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INTERNATIONAL METEOROLOGICAL CODE

Adopted by the International Meteorological
Organisation, Washington, 1947

DECODE FOR USE OF SHIPPING

Incorporating the Code for Weather Reports
from and to Ships and the Analysis Code
for use of Shipping

*Effective from
1st January, 1949*



LONDON : HIS MAJESTY'S STATIONERY OFFICE

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NINEPENCE NET

15 (Stock III)

I. INTERNATIONAL METEOROLOGICAL CODE FOR REPORTS FROM SHIPS

(a) **Full message** (as reported by Selected Ships) :—

YQL_aL_aL_a L_oL_oL_oGG Nddff VVwwW PPPTT N_hC_LhC_MC_H D_sv_sapp
(8N_sCh_sh_s) (9S_PS_PS_PS_P) OT_sT_sT_dT_d Id_wd_wP_wH_w ICE c₂KD₁re

The first six groups are reported on all occasions. Any of the remaining groups may be omitted when the relevant observations are lacking. The addition of 30 to GG, when the message contains seven groups or more, indicates that the group D_sv_sapp is omitted.

The group commencing with indicator figure 8 gives additional cloud information, not necessarily included in the group N_hC_LhC_MC_H. Its use is not obligatory however and reports from Selected Ships may not include this group.

The group commencing with indicator figure 9 is only used by Ocean Weather Ships.

When ice, other than icebergs, is reported, the word ICE is inserted in the coded message immediately before the ice group c₂KD₁re.

Icebergs are reported in plain language at the end of the message, e.g. "3 bergs" (i.e. the number of bergs in sight at the time of observation (GG).)

(b) **Abbreviated Message** (as reported by Supplementary Ships) :—

YQL_aL_aL_a L_oL_oL_oGG Nddff VVwwW PPPTT N_hC_LhC_MC_H.

(c) **Short Message** (as used in weather messages from ships other than Selected and Supplementary Ships).

YQL_aL_aL_a L_oL_oL_oGG Nddff VVwwW

Note.—In the Atlantic Weather Bulletin for Shipping (Great Britain) the group PPPTT is included. This group may also be included in messages from ships whose barometers are considered to be sufficiently accurate.

In all messages, when an observation or element in any group is not available, an X, or the appropriate number of X's, is substituted in order to maintain the sequence of figures in the group.

The following notes explain the significance of each group in the message.

1. Position Groups YQL_aL_aL_a L_oL_oL_oGG

All coded reports from ships begin with these two groups.

- | | | | |
|--|----|----|--|
| Y | .. | .. | Day of week (Table I). |
| Q | .. | .. | Octant of the Globe (Table II). |
| L _a L _a L _a | .. | .. | Latitude in degrees and tenths. |
| L _o L _o L _o | .. | .. | Longitude in degrees (two figures) and tenths. |
| GG | .. | .. | Greenwich Mean Time of observation. |

2. Group Nddff

- | | | | |
|----|----|----|--|
| N | .. | .. | Total amount of cloud in eighths (oktas) (Table III). |
| dd | .. | .. | The true direction, in tens of degrees, from which the surface wind is blowing (Table IV). |
| ff | .. | .. | Speed of surface wind in knots. This value is derived from the observed Beaufort Force. (Table V.) |

3. Group VVwwW

- VV Visibility (Table VI). The demand for increasingly accurate observations of visibility from land stations has led inevitably to the introduction of a two-figure scale. Uniformity of procedure entails the corresponding use of this code at sea.
- ww Present weather, i.e. the weather at the time of observation (Table VII).
- W Past weather, i.e. weather since last synoptic hour (Table VIII).

4. Group PPPTT

- PPP Pressure in millibars and tenths (initial 9 or 10 omitted), e.g. 998.0 mbs. coded as 980; 1014.7 mbs. as 147.
- TT Temperature of the air in whole degrees Fahrenheit. (Subtract from 100 for temperatures below 0° F.)

