

118

TABLE 5 Meridional Parts											
Lat.	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	Lat.
0	1876.9	1946.2	2016.2	2087.0	2158.6	2231.1	2304.5	2378.8	2454.1	2530.4	0
1	78.0	47.3	17.4	88.2	59.8	32.3	05.7	80.0	55.3	31.7	1
2	79.2	48.5	18.5	89.4	61.0	33.5	06.9	81.3	56.6	33.0	2
3	80.3	49.6	19.7	90.5	62.2	34.7	08.1	82.5	57.9	34.3	3
4	81.5	50.8	20.9	91.7	63.4	35.9	09.4	83.8	59.1	35.6	4
5	1882.6	1952.0	2022.1	2092.9	2164.6	2237.2	2310.6	2385.0	2460.4	2536.8	5
6	83.8	53.1	23.2	94.1	65.8	38.4	11.8	85.3	61.7	38.1	6
7	84.9	54.3	24.4	95.3	67.0	39.6	13.1	87.5	62.9	39.4	7
8	86.1	55.4	25.6	96.5	68.2	40.8	14.3	88.8	64.2	40.7	8
9	87.2	56.6	26.8	97.7	69.4	42.0	15.5	90.0	65.5	42.0	9
10	1888.4	1957.8	2027.9	2098.9	2170.6	2243.2	2316.8	2391.3	2466.7	2543.3	10
11	89.5	58.9	29.1	2100.1	71.8	44.5	18.0	92.5	68.0	44.5	11
12	90.7	60.1	30.3	01.2	73.0	45.7	19.2	93.8	69.3	45.8	12
13	91.8	61.3	31.5	02.4	74.2	46.9	20.5	95.0	70.5	47.1	13
14	93.0	62.4	32.6	03.6	75.4	48.1	21.7	96.3	71.8	48.4	14
15	1894.1	1963.6	2033.8	2104.8	2176.6	2249.3	2322.9	2397.5	2473.1	2549.7	15
16	95.3	64.8	35.0	06.0	77.8	50.6	24.2	2398.8	74.3	51.0	16
17	96.4	65.9	36.2	07.2	79.0	51.8	25.4	2400.0	75.6	52.3	17
18	97.6	67.1	37.3	08.4	80.3	53.0	26.6	01.3	76.9	53.6	18
19	98.7	68.2	38.5	09.6	81.5	54.2	27.9	02.5	78.1	54.8	19
20	1899.9	1969.4	2039.7	2110.8	2182.7	2255.4	2329.1	2403.8	2479.4	2556.1	20
21	1901.0	70.6	40.9	12.0	83.9	56.7	30.4	05.0	80.7	57.4	21
22	02.2	71.7	42.1	13.1	85.1	57.9	31.6	06.3	82.0	58.7	22
23	03.3	72.9	43.2	14.3	86.3	59.1	32.8	07.5	83.2	60.0	23
24	04.5	74.1	44.4	15.5	87.5	60.3	34.1	08.8	84.5	61.3	24
25	1905.6	1975.2	2045.6	2116.7	2188.7	2261.5	2335.3	2410.0	2485.8	2562.6	25
26	06.8	76.4	46.8	17.9	89.9	62.8	36.5	11.3	87.0	63.9	26
27	08.0	77.6	47.9	19.1	91.1	64.0	37.8	12.5	88.3	65.1	27
28	09.1	78.7	49.1	20.3	92.3	65.2	39.0	13.8	89.6	66.4	28
29	10.3	79.9	50.3	21.5	93.5	66.4	40.3	15.0	90.9	67.7	29
30	1911.4	1981.1	2051.5	2122.7	2194.7	2267.6	2341.5	2416.3	2492.1	2569.0	30
31	12.6	82.2	52.7	23.9	95.9	68.9	42.7	17.6	93.4	70.3	31
32	13.7	83.4	53.8	25.1	97.1	70.1	44.0	18.8	94.7	71.6	32
33	14.9	84.6	55.0	26.3	98.4	71.3	45.2	20.1	95.9	72.9	33
34	16.0	85.7	56.2	27.5	2199.6	72.5	46.4	21.3	97.2	74.2	34
35	1917.2	1986.9	2057.4	2128.7	2200.8	2273.8	2347.7	2422.6	2498.5	2575.5	35
36	18.4	88.1	58.6	29.9	02.0	75.0	48.9	23.8	2499.8	76.8	36
37	19.5	89.2	59.7	31.1	03.2	76.2	50.2	25.1	2501.0	78.1	37
38	20.7	90.4	60.9	32.2	04.4	77.4	51.4	26.3	02.3	79.4	38
39	21.8	91.6	62.1	33.4	05.6	78.7	52.6	27.6	03.6	80.6	39
40	1923.0	1992.8	2063.3	2134.6	2206.8	2279.9	2353.9	2428.9	2504.9	2581.9	40
41	24.1	93.9	64.5	35.8	08.0	81.1	55.1	30.1	08.1	83.2	41
42	25.3	95.1	65.7	37.0	09.2	82.3	56.4	31.4	07.4	84.5	42
43	26.4	96.3	66.8	38.2	10.5	83.6	57.6	32.6	08.7	85.8	43
44	27.6	97.4	68.0	39.4	11.7	84.8	58.9	33.9	10.0	87.1	44
45	1928.8	1998.6	2069.2	2140.6	2212.9	2286.0	2360.1	2435.2	2511.2	2588.4	45
46	29.9	1999.8	70.4	41.8	14.1	87.2	61.3	36.4	12.5	89.7	46
47	31.1	2000.9	71.6	43.0	15.3	88.5	62.6	37.7	13.8	91.0	47
48	32.2	02.1	72.8	44.2	16.5	89.7	63.8	38.9	15.1	92.3	48
49	33.4	03.3	73.9	45.4	17.7	90.9	65.1	40.2	16.4	93.6	49
50	1934.6	2004.5	2075.1	2146.6	2218.9	2292.2	2366.3	2441.5	2517.6	2594.9	50
51	35.7	05.6	76.3	47.8	20.1	93.4	67.6	42.7	18.9	96.2	51
52	36.9	06.8	77.5	49.0	21.4	94.6	68.8	44.0	20.2	97.5	52
53	38.0	08.0	78.7	50.2	22.6	95.8	70.0	45.2	21.5	2598.8	53
54	39.2	09.1	79.9	51.4	23.8	97.1	71.2	46.5	22.8	2600.1	54
55	1940.4	2010.3	2081.1	2152.6	2225.0	2298.3	2372.5	2447.8	2524.0	2601.4	55
56	41.5	11.5	82.2	53.8	26.2	2299.5	73.8	49.0	25.3	02.7	56
57	42.7	12.7	83.4	55.0	27.4	2300.8	75.0	50.3	26.6	04.0	57
58	43.8	13.8	84.6	56.2	28.6	02.0	76.3	51.6	27.9	05.3	58
59	45.0	15.0	85.8	57.4	29.9	03.2	77.5	52.8	29.2	06.6	59
60	1946.2	2016.2	2087.0	2158.6	2231.1	2304.5	2378.8	2454.1	2530.4	2607.9	60
Lat.	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	Lat.

