5	0	0	0	0	0	0	0	0
40	-	35	10	5	5	5	0	0	0	0
60	-	-	55	20	15	10	5	5	5	0
80	-	-	-	70	30	15	10	10	5	5
100	-	-	-	-	90	25	15	15	10	5
120	-	-	-	-	-	45	25	20	15	10
140	-	-	-	-	-	80	40	30	20	15
160	-	-	-	-	-	-	60	40	30	20
180	-	-	-	-	-	-	95	55	40	25
200	-	-	-	-	-	-	180	75	55	35

FOREWORD

If   G is the geostrophic wind speed $= \dfrac{\text{pressure gradient}}{\text{density} \times \text{Coriolis force}}$

V is the actual wind speed

ψ is the angular deviation of the actual wind from the geostrophic, then in horizontal frictionless flow (e.g. Petterssen, p.61)

$$V = G \cos\psi \mp \frac{V^2}{fR}$$

where f is the Coriolis parameter
       R is the numerical value of the radius of curvature of the air trajectory

and the upper sign refers to cyclonic curvature.

The value of V when $\psi = 0$, i.e. when there is no cross-isobar flow, is called the gradient wind.

If the isobaric pattern is moving, without changing its shape, at a speed C and at an angular deviation A from the direction of an isobar, then r, the radius of curvature of the isobars, may be related to R by the equation (e.g. Petterssen 1956, p.31)

$$\frac{1}{R} = \frac{1}{r}\left(1 - \frac{C\cos A}{V}\right)$$

Hence the gradient wind V is given by

$$V = G \mp \frac{V^2}{fr}\left(1 - \frac{C\cos A}{V}\right)$$

This is a quadratic equation in V which may be solved for given values of the other quantities. Since f and r appear only as a product, the solution for latitude 50°, say, and radius of curvature r_{50} is equal to that for latitude L° and radius r where

$$r = r_{50} \frac{\sin 50°}{\sin L°}$$

The equation has been solved, using METEOR, for 10° steps of latitude, 100 n.mile steps of radius of curvature in latitude 50°, and 10 kt steps of G and C cos A. A selection of these solutions is given in the following tables, expressed in terms of the correction G - V to be applied to the measured geostrophic speed. Tabulation of the correction, rather than the actual value V facilitates interpolation for the units figure of G; moreover, a glance at the tables will often show that the correction is negligibly small or is comparable with errors in measurement.

Care should be exercised in applying very large values of the correction, since on these occasions one or more of the inherent assumptions may be violated (see Petterssen p.65).

On pages 6 and 7 will be found tables to facilitate the assessment of C cos A from values of C and A.

Reference: S.Petterssen, Weather analysis and forecasting. Vol.I, 1956.

Instructions for use of gradient wind tables

1. Measure the geostrophic wind, G kt, and the angle, A, between the direction of motion of the pressure system and the wind direction.

2. From the table at the foot of pages 6 and 7 evaluate C cos A where C is the speed of the pressure system in knots. (C cos A is the component of velocity of the system in the direction of the wind being measured. If the geostrophic wind is projected along the direction of motion of the system and its component is in the same direction as the motion, then C cos A is positive; if the geostrophic component is in the opposite direction to that of the system, then C cos A is negative).

3. Measure the radius of curvature of the contours.

4. Using the page appropriate to the type of curvature and the geostrophic speed, enter the top part of the table by latitude to locate the column according to curvature. Interpolate as necessary.

5. From the selected column note the correction given for values of G and C cos A.

6. To obtain the gradient wind speed apply the correction to G as follows:-

   Cyclonic curvature, subtract correction

   Anticyclonic curvature, add correction.

Radius of curvature (n. mile)

Lat.											
70	160	240	330	410	490	650	820	1220	1630	2040	2450
60	180	270	350	440	530	710	880	1330	1770	2210	2650
50	200	300	400	500	600	800	1000	1500	2000	2500	3000
40	240	360	480	600	720	960	1190	1790	2380	2980	3580
30	310	460	610	770	920	1230	1530	2300	3060	3830	4600

Knots

G Kt	C cos A Kt											
20	0	3	3	2	2	1	1	1	1	0	0	0
	-20	6	5	4	3	3	2	2	1	1	1	0
	-40	8	6	5	4	4	3	3	2	1	1	1
	-60	9	8	6	5	5	4	3	2	2	1	1
30	20	3	2	2	1	1	1	1	0	0	0	0
	0	7	5	4	4	3	2	2	1	1	1	1
	-20	10	8	6	5	5	4	3	2	2	1	1
	-40	13	10	8	7	6	5	4	3	2	2	2
	-60	15	12	10	9	8	6	5	4	3	2	2
40	20	6	5	4	3	3	2	2	1	1	1	1
	0	11	8	7	6	5	4	3	2	2	1	1
	-20	14	11	10	8	7	6	5	3	3	2	2
	-40	18	14	12	10	9	7	6	4	3	3	2
	-60	20	16	14	12	11	9	7	5	4	4	3
50	40	4	3	2	2	2	1	1	1	1	0	0
	20	10	8	6	5	5	4	3	2	2	1	1
	0	15	12	10	9	8	6	5	4	3	2	2
	-20	19	16	13	11	10	8	7	5	4	3	3
	-40	23	19	16	14	12	10	8	6	5	4	3
	-60	26	21	18	16	14	12	10	7	6	5	4
60	40	8	6	5	4	4	3	3	2	1	1	1
	20	14	11	10	8	7	6	5	3	3	2	2
	0	20	16	13	12	10	8	7	5	4	3	3
	-20	25	20	17	15	13	11	9	7	5	4	4
	-40	28	23	20	17	16	13	11	8	6	5	4
	-60	31	26	23	20	18	15	13	9	7	6	5
70	60	4	4	3	3	2	2	1	1	1	1	1
	50	9	7	6	5	4	3	3	2	2	1	1
	40	13	10	8	7	6	5	4	3	2	2	2
	30	16	13	11	9	8	7	6	4	3	3	2
	20	19	16	13	11	10	8	7	5	4	3	3
	10	22	18	15	13	12	10	8	6	5	4	3
	0	25	20	17	15	13	11	9	7	5	4	4
	-20	30	25	21	18	16	13	11	8	7	5	6
	-40	34	28	24	21	19	16	14	10	8	7	6
	-60	37	32	27	24	22	18	16	12	9	8	7

Radius of curvature (n. mile)

Lat.											
70	160	240	330	410	490	650	820	1220	1630	2450	4890
60	180	270	350	440	530	710	880	1330	1770	2650	5310
50	200	300	400	500	600	800	1000	1500	2000	3000	6000
40	240	360	480	600	720	960	1190	1790	2380	3580	7150
30	310	460	610	770	920	1230	1530	2300	3060	4600	9190