5. Group N_hC_LhC_MC_H

- N_h Amount of Low Cloud in eighths (oktas). (Table III.)
- C_L Type of Low Cloud. (Table IX.)
- h Height of base of Low Cloud. (Table X.)
- C_M Type of Middle Cloud. (Table XI.)
- C_H Type of High Cloud. (Table XII.)

6. Group D_sv_sapp

- D_s Course of ship. (Table XIII.)
- v_s Speed of ship. (Table XIV.)
- a Characteristic of barometric tendency during the period of three hours preceding the time of observation. (Table XV.)
- pp Amount of barometric tendency during the three hours preceding the time of observation, expressed in tenths of a millibar (*tendency not greater than 9.9 mbs.*), e.g. tendency = 9.6 mbs.; pp = 96.

Note.—When the tendency is greater than 9.9 mbs., an additional group (99ppp) is added after the group D_sv_sapp, pp then being coded as 99; e.g. tendency = 10.3 mbs., D_s = 2, v_s = 4, a = 8, then D_sv_sapp 99ppp is coded as 24899 99103.

7. Group 8N_sCh_sh_s (Reports from Selected Ships may not include this group).

- N_s Amount of Significant Cloud in eighths (oktas) (as defined below). (Table III.)
- C Type of Significant Cloud. (Table XVI.)
- h_sh_s Height of base of Significant Cloud. (Table XVII.)

The Significant Cloud layer(s) are:—

- (1) The lowest layer of cloud below 20,000 ft. covering more than half the sky and
- (2) the lowest layer of cloud, if any, below the layer (1). If the layers (1) and (2) are both present, they may both be reported, two separate 8 groups being used.

(3) If no layer of cloud below 20,000 ft. covers more than half the sky, the significant cloud layer is the lowest layer of cloud below 20,000 ft.

(4) If the sky is obscured by fog or thick dust haze, the appropriate value of this group is 89-00.

8. Special Phenomena Group :— $9S_pS_pS_pS_p$.

This group, which will only be reported by Ocean Weather Ships, is included for the purpose of reporting phenomena not included in the ww code and for amplifying the information contained in ww and in other parts of the message. The specifications for S_pS_p and s_pS_p are not included as they vary for different regions of the world.

9. Group $OT_sT_sT_dT_d$

T_sT_s .. Difference between Air and Sea Temperature expressed to the nearest degree F. (If the Air Temperature is below the Sea Temperature, 50 is added to the code figure for T_sT_s .) Examples :—
Air Temp. 50.4° F., Sea Temp. 49.6° F., Air-Sea = 0.8° F. ; $T_sT_s = 01$.

Air Temp. 53.6° F., Sea Temp. 55.4° F., Air-Sea = -1.8° F., $T_sT_s = 52$.

T_dT_d .. Temperature of dew point in whole degrees Fahrenheit.

10. Group $ld_wd_wP_wH_w$

The distinction between sea and swell is now no longer made. Instead, observers report measurements or careful estimates of the characteristics of the waves. These characteristics are :—

d_wd_w .. Direction from which the waves come. (Table IV.)

P_w .. Period of waves. (Table XVIII.)

H_w .. Mean maximum height of waves. (Table XIX.)

Where more than one system of waves can be distinguished the group is repeated.

11. Ice group :— c_2KD_1re

The code provides for the reporting of the following elements on occasions when ice, other than icebergs, is observed.

c_2 .. Kind of ice. (Table XX.)

K .. Effect of the ice on navigation. (Table XXI.)

D_1 .. Bearing of ice limit. (Table XXII.)

r .. Distance to ice limit from reporting ship. (Table XXIII.)

e .. Orientation of ice limit. (Table XXIV.)

II. INTERNATIONAL METEOROLOGICAL CODE FOR REPORTS FROM LAND STATIONS

(a) Full message :—

999II

iii T_dT_d Nddff VVwwW PPPTT $N_hC_LhC_MC_H$ (6Eapp) (7RRT $_eT_e$)
(SN $_s$ Ch $_s$ h $_s$) (9 $S_pS_pS_pS_p$)

(b) Short message (as used in Atlantic Weather Bulletin for Shipping).