122

TABLE 5											
Meridional Parts											
Lat.	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	Lat.
0	5944.2	6123.9	6312.9	6512.4	6723.6	6948.1	7187.7	7444.7	7722.0	8023.1	0
1	47.2	27.0	16.1	15.8	27.2	51.9	91.8	49.2	26.8	28.3	1
2	50.1	30.0	19.4	19.2	30.8	55.8	7196.0	53.6	31.6	33.6	2
3	53.0	33.1	22.6	22.6	34.5	59.7	7200.1	58.1	36.5	38.8	3
4	56.0	36.2	25.9	26.1	38.1	63.5	04.3	62.6	41.3	44.1	4
5	5958.9	6139.3	6329.1	6529.5	6741.8	6967.4	7208.4	7467.0	7746.1	8049.4	5
6	61.8	42.4	32.4	32.9	45.4	71.3	12.6	71.5	51.0	54.6	6
7	64.8	45.4	35.6	36.4	49.0	75.2	16.7	76.0	55.8	59.9	7
8	67.7	48.5	38.9	39.8	52.7	79.1	20.9	80.5	60.7	65.2	8
9	70.6	51.6	42.1	43.3	56.4	83.0	25.1	85.0	65.6	70.5	9
10	5973.6	6154.7	6345.4	6546.7	6760.0	6986.9	7229.3	7489.5	7770.4	8075.9	10
11	76.5	57.8	48.7	50.2	63.7	90.8	33.4	94.0	75.3	81.2	11
12	79.5	60.9	51.9	53.6	67.4	94.7	37.6	7498.5	80.2	86.5	12
13	82.4	64.0	55.2	57.1	71.0	99.8	41.8	7503.0	85.1	91.9	13
14	85.4	67.1	58.5	60.5	74.7	7002.5	46.0	07.5	90.0	8097.2	14
15	5988.3	6170.2	6361.7	6564.0	6778.4	7006.5	7250.2	7512.0	7794.9	8102.6	15
16	91.3	73.3	65.0	67.5	82.1	10.4	54.4	16.6	7799.8	07.9	16
17	94.3	76.5	68.3	71.0	85.8	14.3	58.6	21.1	04.7	13.8	17
18	5997.2	79.6	71.6	74.4	89.4	18.3	62.9	25.6	09.6	18.7	18
19	6000.2	82.7	74.9	77.9	93.1	22.2	67.1	30.2	14.6	24.1	19
20	6003.2	6185.8	6378.2	6581.4	6796.8	7026.2	7271.3	7534.8	7819.5	8129.5	20
21	06.1	88.9	81.5	84.9	6800.5	30.1	75.5	39.3	24.5	34.9	21
22	09.1	92.1	84.8	88.4	04.3	34.1	79.8	43.9	29.4	40.3	22
23	12.1	95.2	88.1	91.9	08.0	38.0	84.0	48.5	34.4	45.7	23
24	15.0	6198.3	91.4	95.4	11.7	42.0	88.3	53.0	39.3	51.1	24
25	6018.0	6201.5	6394.7	6598.9	6815.4	7045.9	7292.5	7557.6	7844.3	8156.6	25
26	21.0	04.6	6398.0	6602.4	19.1	49.9	7296.8	62.2	49.3	62.0	26
27	24.0	07.7	6401.3	05.9	22.8	53.9	7301.1	66.8	54.3	67.5	27
28	27.0	10.9	04.6	09.4	26.6	57.9	05.3	71.4	59.3	72.9	28
29	30.0	14.0	07.9	12.9	30.3	61.9	09.6	76.0	64.3	78.4	29