Knots

G Kt	C cos A Kt											
80	60	9	8	6	5	5	4	3	2	2	1	1
	50	14	11	9	8	7	6	5	3	3	2	1
	40	18	14	12	10	9	7	6	4	3	2	1
	30	21	17	14	13	11	9	8	6	4	3	2
	20	25	20	17	15	13	11	9	7	5	4	2
	10	28	23	19	17	15	12	10	8	6	4	2
	0	31	25	21	19	17	14	12	8	7	5	2
	-20	36	30	25	22	20	17	14	10	8	6	3
	-40	40	33	29	26	23	19	16	12	10	7	4
	-60	44	37	32	29	26	22	19	14	11	8	4
90	60	15	12	10	9	8	6	5	4	3	2	1
	50	19	15	13	11	10	8	7	5	4	3	1
	40	23	19	16	14	12	10	8	6	5	3	2
	30	27	22	18	16	14	12	10	7	6	4	2
	20	30	25	21	18	16	13	11	8	7	5	2
	10	33	27	23	21	18	15	13	9	7	5	3
	0	36	30	26	23	20	17	14	11	8	6	3
	-20	41	35	30	26	24	20	17	13	10	7	4
	-40	46	39	34	30	27	23	19	14	12	8	4
	-60	50	42	37	33	30	25	22	16	13	9	5
100	60	20	16	14	12	11	9	7	5	4	3	2
	50	24	20	17	15	13	11	9	7	5	4	2
	40	28	23	20	17	16	13	11	8	6	4	2
	30	32	27	23	20	18	15	13	9	7	5	3
	20	36	30	25	22	20	17	14	10	8	6	3
	10	39	32	28	25	22	18	16	12	9	6	3
	0	42	35	30	27	24	20	17	13	10	7	4
	-20	47	40	35	31	28	23	20	15	12	8	5
	-40	52	44	39	34	31	26	23	17	14	10	5
	-60	56	48	42	38	34	29	25	19	15	11	6
110	60	26	21	18	16	14	12	10	7	6	4	2
	50	30	25	21	19	17	14	12	9	7	5	3
	40	34	28	24	21	19	16	14	10	8	6	3
	30	38	32	27	24	22	18	15	11	9	6	3
	20	41	35	30	26	24	20	17	13	10	7	4
	10	45	38	33	29	26	22	19	14	11	8	4
	0	48	40	35	31	28	23	20	15	12	9	5
	-20	54	45	40	35	32	27	23	17	14	10	5
	-40	59	50	44	39	35	30	26	20	16	11	6
	-60	63	54	48	43	39	33	29	22	18	13	7

Radius of curvature (n. mile)

Lat.											
70	160	240	330	410	490	650	820	1220	1630	2450	4890
60	180	270	350	440	530	710	880	1330	1770	2650	5310
50	200	300	400	500	600	800	1000	1500	2000	3000	6000
40	240	360	480	600	720	960	1190	1790	2380	3580	7150
30	310	460	610	770	920	1230	1530	2300	3060	4600	9190

Knots

G Kt	C cos A Kt											
120	60	31	26	23	20	18	15	13	9	7	5	3
	50	36	30	26	23	20	17	15	11	9	6	3
	40	40	33	29	26	23	19	16	12	10	7	4
	30	44	37	32	28	25	21	18	14	11	8	4
	20	47	40	35	31	28	23	20	15	12	8	5
	10	51	43	37	33	30	25	22	16	13	9	5
	0	54	46	40	36	32	27	23	17	14	10	5
	-20	60	51	45	40	36	31	26	20	16	12	6
	-40	65	56	49	44	40	34	29	22	18	13	7
	-60	70	60	53	48	43	37	32	25	20	15	8
130	60	37	32	27	24	22	18	16	12	9	7	3
	50	42	35	31	27	24	20	18	13	10	7	4
	40	46	39	34	30	27	23	19	14	12	8	4
	30	50	42	37	33	29	25	21	16	13	9	5
	20	54	45	40	35	32	27	23	17	14	10	5
	10	57	48	42	38	34	29	25	19	15	11	6
	0	60	51	45	40	36	31	27	20	16	12	6
	-20	66	57	50	45	41	34	30	23	18	13	7
	-40	72	62	54	49	45	38	33	25	20	15	8
	-60	76	66	59	53	48	41	36	28	22	16	9
140	60	44	37	32	29	26	22	19	14	11	8	4
	50	48	41	35	32	28	24	21	15	12	9	5
	40	52	44	39	34	31	26	23	17	14	10	5
	30	56	48	42	37	34	28	25	18	15	11	6
	20	60	51	45	40	36	31	26	20	16	12	6
	10	63	54	48	43	39	33	28	21	17	12	7
	0	67	57	50	45	41	35	30	23	18	13	7
	-20	73	63	55	50	45	38	34	26	21	15	8
	-40	78	68	60	54	49	42	37	28	23	17	9
	-60	83	72	64	58	53	46	40	31	25	18	10
150	60	50	42	37	33	30	25	22	16	13	9	5
	50	54	46	41	36	33	28	24	18	14	10	6
	40	59	50	44	39	35	30	26	20	16	11	6
	30	63	53	47	42	38	32	28	21	17	12	7
	20	66	57	50	47	41	34	30	23	18	13	7
	10	70	60	53	47	43	37	32	24	20	14	8
	0	73	63	56	50	45	39	34	26	21	15	8
	-20	80	69	61	55	50	43	37	29	23	17	9
	-40	85	74	66	59	54	46	41	31	26	19	10
	-60	90	78	70	63	58	50	44	34	28	20	11

Lat.											
70	160	240	330	410	490	570	650	730	820	900	980
60	180	270	350	440	530	620	710	800	880	970	1060
50	200	300	400	500	600	700	800	900	1000	1100	1200
40	240	360	480	600	720	830	960	1070	1190	1310	1430
30	310	460	610	770	920	1070	1230	1380	1530	1690	1840