(999II) iii T_dT_d Nddff VVwwW PPPTT

1. Block Indicator Group 999II

All meteorological stations ashore have been allotted five-figure index numbers in the form Iiiii where II is the block number and iii the number of the station in the block. II thus denotes an area, and iii a station within that area. In collective reports, a sequence of reports from stations in the same block is preceded by a group of form 999II for the purpose of identifying the block.

The general scheme of assignment of block numbers to Regions is as follows :—

Europe and Asia	00 to 49
Africa	60 to 69
North and Central America	70 to 79
South America	80 to 89
Australia and Pacific Ocean	90 to 99

Block number 03 has been assigned to the British Isles. Station numbers 03000 to 03899 apply to Great Britain and 03900 to 03999 to Northern Ireland and Eire. The numbers of stations used in the Atlantic Weather Bulletin for Shipping (Great Britain) are given on pages 33 and 34. For full list of numbers, see Admiralty List of Radio Signals, Volume III (Part B), 1949.

2. Group iiiT_dT_d

iii	Last three figures of station index number.
T _d T _d	Temperature of the Dew Point in whole degrees Fahrenheit.

3. Groups Nddff VVwwW PPPTT N_hC_LhC_MC_H.

As under (I) Code for Reports from Ships.

4. Group 6Eapp

E	State of ground. (Table XXV.)
a	As under (I) Code for Reports from Ships.
pp	As under (I) Code for Reports from Ships.

5. Group 7RRT_eT_e (included only at specified hours for measurement of rainfall and extreme temperatures (0900 and 2100 G.M.T. in U.K.) : omitted by stations which do not observe rainfall, maximum and minimum temperature).

RR	Rainfall for 12 hours ended at 0900 or 2100 hours. (Table XXVI.)
T _e T _e	Extreme of temperature in whole degrees (night minimum at 0900 : day maximum at 2100).

6. Groups 8N_sCh_sh_s 9S_pS_pS_pS_p.

As under (I) Code for Reports from Ships.

Note.—Stations which observe sunshine and grass minimum temperature add a group SSST_gT_g at the end of the 0900 reports.

SSS	Yesterday's sunshine in hours and tenths.
T _g T _g	Grass minimum temperature in whole degrees F. (at 0900 only).

III. REPORTS OF SUDDEN CHANGES

These are in the following forms :—

(a) Reports from Ocean Weather Ships

1. Deterioration

MMMMM w_2GGgg YQL_aL_aL_a L_oL_oL_o Nddff VVwwW
 (8N_sCh_sh_s) (9S_pS_pS_pS_p) (OTTT_dT_d) (1d_wd_wP_wH_w)

2. Improvement

BBBBB w_2GGgg YQL_aL_aL_a L_oL_oL_o Nddff VVwwW
 (8N_sCh_sh_s) (9S_pS_pS_pS_p) (OTTT_dT_d) (1d_wd_wP_wH_w)

(b) Reports from Land Stations

1. Deterioration

MMMMM w_2GGgg iii Nddff VVwwW (8N_sCh_sh_s)
 (9S_pS_pS_pS_p) (OTTT_dT_d) (1d_wd_wP_wH_w)

2. Improvement

BBBBB w_2GGgg iii Nddff VVwwW (8N_sCh_sh_s)
 (9S_pS_pS_pS_p) (OTTT_dT_d) (1d_wd_wP_wH_w)

Note.—Group 1d_wd_wP_wH_w is reported only when $w_2 = 9$.

w_2 Nature of the phenomenon. (Table XXVII.)

GGgg Time of the phenomenon in hours and minutes.