30	6033.0	6217.2	6411.3	6616.4	6834.1	7065.9	7313.9	7580.6	7869.3	8183.9	30
31	36.0	20.3	14.6	19.9	37.8	69.8	18.2	85.3	74.3	89.4	31
32	39.0	23.5	17.9	23.5	41.5	73.8	22.4	89.9	79.3	8194.9	32
33	42.0	26.6	21.2	27.0	45.3	77.9	26.7	94.5	84.4	8200.4	33
34	45.0	29.8	24.6	30.5	49.0	81.9	31.0	7599.2	89.4	05.9	34
35	6048.0	6233.0	6427.9	6634.1	6852.8	7085.9	7335.4	7603.8	7894.5	8211.4	35
36	51.0	36.1	31.3	37.6	56.6	89.9	39.7	08.5	7899.5	17.0	36
37	54.0	39.3	34.6	41.1	60.3	93.9	44.0	13.1	7904.6	22.5	37
38	57.0	42.5	37.9	44.7	64.1	7097.9	48.3	17.8	09.7	28.1	38
39	60.0	45.6	41.3	48.2	67.9	7102.0	52.6	22.5	14.7	33.6	39
40	6063.0	6248.8	6444.6	6651.8	6871.7	7106.0	7357.0	7627.1	7919.8	8239.2	40
41	66.0	52.0	48.0	55.3	75.4	10.0	61.3	31.8	24.9	44.8	41
42	69.1	55.2	51.4	58.9	79.2	14.1	65.6	36.5	30.0	50.4	42
43	72.1	58.3	54.7	62.5	83.0	18.1	70.0	41.2	35.1	56.0	43
44	75.1	61.5	58.1	66.0	86.8	22.2	74.3	45.9	40.2	61.6	44
45	6078.1	6264.7	6461.5	6669.6	6890.6	7126.2	7378.7	7650.6	7945.3	8267.2	45
46	81.2	67.9	64.8	73.2	94.4	30.3	83.1	55.3	50.5	72.8	46
47	84.2	71.1	68.2	76.7	6898.2	34.4	87.4	60.0	55.6	78.4	47
48	87.3	74.3	71.6	80.3	02.0	38.5	91.8	64.8	60.7	84.1	48
49	90.3	77.5	75.0	83.9	05.8	42.5	7396.2	69.5	65.9	89.7	49
50	6093.3	6280.7	6478.3	6687.5	6909.7	7146.6	7400.6	7674.2	7971.1	8295.4	50
51	96.4	83.9	81.7	91.1	13.5	50.7	05.0	79.0	76.2	8301.0	51
52	6099.4	87.1	85.1	94.7	17.3	54.8	09.4	83.7	81.4	06.7	52
53	6102.5	90.3	88.5	6698.3	21.1	58.9	13.8	88.5	86.6	12.4	53
54	05.5	93.6	91.9	6701.9	25.0	63.0	18.2	93.3	91.8	18.1	54
55	6108.6	6296.8	6495.3	6705.5	6928.8	7167.1	7422.6	7698.0	7997.0	8323.8	55
56	11.6	6300.0	6498.7	09.1	32.6	71.2	27.0	7702.8	8002.2	29.5	56
57	14.7	03.2	02.1	12.7	36.5	75.3	31.4	07.6	07.4	35.3	57
58	17.8	06.4	05.5	16.3	40.3	79.4	35.9	12.4	12.6	41.0	58
59	20.8	09.7	09.0	20.0	44.2	83.6	40.3	17.2	17.8	46.7	59
60	6123.9	6312.9	6512.4	6723.6	6948.1	7187.7	7444.7	7722.0	8023.1	8352.5	60
Lat.	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	Lat.