G Kt	C cos A Kt	Knots										
	60	56	48	42	38	34	31	29	27	25	24	22
	50	61	52	46	41	37	34	31	29	27	26	24
	40	65	56	49	44	40	37	34	32	29	28	26
	30	69	59	52	47	43	39	36	34	32	30	28
	20	73	63	55	50	45	42	38	36	34	32	30
	10	77	66	58	52	48	44	41	38	36	33	32
160	0	80	69	61	55	50	46	43	40	37	35	33
	-10	83	72	64	57	52	48	45	42	39	37	35
	-20	86	75	66	60	55	51	47	44	41	39	37
	-30	89	77	69	62	57	53	49	46	43	40	38
	-40	92	80	71	65	59	55	51	48	45	42	40
	-50	94	82	74	67	61	57	53	49	46	44	41
	-60	97	85	76	69	63	58	54	51	48	45	43
	60	63	54	48	43	39	36	33	31	29	27	25
	50	67	58	51	46	42	38	35	33	31	29	27
	40	72	62	54	49	45	41	38	35	33	31	29
	30	76	65	58	52	47	43	40	38	35	33	31
	20	80	69	61	55	50	46	43	40	37	35	33
	10	83	72	64	57	52	48	45	42	39	37	35
170	0	87	75	67	60	55	51	47	44	41	39	37
	-10	90	78	69	63	57	53	49	46	43	41	39
	-20	93	81	72	65	60	55	51	48	45	43	40
	-30	96	84	75	68	62	57	53	50	47	44	42
	-40	99	86	77	70	64	59	55	52	49	46	44
	-50	101	89	79	72	66	61	57	54	50	48	45
	-60	104	91	82	74	68	63	59	55	52	49	47
	60	70	60	53	48	43	40	37	34	32	30	29
	50	74	64	57	51	46	43	40	37	35	33	31
	40	78	68	60	54	49	45	42	39	37	35	33
	30	82	71	63	57	52	48	45	42	39	37	35
	20	86	75	66	60	55	51	47	44	41	39	37
	10	90	78	69	63	57	53	49	46	43	41	39
180	0	93	81	72	65	60	55	51	48	45	43	40
	-10	97	84	75	68	62	58	54	50	47	45	42
	-20	100	87	78	71	65	60	56	52	49	46	44
	-30	103	90	80	73	67	62	58	54	51	48	46
	-40	106	93	83	75	69	64	60	56	53	50	47
	-50	108	95	85	78	71	66	62	58	55	52	49
	-60	111	98	88	80	74	68	64	60	57	53	51

											Lat.
980	1140	1300	1470	1630	1790	2040	2450	3260	4890	6520	70
1060	1240	1410	1590	1770	1950	2210	2650	3540	5310	7080	60
1200	1400	1600	1800	2000	2200	2500	3000	4000	6000	8000	50
1430	1670	1910	2150	2380	2620	2980	3580	4760	7150	9530	40
1840	2150	2450	2760	3060	3370	3830	4600	6130	9190	12260	30

Knots											C cos A Kt	G Kt
22	20	18	17	15	14	13	11	9	6	5	60	
24	22	20	18	17	15	14	12	9	7	5	50	
26	23	21	20	18	17	15	13	10	7	6	40	
28	25	23	21	19	18	16	14	11	8	6	30	
30	27	24	22	21	19	17	15	12	8	6	20	
32	28	26	24	22	20	19	16	13	9	7	10	
33	30	27	25	23	22	20	17	13	9	7	0	160
35	32	29	27	25	23	21	18	14	10	8	-10	
37	33	30	28	26	24	22	19	15	11	8	-20	
38	35	32	29	27	25	23	20	16	11	9	-30	
40	36	33	30	28	26	24	21	16	12	9	-40	
41	38	34	32	29	27	25	22	17	12	9	-50	
43	39	36	33	31	29	26	23	18	13	10	-60	
25	23	21	19	18	16	15	13	10	7	5	60	
27	25	22	21	19	18	16	14	11	8	6	50	
29	26	24	22	20	19	17	15	12	8	6	40	
31	28	26	24	22	20	18	16	13	9	7	30	
33	30	27	25	23	22	20	17	13	9	7	20	
35	32	29	27	25	23	21	18	14	10	8	10	
37	33	30	28	26	24	22	19	15	11	8	0	170
39	35	32	29	27	25	23	20	16	11	9	-10	
40	36	35	31	28	27	24	21	17	12	9	-20	
42	38	35	32	30	28	25	22	17	12	10	-30	
44	40	36	33	31	29	26	23	18	13	10	-40	
45	41	38	35	32	30	27	24	19	13	10	-50	
47	43	39	36	33	31	28	25	20	14	11	-60	
29	26	24	22	20	19	17	15	11	8	6	60	
31	28	25	23	21	20	18	16	12	9	7	50	
33	30	27	25	23	21	19	17	13	9	7	40	
35	31	29	26	24	23	21	18	14	10	8	30	
37	33	30	28	26	24	22	19	15	11	8	20	
39	35	32	29	27	25	23	20	16	11	9	10	
40	37	33	31	29	27	24	21	17	12	9	0	180
42	38	35	32	30	28	25	22	17	12	10	-10	
44	40	37	34	31	29	27	23	18	13	10	-20	
46	42	38	35	33	30	28	24	19	14	11	-30	
47	43	40	36	34	32	29	25	20	14	11	-40	
49	45	41	38	35	33	31	27	22	15	11	-50	
51	46	42	39	36	34	31	27	22	15	12	-60	

Radius of curvature (n. mile)

Lat.											
70	160	240	330	410	490	570	650	730	820	900	980
60	180	270	350	440	530	620	710	800	880	970	1060
50	200	300	400	500	600	700	800	900	1000	1100	1200
40	240	360	480	600	720	830	960	1070	1190	1310	1430
30	310	460	610	770	920	1070	1230	1380	1530	1690	1840

G Kt	C cos A Kt	Knots										
	60	76	66	59	53	48	44	41	38	36	34	32
	50	81	70	62	56	51	47	44	41	38	36	34
	40	85	74	66	59	54	50	46	43	41	38	36
	30	89	77	69	62	57	53	49	46	43	40	38
	20	93	81	72	65	60	55	51	48	45	43	40
	10	97	84	75	68	62	58	54	50	47	45	42
190	0	100	87	78	71	65	60	56	52	49	47	44
	-10	104	91	81	73	67	62	58	55	51	49	46
	-20	107	93	84	76	70	65	60	57	53	50	48
	-30	110	96	86	79	72	67	63	59	55	52	50
	-40	113	99	89	81	75	69	65	61	57	54	51
	-50	116	102	91	83	77	71	67	63	59	56	53
	-60	118	104	94	86	79	73	69	64	61	58	55
	60	83	72	64	58	53	49	46	43	40	38	36
	50	88	76	68	61	56	52	48	45	42	40	38
	40	92	80	71	65	59	55	51	48	45	42	40
	30	96	84	75	68	62	57	53	50	47	44	42
	20	100	87	78	71	65	60	56	52	49	46	44
	10	104	91	81	73	67	62	58	55	51	49	46
200	0	107	94	84	76	70	65	61	57	54	51	48
	-10	111	97	87	79	73	67	63	59	56	53	50
	-20	114	100	90	82	75	70	65	61	58	55	52
	-30	117	103	92	84	78	72	67	63	60	56	54
	-40	120	106	95	87	80	74	69	65	62	58	55
	-50	123	108	97	89	82	76	71	67	63	60	57
	-60	125	111	100	91	84	79	74	69	65	62	59