INTERNATIONAL ANALYSIS CODE FOR USE OF SHIPPING I.A.C. (FLEET)

Specification

1 0 0 0 1	333x ₁ x ₁	OYYG _o G _o		
8P _t P _o PP	yyyyy	(md _s d _s f _s f _s)	8P _t P _o PP	yyyyy etc.
66F _t F _i F _o	yyyyy	yyyyy	.....	..... (md _s d _s f _s f _s)
44P ₁ P ₁ P ₁	yyyyy	yyyyy	.....	.....
55T _t T _i T _o	(555PP)	yyyyy	.....	(md _s d _s f _s f _s)
987w _s w _s	yyyyy	yyyyy	.....
7 7 7 4 4	.....	.....	4 4 7 7 7	
1 9 1 9 1				

The Group 10001 is an indicator group signifying "Analysis follows".

333x₁x₁ is a position system indicator, x₁x₁ having the following interpretations :—

0 0 positions in the form L_aL_aL_oL_ok (Northern Hemisphere).

1 1 positions in the form L_aL_aL_oL_ok (Southern Hemisphere).

2 2 positions in the form L_aL_aL_oL_ok (Equatorial).

8 8 positions in the form QL_aL_aL_oL_o

where L_aL_a = Latitude to nearest degree.

L_oL_o = Longitude to nearest degree. Hundreds figure omitted.

k = Half-degree position figure (*see* specification tables).

Q = Octant of the globe (*see* specification tables).

When the $L_n L_n L_n L_n k$ type of point position group is used, the key groups 33300 and 33311 ordinarily designate the appropriate hemisphere. When the group 33322 (Equatorial) is used for tropical areas, southern latitudes from 0° to 30° S. are indicated by subtraction from 100 (e.g., 13° S. = 87; 29° S. = 71, etc.).

Y Y = Day of month.

$G_c G_c$ = Synoptic hour on which chart is based.

P_t = Type of pressure system (*see* specification tables).

P_c = Character of pressure system.

P P = Pressure to nearest millibar (9 or 10 omitted).

y y y y y = Position group in the form indicated by the value of $x_1 x_1$.

m = Movement index figure (*see* specification tables).

$d_s d_s$ = Direction in tens of degrees toward which the system or front is moving (01-36). 00 means stationary, 99 means unknown.

$f_s f_s$ = Speed in knots of moving system. (99 means unknown.)

F_t = Type of front (*see* specification tables).

F_i = Intensity of front (*see* specification tables).

F_c = Character of front (*see* specification tables).

$P_1 P_1 P_1$ = Pressure in millibars (if over 1000 the initial 1 is omitted).

$w_s w_s$ = Significant weather.

T_t = Tropical Circulation type (*see* specification tables).

T_i = Tropical System Intensity (*see* specification tables).

T_c = Tropical System Characteristic (*see* specification tables).

77744....44777 = Vocabulary Section.

1 9 1 9 1 = Indicator group signifying end of message.

Explanation

The International Analysis Code is used by Central Meteorological Stations to issue the results of detailed synoptic analyses in an abbreviated form suitable for rapid transmission by W/T or teleprinter. In spite of the large number of symbols and specifications used, its form is inherently simple if the following facts are remembered:—

- (a) The first three groups commencing with 10001 specify the date and time of the message and indicate the nature of the position groups used, e.g., if $x_1 x_1$ is given as 00 then the position groups are in the form $L_n L_n L_n L_n k$ and the latitude refers to the Northern Hemisphere.
- (b) A group beginning with 8 gives data relating to a pressure system, e.g., a depression. This group is followed by one or more position groups as necessary. Similar information is given for each pressure system included in the analysis, i.e., there may be several groups beginning with 8 each followed by one or more position groups.
- (c) A group beginning with 66 gives data relating to a front, the succeeding groups specifying its position. There are generally several groups beginning with 66 each followed by a series of position groups.
- (d) The figures 44 are used to indicate data relating to isobars, the figures $P_1 P_1 P_1$ in the group $44 P_1 P_1 P_1$ giving the numerical value of the isobar whose position is determined by the series of following position groups.