bowditch table 5_2

- (5.8.2.2A1-1) The following questions are to be answered using Chart 13205 TR, Block Island Sound, and supporting publications.

Your vessel is on a course of 090°T at a speed of 14 knots.
Your draft is 37 feet and your height of eye is 56 feet.

A deviation table is not included with this question. Course is given as True.

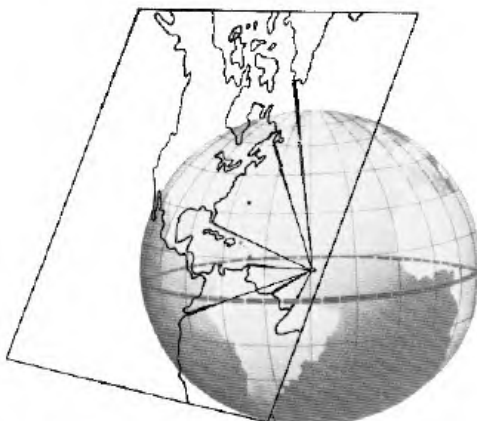


Figure 316a. An oblique gnomonic projection.

The usefulness of this projection rests upon the fact

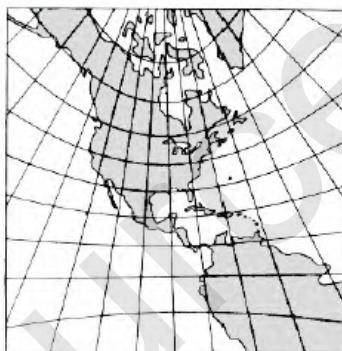


Figure 316b. An oblique gnomonic map with point of tangency at latitude 30°N, longitude 90°W.

that any great circle appears on the map as a straight line, giving charts made on this projection the common name **great-circle charts**.