Values of C cos A

C	10	15	20	25	30	35	40	45	50	55	60
A											
10°	10	15	20	25	30	34	39	44	49	54	59
20°	9	14	19	23	28	33	38	42	47	52	56
30°	9	13	17	22	26	30	35	39	43	48	52
35°	8	12	16	20	25	29	33	37	41	45	49
40°	8	11	15	19	23	27	31	34	38	42	46
45°	7	11	14	18	21	25	28	32	35	39	42
50°	6	10	13	16	19	22	26	29	32	35	39

Subtract correction

Radius of curvature (N.mile)

											Lat.
980	1140	1300	1470	1630	1790	2040	2450	3260	4890	6520	70
1060	1240	1410	1590	1770	1950	2210	2650	3540	5310	7080	60
1200	1400	1600	1800	2000	2200	2500	3000	4000	6000	8000	50
1430	1670	1910	2150	2380	2620	2980	3580	4760	7150	9530	40
1840	2150	2450	2760	3060	3370	3830	4600	6130	9190	12260	30

Knots											C cos A Kt	G Kt
32	29	26	24	22	21	19	16	13	9	7	60	
34	31	28	26	24	22	20	18	14	10	8	50	
36	33	30	28	26	24	22	19	15	10	8	40	
38	35	32	29	27	25	23	20	16	11	9	30	
40	36	33	31	28	27	24	21	17	12	9	20	
42	38	35	32	30	28	25	22	17	12	10	10	
44	40	37	34	31	29	27	23	18	13	10	0	190
46	42	38	35	33	31	28	24	19	14	11	-10	
48	43	40	37	34	32	29	25	20	14	11	-20	
50	45	41	38	36	33	30	26	21	15	12	-30	
51	47	43	40	37	34	31	27	22	16	12	-40	
53	48	44	41	38	36	33	28	23	16	13	-50	
55	50	46	42	39	37	34	29	24	17	13	-60	
36	32	29	27	25	23	21	18	15	10	8	60	
38	34	31	29	27	25	23	20	15	11	8	50	
40	36	33	30	28	26	24	21	16	12	9	40	
42	38	35	32	30	28	25	22	17	12	10	30	
44	40	37	34	31	29	27	23	18	13	10	20	
46	42	38	35	33	31	28	24	19	14	11	10	
48	44	40	37	34	32	29	25	20	14	11	0	200
50	45	42	38	36	33	30	26	21	15	12	-10	
52	47	43	40	37	35	32	28	22	16	12	-20	
54	49	45	41	39	36	33	29	23	16	13	-30	
55	50	46	43	40	37	34	30	24	17	13	-40	
57	52	48	44	41	39	35	31	25	18	14	-50	
59	54	49	46	43	40	36	32	26	18	14	-60	

Values of C cos A

C	10	15	20	25	30	35	40	45	50	55	60
A											
55°	6	9	11	14	17	20	23	26	29	32	34
60°	5	7	10	13	15	17	20	23	25	27	30
65°	4	6	8	11	13	15	17	19	21	23	25
70°	3	5	7	9	10	12	14	15	17	19	21
75°	3	4	5	6	8	9	10	12	13	14	16
80°	2	3	3	4	5	6	7	8	9	10	10
85°	1	1	2	2	3	3	3	4	4	5	5

Lat.											
70	240	330	410	490	570	650	730	820	980	1220	1630
60	270	350	440	530	620	710	800	880	1060	1330	1770
50	300	400	500	600	700	800	900	1000	1200	1500	2000
40	360	480	600	720	830	960	1070	1190	1430	1790	2380
30	460	610	770	920	1070	1230	1380	1530	1840	2300	3060

G Kt	C cos A Kt	Knots										
20	10	2	2	1	1	1	1	1	1	0	0	0
	0	5	3	3	2	2	1	1	1	1	1	1
	-10	10	6	4	3	3	2	2	2	1	1	1
	-20	20	9	6	5	4	3	3	2	2	1	1
	-30	-	13	8	6	5	4	3	3	2	2	1
	-40	-	20	11	8	6	5	4	4	3	2	2
30	20	4	3	2	2	1	1	1	1	1	1	0
	10	10	6	4	3	3	2	2	2	1	1	1
	0	27	10	7	5	4	3	3	3	2	2	1
	-10	-	16	10	7	6	5	4	4	3	2	2
	-20	-	29	14	10	8	6	5	5	4	3	2
	-30	-	-	20	13	10	8	7	6	5	4	3
	-40	-	-	30	17	12	10	8	7	6	4	3
	-50	-	-	-	22	15	12	10	8	7	5	3
	-60	-	-	-	30	19	14	12	10	8	6	4
40	30	6	4	3	2	2	1	1	1	1	1	1
	20	20	9	6	5	4	3	3	2	2	1	1
	10	-	16	10	7	6	5	4	4	3	2	2
	0	-	36	15	11	8	7	6	5	4	3	2
	-10	-	-	23	15	11	9	8	7	5	4	3
	-20	-	-	39	20	14	11	10	8	6	5	3
	-30	-	-	-	27	18	14	12	10	8	6	4
	-40	-	-	-	39	23	17	14	12	9	7	5
	-50	-	-	-	-	30	21	17	14	11	8	5
	-60	-	-	-	-	39	26	20	16	12	9	6
50	40	10	5	4	3	2	2	2	1	1	1	1
	30	-	13	8	6	5	4	3	3	2	2	1
	20	-	29	14	10	8	6	5	5	4	3	2
	10	-	-	23	15	11	9	8	7	5	4	3
	0	-	-	45	21	15	12	10	9	7	5	4
	-10	-	-	-	30	20	15	13	11	8	6	4
	-20	-	-	-	49	26	19	16	13	10	7	5
	-30	-	-	-	-	34	24	19	16	12	9	6
	-40	-	-	-	-	49	30	23	19	14	10	7
	-50	-	-	-	-	-	37	27	22	16	11	8
	-60	-	-	-	-	-	49	33	26	18	13	9

ANTICYCLONIC CURVATURE – Add correction

Radius of curvature (n mile)

Lat.											
70	410	490	570	650	730	820	900	980	1220	1630	2040
60	440	530	620	710	800	880	970	1060	1330	1770	2210
50	500	600	700	800	900	1000	1100	1200	1500	2000	2500
40	600	720	830	960	1070	1190	1310	1430	1790	2380	2980
30	770	920	1070	1230	1380	1530	1690	1840	2300	3060	3830

G Kt	C cos A Kt	Knots										
60	50	5	4	3	2	2	2	2	1	1	1	1
	40	11	8	6	5	4	4	3	3	2	2	1
	30	20	13	10	8	7	6	5	5	4	3	2
	20	39	20	14	11	10	8	7	6	5	3	3
	10	-	30	20	15	13	11	9	8	6	4	3
	0	-	54	27	20	16	13	12	10	8	5	4
	-10	-	-	37	25	20	16	14	12	9	6	5
	-20	-	-	58	32	24	20	17	15	11	7	6
	-30	-	-	-	42	30	24	20	17	12	8	6
	-40	-	-	-	59	36	28	23	20	14	9	7
	-50	-	-	-	-	45	33	27	23	16	11	8
	-60	-	-	-	-	59	40	31	26	18	12	9
70	60	6	4	4	3	3	2	2	2	1	1	1
	50	15	10	8	6	5	5	4	4	3	2	2
	40	30	17	12	10	8	7	6	6	4	3	2
	30	-	27	18	14	12	10	9	8	6	4	3
	20	-	49	26	19	16	13	11	10	7	5	4
	10	-	-	37	25	20	16	14	12	9	6	5
	0	-	-	63	33	25	20	17	15	11	7	6
	-10	-	-	-	44	31	25	21	18	13	9	7
	-20	-	-	-	67	39	30	25	21	15	10	8
	-30	-	-	-	-	49	36	29	24	17	11	8
	-40	-	-	-	-	68	43	34	28	19	13	9
	-50	-	-	-	-	-	53	40	32	22	14	10
	-60	-	-	-	-	-	69	47	37	24	16	12
80	60	20	12	9	7	6	5	5	4	3	2	2
	50	-	22	15	12	10	8	7	7	5	3	3
	40	-	39	23	17	14	12	10	9	7	5	4
	30	-	-	34	24	19	16	13	12	9	6	5
	20	-	-	58	32	24	20	17	15	11	7	6
	10	-	-	-	44	31	25	21	18	13	9	7
	0	-	-	-	72	40	30	25	21	15	10	8
	-10	-	-	-	-	52	37	30	25	17	12	9
	-20	-	-	-	-	77	46	35	29	20	13	10
	-30	-	-	-	-	-	57	42	34	23	15	11
	-40	-	-	-	-	-	78	50	40	26	16	12
	-50	-	-	-	-	-	-	61	46	29	18	13
	-60	-	-	-	-	-	-	78	54	32	20	15

Radius of curvature (n mile)

Lat.											
70	490	570	650	730	820	900	980	1060	1140	1220	1300
60	530	620	710	800	880	970	1060	1150	1240	1330	1410
50	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
40	720	830	960	1070	1190	1310	1430	1550	1670	1790	1910
30	920	1070	1230	1380	1530	1690	1840	1990	2150	2300	2450

G Kt	C cos A Kt					Knots						
	60	30	19	14	12	10	9	8	7	6	6	5
	50	-	30	21	17	14	12	11	9	9	8	7
	40	-	49	30	23	19	16	14	12	11	10	9
	30	-	-	42	30	24	20	17	15	14	12	11
	20	-	-	67	39	30	25	21	18	16	15	13
	10	-	-	-	52	37	30	25	22	19	17	16
90	0	-	-	-	81	46	36	30	26	23	20	18
	-10	-	-	-	-	59	43	35	30	26	23	21
	-20	-	-	-	-	86	52	41	35	30	26	24
	-30	-	-	-	-	-	65	48	40	34	30	27
	-40	-	-	-	-	-	88	57	46	39	34	30
	-50	-	-	-	-	-	-	69	53	44	38	33
	-60	-	-	-	-	-	-	88	61	50	42	37
	60	-	39	26	20	16	14	12	11	10	9	8
	50	-	-	37	27	22	18	16	14	13	11	10
	40	-	-	59	36	28	23	20	17	16	14	13
	30	-	-	-	49	36	29	24	21	19	17	15
	20	-	-	-	77	46	35	29	25	22	20	18
	10	-	-	-	-	59	43	35	30	26	23	21
100	0	-	-	-	-	90	53	42	35	30	27	24
	-10	-	-	-	-	-	67	50	41	35	30	27
	-20	-	-	-	-	-	95	59	47	40	35	31
	-30	-	-	-	-	-	-	73	55	45	39	34
	-40	-	-	-	-	-	-	97	65	52	44	39
	-50	-	-	-	-	-	-	-	77	60	50	43
	-60	-	-	-	-	-	-	-	98	69	56	48
	60	-	-	49	33	26	21	18	16	14	13	12
	50	-	-	-	45	33	27	23	20	18	16	14
	40	-	-	-	68	43	34	28	24	21	19	17
	30	-	-	-	-	57	42	34	29	25	23	20
	20	-	-	-	-	86	52	41	35	30	26	24
	10	-	-	-	-	-	67	50	41	35	30	27
110	0	-	-	-	-	-	99	60	48	40	35	31
	-10	-	-	-	-	-	-	75	56	46	40	35
	-20	-	-	-	-	-	-	105	67	53	45	39
	-30	-	-	-	-	-	-	-	81	62	51	44
	-40	-	-	-	-	-	-	-	106	72	58	50
	-50	-	-	-	-	-	-	-	-	85	66	56
	-60	-	-	-	-	-	-	-	-	107	76	62

Radius of curvature (n. mile)

											Lat.
1300	1390	1470	1630	1790	2040	2450	2850	3260	4080	4890	70
1410	1500	1590	1770	1950	2210	2650	3100	3540	4420	5310	60
1600	1700	1800	2000	2200	2500	3000	3500	4000	5000	6000	50
1910	2030	2150	2380	2620	2980	3580	4170	4760	5960	7150	40
2450	2600	2760	3060	3370	3830	4600	5360	6130	7660	9190	30