Gnomonic charts are most often used for planning the great-circle track between points. Points along the determined track are then transferred to a Mercator projection. The great circle is then followed by following the rhumb lines from one point to the next. Computer programs which automatically calculate great circle routes between points and provide latitude and longitude of corresponding rhumb line endpoints are quickly making this use of the gnomonic chart obsolete.

gnomonicprojection

NP-0001	Zone Time	GHA	Observed Altitude	Declination
	0915	110°44.9'	40°01.9'	S 0°15.8'
	0950	119°27.4'	46°22.9'	S 0°16.3'
	1020	127°00.9'	51°21.7'	S 0°16.8'

np0001

NP-0002	Zone Time	GHA	Observed Altitude	Declination
	0700	17°20.1'	21°09.0'	S 00°09.7'
	0900	47°03.0'	46°05.0'	S 00°11.6'
	1100	77°06.4'	63°16.1'	S 00°13.5'

np0002

NP-0003	Zone Time	GHA	Observed Altitude	Declination
	0830	21°01.8'	44°16.4'	N 21°29.2'
	0930	36°01.7'	57°25.5'	N 21°28.8'
	1130	66°01.6'	81°30.2'	N 21°28.0'

np0003

NP-0004	Zone Time	GHA	Observed Altitude	Declination
	0800	12°50.0'	19°00.0'	S 01°38.8'
	1030	50°20.4'	51°42.0'	S 01°36.5'
	1130	65°20.5'	62°11.5'	S 01°35.5'

np0004

NP-0006	Body	Zone Time	GHA	Observed Altitude	Declination
	Peacock	0520	226°18.5'	49°42.9'	S 56°47.6'
	Altair	0535	238°38.2'	43°53.1'	N 8°48.9'
	Spica	0550	338°48.5'	21°11.7'	S 11°03.8'

np0006

NP-0008	Body	Zone Time	GHA	Observed Altitude	Declination
	Sirius	1836	73°02.7'	46°00.5'	S 16°41.7'
	Regulus	1842	23°46.9'	49°07.2'	N 12°03.5'
	Mirfak	1900	129°24.3'	35°51.6'	N 49°47.7'

np0008

NP-0009	Body	Zone Time	GHA	Observed Altitude	Declination
	Rigel	1845	329°19.7'	19°54.7"	S 8°13.4'
	Peacock	1910	107°58.4'	32°43.9"	S 56°47.8'
	Markab	1930	73°04.1'	39°53.1'	N 15°06.5'

np0009

NP-0010	Body	Zone Time	GHA	Observed Altitude	Declination
	Regulus	0540	218°35.9'	13°02.2'	N 12°03.5'
	Antares	0552	126°23.5'	38°04.1"	S 26°23.3'
	Vega	0600	96°23.2'	52°33.5'	N 38°45.8'

np0010

NP-0011	Body	Zone Time	GHA	Observed Altitude	Declination
	Venus	1810	341°3.4'	38°48.9"	S 12°48.1'
	Altair	1816	255°00.4'	41°20.3'	N 8°49.3'
	Peacock	1822	247°55.8'	48°39.5'	S 56°47.8'

np0011

NP-0012	Body	Zone Time	GHA	Observed Altitude	Declination
	Moon	1030	259°24.4'	34°01.5'	N 9°47.3'
	Sun	1116	202°30.5'	43°00.0'	S 19°38.0'
	Venus	1200	162°57.7'	24°26.9'	S 26°02.4'

np0012

NP-0014	Body	Zone Time	GHA	Observed Altitude	Declination
	Venus	1500	73°51.1'	48°29.5'	S 23°22.1'
	Sun L/L	1524	128°25.7'	24°24.9'	S 22°18.6'
	Moon L/L	1548	37°54.1'	43°24.8'	S 9°43.0'