				Knots							C cos A Kt	V g Kt
5	5	4	4	3	2	2	2	1	1		60	
7	7	6	5	5	4	3	3	2	2		50	
9	8	8	7	6	5	4	4	3	2		40	
11	10	10	8	7	6	5	4	4	3		30	
13	12	11	10	9	8	6	5	4	3		20	
16	14	13	12	10	9	7	6	5	4		10	
18	17	15	13	12	10	8	7	6	4	4	0	90
21	19	17	15	13	11	9	7	6	5	4	-10	
24	22	20	17	15	13	10	8	7	6	4	-20	
27	24	22	19	16	14	11	9	8	6	5	-30	
30	27	25	21	18	15	12	10	9	7	5	-40	
33	30	27	23	20	17	13	11	9	7	6	-50	
37	33	30	25	22	18	14	12	10	8	6	-60	
8	7	7	6	5	5	4	3	3	2	2	60	
10	10	9	8	7	6	5	4	3	3	2	50	
13	12	11	9	8	7	6	5	4	3	3	40	
15	14	13	11	10	8	7	6	5	4	3	30	
18	16	15	13	12	10	8	7	6	4	4	20	
21	19	17	15	13	11	9	7	6	5	4	10	
24	22	20	17	15	13	10	8	7	6	5	0	100
27	25	22	19	17	14	11	9	8	6	5	-10	
31	28	25	21	19	16	12	10	9	7	6	-20	
34	31	28	24	21	17	14	11	10	7	6	-30	
39	34	31	26	23	19	15	12	10	8	6	-40	
43	38	34	29	25	20	16	13	11	9	7	-50	
48	42	38	31	27	22	17	14	12	9	7	-60	
12	11	10	9	8	7	5	4	4	3	2	60	
14	13	12	11	9	8	6	5	5	4	3	50	
17	16	15	13	11	9	8	6	5	4	3	40	
20	19	17	15	13	11	9	7	6	5	4	30	
24	22	20	17	15	13	10	8	7	6	4	20	
27	25	22	19	17	14	11	9	8	6	5	10	
31	28	25	22	19	16	12	10	9	7	6	0	110
35	31	28	24	21	17	14	11	10	7	6	-10	
39	35	32	27	23	19	15	12	11	8	7	-20	
44	39	35	29	25	21	16	14	11	9	7	-30	
50	44	39	32	28	23	18	15	12	10	8	-40	
56	48	43	35	30	25	19	16	13	10	8	-50	
62	54	47	39	33	27	21	17	14	11	9	-60	

Radius of curvature (n. mile)

Lat.											
70	820	900	980	1060	1140	1220	1300	1390	1470	1550	1630
60	880	970	1060	1150	1240	1330	1410	1500	1590	1680	1770
50	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
40	1190	1310	1430	1550	1670	1790	1910	2030	2150	2270	2380
30	1530	1690	1840	1990	2150	2300	2450	2600	2760	2910	3060

Knots

G Kt	C cos A Kt											
	60	40	31	26	23	20	18	16	15	14	13	12
	50	53	40	32	28	24	22	19	18	16	15	14
	40	78	50	40	33	29	26	23	21	19	18	16
	30	–	65	48	40	34	30	27	24	22	20	19
	20	–	95	59	47	40	35	31	28	25	23	21
	10	–	–	75	56	46	40	35	31	28	26	24
120	0	–	–	108	67	54	46	40	35	32	29	27
	-10	–	–	–	83	63	52	45	40	36	33	30
	-20	–	–	–	114	74	60	51	45	40	36	33
	-30	–	–	–	–	89	68	57	50	44	40	36
	-40	–	–	–	–	116	79	65	55	49	44	40
	-50	–	–	–	–	–	94	73	62	54	48	44
	-60	–	–	–	–	–	117	84	69	60	53	48
	60	69	47	37	31	27	24	22	20	18	17	16
	50	–	61	46	38	33	29	26	23	21	20	18
	40	–	88	57	46	39	34	30	27	25	23	21
	30	–	–	73	55	45	39	34	31	28	26	24
	20	–	–	105	67	53	45	39	35	32	29	27
	10	–	–	–	83	63	52	45	40	36	33	30
130	0	–	–	–	117	74	60	51	45	40	36	33
	-10	–	–	–	–	91	69	58	50	45	40	37
	-20	–	–	–	–	123	81	66	56	50	45	40
	-30	–	–	–	–	–	97	75	63	55	49	44
	-40	–	–	–	–	–	125	87	71	61	54	49
	-50	–	–	–	–	–	–	102	80	68	60	53
	-60	–	–	–	–	–	–	126	91	76	66	58
	60	–	78	54	43	37	32	28	26	23	22	20
	50	–	–	69	53	44	38	33	30	27	25	23
	40	–	–	97	65	52	44	39	34	31	28	26
	30	–	–	–	81	62	51	44	39	35	32	29
	20	–	–	–	114	74	60	51	45	40	36	33
	10	–	–	–	–	91	69	58	50	45	40	37
140	0	–	–	–	–	126	82	66	57	50	45	41
	-10	–	–	–	–	–	99	76	64	56	50	45
	-20	–	–	–	–	–	132	88	72	62	55	49
	-30	–	–	–	–	–	–	105	82	69	61	54
	-40	–	–	–	–	–	–	135	94	78	67	60
	-50	–	–	–	–	–	–	–	110	87	74	65
	-60	–	–	–	–	–	–	–	136	99	82	72

– Add correction

Radius of curvature (n. mile)

											Lat.
1630	1710	1790	1880	1960	2040	2280	2450	3260	4080	4890	70
1770	1860	1950	2030	2120	2210	2480	2650	3540	4420	5310	60
2000	2100	2200	2300	2400	2500	2800	3000	4000	5000	6000	50
2380	2500	2620	2740	2860	2980	3340	3580	4760	5960	7150	40
3060	3220	3370	3520	3680	3830	4290	4600	6130	7660	9190	30

Knots											C Cos A Kt	G Kt
12	11	10	10	9	9	8	7	5	4	3	60	
14	13	12	12	11	10	9	8	6	5	4	50	
16	15	14	14	13	12	11	10	7	5	4	40	
19	18	16	15	15	14	12	11	8	6	5	30	
21	20	19	18	17	16	13	12	9	7	6	20	
24	22	21	20	18	17	15	14	10	7	6	10	
27	25	23	22	21	19	17	15	11	8	7	0	120
30	28	26	24	23	21	18	17	12	9	7	-10	
33	30	28	26	25	23	20	18	13	10	8	-20	
36	33	31	29	27	25	22	20	14	10	8	-30	
40	37	34	31	29	28	23	21	15	11	9	-40	
44	40	37	34	32	30	25	23	16	12	10	-50	
45	43	40	37	34	32	27	25	17	13	10	-60	
16	14	14	13	12	12	10	9	7	5	4	60	
18	17	16	15	14	13	12	11	7	6	5	50	
21	19	18	17	16	15	13	12	9	7	5	40	
24	22	21	19	18	17	15	14	10	7	6	30	
27	25	23	22	20	19	17	15	11	8	7	20	
30	28	26	24	23	21	18	17	12	9	7	10	
33	31	28	27	25	23	20	18	13	10	8	0	130
37	34	31	29	27	26	22	20	14	11	9	-10	
40	37	34	32	30	28	24	22	15	11	9	-20	
44	41	37	35	32	30	26	23	16	12	10	-30	
49	44	41	38	35	33	28	25	17	14	11	-40	
53	48	44	41	38	36	30	27	18	15	11	-50	
58	53	48	44	41	38	32	29	20	15	12	-60	
20	19	17	16	15	15	13	12	8	6	5	60	
23	21	20	19	18	17	14	13	9	7	6	50	
26	24	23	21	20	19	16	15	10	8	6	40	
29	27	25	24	22	21	18	16	11	9	7	30	
33	30	28	26	25	23	20	18	13	10	8	20	
37	34	31	29	27	26	22	20	14	11	9	10	
41	37	35	32	30	28	24	22	15	11	9	0	140
45	41	38	35	33	31	26	24	16	12	10	-10	
49	45	41	38	36	33	28	26	17	13	11	-20	
54	49	45	42	39	36	30	27	19	14	11	-30	
60	54	49	45	42	39	33	30	20	15	12	-40	
65	59	55	49	45	42	35	32	21	16	13	-50	
72	64	58	53	49	45	38	34	23	17	14	-60	

Radius of curvature (n. mile)

Lat.											
70	980	1060	1140	1220	1300	1390	1470	1550	1630	1710	1790
60	1060	1150	1240	1330	1410	1500	1590	1680	1770	1860	1950
50	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
40	1430	1550	1670	1790	1910	2030	2150	2270	2380	2500	2620
30	1840	1990	2150	2300	2450	2600	2760	2910	3060	3220	3370

G Kt	C cos A Kt	Knots										
	60	88	61	50	42	37	33	30	27	25	23	22
	50	-	77	60	50	43	38	34	31	29	27	25
	40	-	106	72	58	50	44	39	35	32	30	28
	30	-	-	89	68	57	50	44	40	36	33	31
	20	-	-	123	81	66	56	50	45	40	37	34
	10	-	-	-	99	76	64	56	50	45	41	38
150	0	-	-	-	135	89	73	63	55	50	45	42
	-10	-	-	-	-	107	83	70	61	55	50	46
	-20	-	-	-	-	141	96	79	68	60	55	50
	-30	-	-	-	-	-	113	89	76	67	60	54
	-40	-	-	-	-	-	144	102	84	73	65	59
	-50	-	-	-	-	-	-	118	94	81	71	64
	-60	-	-	-	-	-	-	146	107	89	78	70
	60	-	98	69	56	48	42	38	34	31	29	27
	50	-	-	85	66	56	48	43	39	35	33	30
	40	-	-	116	79	65	55	49	44	40	37	34
	30	-	-	-	97	75	63	55	49	44	41	37
	20	-	-	-	132	88	72	62	55	49	45	41
	10	-	-	-	-	107	83	70	61	55	50	46
160	0	-	-	-	-	144	96	79	69	61	55	50
	-10	-	-	-	-	-	115	90	76	67	60	55
	-20	-	-	-	-	-	150	103	86	74	66	60
	-30	-	-	-	-	-	-	121	96	82	72	65
	-40	-	-	-	-	-	-	153	109	91	79	71
	-50	-	-	-	-	-	-	-	127	102	87	77
	-60	-	-	-	-	-	-	-	153	114	96	84
	60	-	-	107	76	62	54	47	43	39	35	33
	50	-	-	-	94	73	62	54	48	44	40	37
	40	-	-	-	125	87	71	61	54	49	44	41
	30	-	-	-	-	105	82	69	61	54	49	45
	20	-	-	-	-	141	96	79	68	60	55	50
	10	-	-	-	-	-	115	90	76	67	60	55
170	0	-	-	-	-	-	153	104	86	75	66	60
	-10	-	-	-	-	-	-	123	97	83	73	66
	-20	-	-	-	-	-	-	160	111	92	80	72
	-30	-	-	-	-	-	-	-	129	103	89	78
	-40	-	-	-	-	-	-	-	163	117	98	86
	-50	-	-	-	-	-	-	-	-	135	109	94
	-60	-	-	-	-	-	-	-	-	164	122	103

Radius of curvature (n. mile)

											Lat.
1790	1880	1960	2040	2120	2280	2450	3260	4080	4890	5710	70
1950	2030	2120	2210	2300	2480	2650	3540	4420	5310	6190	60
2200	2300	2400	2500	2600	2800	3000	4000	5000	6000	7000	50
2620	2740	2860	2980	3100	3340	3580	4760	5960	7150	8340	40
3370	3520	3680	3830	3980	4290	4600	6130	7660	9190	10730	30

Knots											C cos A Kt	G Kt
22	20	19	18	17	16	14	10	8	6	5	60	
25	23	22	20	19	18	16	11	9	7	6	50	
28	26	24	23	22	20	18	12	10	8	6	40	
31	29	27	25	24	22	20	14	10	8	7	30	
34	32	30	28	26	24	22	15	11	9	8	20	
38	35	33	31	29	26	24	16	12	10	8	10	
42	39	36	34	32	28	26	17	13	11	9	0	150
46	42	39	37	34	31	28	19	14	12	10	-10	
50	46	42	40	37	33	30	20	15	12	10	-20	
54	50	46	43	40	36	32	22	16	13	11	-30	
59	54	50	46	43	38	34	23	17	14	12	-40	
64	58	54	50	46	41	37	24	18	15	12	-50	
70	63	58	53	50	44	39	26	19	16	13	-60	
27	25	24	22	21	19	17	12	9	7	6	60	
30	28	26	25	23	21	19	13	10	8	7	50	
34	31	29	28	26	23	21	15	11	9	8	40	
37	35	32	30	29	26	23	16	12	10	8	30	
41	38	36	33	31	28	26	17	13	11	9	20	
46	42	39	37	34	31	28	19	14	12	10	10	
50	46	43	40	37	33	30	20	15	12	10	0	160
55	50	46	43	40	36	32	22	16	13	11	-10	
60	55	50	47	44	39	35	23	17	14	12	-20	
65	59	54	50	47	42	37	25	19	15	12	-30	
71	64	59	54	51	45	40	26	20	16	13	-40	
77	70	63	59	54	48	42	28	21	17	14	-50	
84	75	68	63	58	51	45	29	22	18	15	-60	
33	31	29	27	25	23	21	14	11	9	7	60	
37	34	32	30	28	25	23	16	12	10	8	50	
41	38	35	33	31	28	25	17	13	11	9	40	
45	42	39	36	34	30	27	19	14	11	10	30	
50	46	42	40	37	33	30	20	15	12	10	20	
55	50	46	43	40	36	32	22	16	13	11	10	
60	55	51	47	44	39	35	23	18	14	12	0	170
66	60	55	51	47	42	38	25	19	15	13	-10	
72	65	59	55	51	45	40	27	20	16	13	-20	
78	71	64	59	55	48	43	28	21	17	14	-30	
86	77	70	64	59	52	46	30	22	18	15	-40	
94	83	75	69	63	55	49	32	23	19	16	-50	
103	91	81	74	68	59	52	33	25	20	16	-60	