np0014

NP-0016				
BODY	ZONE TIME	GHA	OBSERVED ALTITUDE (Ho)	DECLINATION
Deneb	1905	104°08.0'	19°52.4'	N 45°12.8'
Antares	1924	172°02.1'	32°22.1'	S 26°23.5'
Denebola	1945	247°20.6'	38°22.3'	N 14°40.7'

np0016

NP-0017	Body	Zone Time	GHA	Observed Altitude	Declination
	Spica	1848	180°24.3'	32°21.4'	S 11°03.8'
	Altair	1910	89°29.8'	43°06.3'	N 8°49.3'
	Kochab	1935	170°33.4'	39°12.0'	N 74°14.3'

np0017

NP-0019	Body	Zone Time	GHA	Observed Altitude	Declination
	Sirius	1836	73°02.7'	46°00.5'	S 16°41.7'
	Regulus	1842	23°46.9'	49°07.2'	N 12°03.5'
	Mirfak	1900	129°24.3'	35°50.5'	N 49°47.7'

np0019

NP-0020	Body	Zone Time	GHA	Observed Altitude	Declination
	Mirfak	0450	100°25.9'	35°27.4'	N 49°47.5'
	Fomalhaut	0502	169°59.9'	38°01.3'	S 29°43.1'
	Altair	0514	219°39.9'	31°39.5'	N 8°49.1'

np0020

NP-0021	Body	Zone Time	GHA	Observed Altitude	Declination
	Fomalhaut	0452	272°03.3'	46°05.3'	S 29°43.1'
	Canopus	0459	162°05.5'	41°48.9'	S 52°41.0'
	Achernar	0510	236°28.2'	60°26.5'	S 57°19.6'

np0021

NP-0022	Body	Zone Time	GHA	Observed Altitude	Declination
	Capella	1848	195°07.8'	44°10.2'	N 45°58.8'
	Sirius	1903	167°06.2'	46°52.9'	S 16°41.7'
	Aldebaran	1912	201°44.0'	38°17.9'	N 16°28.2'

np0022

np0032

NP-0032	Body	Zone Time	GHA	Observed Altitude	Declination
	Rigel	0512	167°31.4'	51°37.7'	S 8°13.2'
	Diphda	0518	236°46.1'	31°52.1'	S 18°05.2'
	Acamar	0524	204°33.0'	27°40.9'	S 40°22.5'

np0033

NP-0033	Body	Zone Time	GHA	Observed Altitude	Declination
	Regulus	0530	198°24.3'	77°21.3'	N 12°03.4'
	Arcturus	0532	137°03.2'	22°47.9'	N 19°16.7'
	Suhail	0537	215°10.4'	26°44.9'	S 43°21.2'

np0034

NP-0034	Body	Zone Time	GHA	Observed Altitude	Declination
	Diphda	0524	076°20.5'	50°34.8'	S 18°05.4'
	Antares	0530	201°26.0'	14°16.9'	S 26°23.4'
	Deneb	0538	140°18.4'	22°00.3'	N 45°12.6'

np0036

NP-0036	Body	Zone Time	GHA	Observed Altitude	Declination
	Fomalhaut	0523	133°27.1'	35°40.4'	S 29°43.4'
	Peacock	0527	172°33.9'	48°28.6'	S 56°47.6'
	Antares	0531	232°32.3'	51°43.9'	S 26°23.4'

np0038

NP-0038	Body	Zone Time	GHA	Observed Altitude	Declination
	Avoir	1727	209°18.2'	47°24.4'	S 59°27.3'
	Regulus	1732	184°14.7'	46°35.2'	N 12°03.6'
	Betelgeuse	1738	249°03.6'	49°41.5'	N 7°24.1'

np0039

NP-0039	Body	Zone Time	GHA	Observed Altitude	Declination
	Mars	0525	180°59.9'	60°05.5'	N 07°05.2'
	Arcturus	0532	137°03.2'	22°39.0'	N 19°16.7'
	Suhail	0537	215°10.4'	26°51.3'	S 43°21.2'