ANTICYCLONIC CURVATURE

Radius of curvature (n. mile)

Lat.											
70	1220	1300	1390	1470	1550	1630	1710	1790	1880	1960	2040
60	1330	1410	1500	1590	1680	1770	1860	1950	2030	2120	2210
50	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500
40	1790	1910	2030	2150	2270	2380	2500	2620	2740	2860	2980
30	2300	2450	2600	2760	2910	3060	3220	3370	3520	3680	3830

G Kt	C cos A Kt					Knots						
	60	117	84	69	60	53	48	43	40	37	34	32
	50	-	102	80	68	60	53	48	44	41	38	36
	40	-	135	94	78	67	60	54	49	45	42	39
	30	-	-	113	89	76	67	60	54	50	46	43
	20	-	-	150	103	86	74	66	60	55	50	47
	10	-	-	-	123	97	83	73	66	60	55	51
180	0	-	-	-	162	111	93	81	72	65	60	55
	-10	-	-	-	-	131	104	89	79	71	65	60
	-20	-	-	-	-	169	119	99	87	77	70	64
	-30	-	-	-	-	-	138	111	95	84	76	70
	-40	-	-	-	-	-	172	125	105	92	82	75
	-50	-	-	-	-	-	-	143	116	100	89	81
	-60	-	-	-	-	-	-	174	130	110	97	87
	60	-	126	91	76	66	58	53	48	44	41	38
	50	-	-	110	87	74	65	59	53	49	45	42
	40	-	-	144	102	84	73	65	59	54	50	46
	30	-	-	-	121	96	82	72	65	59	54	50
	20	-	-	-	160	111	92	80	72	65	59	55
	10	-	-	-	-	131	104	89	79	71	65	60
190	0	-	-	-	-	171	119	100	87	78	70	65
	-10	-	-	-	-	-	139	111	96	85	77	70
	-20	-	-	-	-	-	178	126	106	93	83	76
	-30	-	-	-	-	-	-	146	118	102	90	82
	-40	-	-	-	-	-	-	181	132	112	98	88
	-50	-	-	-	-	-	-	-	152	124	107	96
	-60	-	-	-	-	-	-	-	183	138	117	103
	60	-	-	136	99	82	72	64	58	53	49	45
	50	-	-	-	118	94	81	71	64	58	54	50
	40	-	-	-	153	109	91	79	71	64	59	54
	30	-	-	-	-	129	103	89	78	71	64	59
	20	-	-	-	-	169	119	99	87	77	70	64
	10	-	-	-	-	-	139	111	96	85	77	70
200	0	-	-	-	-	-	180	127	106	93	83	76
	-10	-	-	-	-	-	-	147	119	102	91	82
	-20	-	-	-	-	-	-	187	134	113	99	89
	-30	-	-	-	-	-	-	-	154	125	108	97
	-40	-	-	-	-	-	-	-	191	140	119	105
	-50	-	-	-	-	-	-	-	-	160	131	114
	-60	-	-	-	-	-	-	-	-	193	146	124

- Add correction

Radius of curvature (n. mile)

										Lat.
2040	2120	2280	2450	2850	3260	4080	4890	5710	6520	70
2210	2300	2480	2650	3100	3540	4420	5310	6190	7080	60
2500	2600	2800	3000	3500	4000	5000	6000	7000	8000	50
2980	3100	3340	3580	4170	4760	5960	7150	8340	9530	40
3830	3980	4290	4600	5360	6130	7660	9190	10730	12260	30

				Knots						C cos A Kt	G Kt
32	30	27	25	20	17	13	10	9	7	60	
36	33	30	27	22	18	14	11	9	8	50	
39	37	33	30	24	20	15	12	10	9	40	
43	40	36	32	26	22	16	13	11	9	30	
47	44	39	35	28	23	17	14	12	10	20	
51	47	42	38	30	25	19	15	13	11	10	
55	51	45	40	32	27	20	16	13	11	0	180
60	55	49	43	34	28	21	17	14	12	-10	
64	60	52	46	36	30	22	18	15	13	-20	
70	64	56	49	39	32	24	19	16	13	-30	
75	69	60	53	41	34	25	20	17	14	-40	
81	74	64	56	44	36	26	21	17	15	-50	
87	80	68	60	46	38	28	22	18	16	-60	
38	36	32	29	23	20	15	12	10	9	60	
42	40	35	32	25	21	16	13	11	9	50	
46	43	38	34	28	23	17	14	12	10	40	
50	47	42	37	30	25	19	15	12	11	30	
55	51	45	40	32	27	20	16	13	11	20	
60	55	49	43	34	28	21	17	14	12	10	
65	60	52	46	37	30	23	18	15	13	0	190
70	65	56	50	39	32	24	19	16	14	-10	
76	70	60	53	41	34	25	20	17	14	-20	
82	75	64	57	44	36	27	21	18	15	-30	
88	81	69	60	47	38	28	22	18	16	-40	
96	87	74	64	49	40	29	23	19	17	-50	
103	93	79	68	52	42	31	24	20	17	-60	
45	42	38	34	27	23	17	14	11	10	60	
50	46	41	37	29	24	18	15	12	11	50	
54	51	45	40	32	26	20	16	13	11	40	
59	55	48	43	34	28	21	17	14	12	30	
60	60	52	46	36	30	22	18	15	13	20	
70	65	56	50	39	32	24	19	16	14	10	
76	70	60	53	42	34	25	20	17	14	0	200
82	75	65	57	44	36	27	21	18	15	-10	
89	81	69	61	47	38	28	22	19	16	-20	
97	88	74	65	50	41	30	24	20	17	-30	
105	94	80	69	53	43	31	25	20	17	-40	
114	102	85	74	56	45	33	26	21	18	-50	
124	110	91	78	59	47	34	27	22	19	-60	