- (e) Groups beginning with 55 are used only for tropical regions. When these groups are included groups giving frontal data, i.e., those beginning with 66, are usually omitted.
- (f) The figures 987 are used to indicate data relating to weather.
- (g) The groups contained by the indicator groups 77744 and 44777 are in plain language.
- (h) The group $md_d f_s f_s$, whose use is optional, may be included after the data for each pressure system or front to indicate its direction and speed of movement.
- (i) The end of the message is indicated by the group 19191.

Specification Tables

	k Half-degree position figure	Q Octant of the Globe			
0	Take $L_a L_a L_o L_o$ as sent	East Longitude $0^\circ-99^\circ$ or West Longitude $100^\circ-180^\circ$	$0-90^\circ W.$ $90^\circ W.-180^\circ$ $180^\circ-90^\circ E.$ $90^\circ E.-0^\circ$	Northern Latitude	0
1	Add $\frac{1}{2}$ degree to $L_a L_a$				1
2	Add $\frac{1}{2}$ degree to $L_o L_o$				2
3	Add $\frac{1}{2}$ degree to $L_a L_a$ and $L_o L_o$				3
4	Whole degrees				
5	Take $L_a L_a L_o L_o$ as sent	West Longitude $0^\circ-99^\circ$ or East Longitude $100^\circ-180^\circ$	$0^\circ-90^\circ W.$ $90^\circ W.-180^\circ$ $180^\circ-90^\circ E.$ $90^\circ E.-0^\circ$	Southern Latitude	5
6	Add $\frac{1}{2}$ degree to $L_a L_a$				6
7	Add $\frac{1}{2}$ degree to $L_o L_o$				7
8	Add $\frac{1}{2}$ degree to $L_a L_a$ and $L_o L_o$				8
9	Whole degrees				

Note.—Half degree position figure—"k":— $L_a L_a$ and $L_o L_o$ are the latitude and longitude in whole degrees (for longitude west of $100^\circ W.$ and east of $100^\circ E.$, the initial 1 is omitted). For equatorial regions, latitudes from 0° to $30^\circ S.$ are subtracted from 100 (e.g. $L_a L_a 87 = 13^\circ S.$; $L_a L_a 71 = 29^\circ S.$).

When $k = 4$ or 9 , the values of $L_a L_a$ and $L_o L_o$ are accurate to the nearest whole degree only; for all other values of k the accuracy is to the nearest $\frac{1}{2}$ degree.

	P_t Pressure Type	P_o Pressure Characteristic	
0	complex low	no specification	0
1	low	low filling or high weakening	1
2	secondary	little change	2
3	trough	low deepening or high intensifying	3
4	wave	complex	4
5	high	forming or existence suspected (Cyclogenesis or anticyclogenesis)	5
6	area of uniform pressure	filling or weakening but not disappearing	6
7	ridge	general rise of pressure	7
8	col	general fall of pressure	8
9	tropical storm	position doubtful	9

Specification Tables—continued

	F_t Frontal Type	F_i Frontal Intensity	F_o Frontal Characteristic	
0	quasi-stationary front	no specification	no specification	0
1	warm front	weak, decreasing including Frontolysis	frontal activity area decreasing	1
2	warm occlusion	weak, little or no change	frontal activity area, little change	2
3	upper warm front	weak, increasing including Frontogenesis	frontal activity area increasing	3
4	cold front	moderate, decreasing	intertropical	4
5	cold occlusion	moderate, little or no change	forming or existence, suspected	5
6	upper cold front	moderate, increasing	quasi-stationary	6
7	instability line*	strong, decreasing	with waves	7
8	inter-tropical front	strong, little or no change	diffuse	8
9	occlusion	strong, increasing	position doubtful	9

* An addition in plain language may be made, when this is considered necessary, to emphasise the existence of a line squall.

	T_t Tropical Circulation Type	T_i Tropical System Intensity ($T_t = 0$ to 8)	T_i Tropical System Intensity ($T_t = 9$)	
0	intertropical convergence zone	no specification	Force 10	0
1	shear line	weak, decreasing	Force 11	1
2	line or zone of convergence	weak, little or no change	Force 12	2
3	axis of doldrum belt	weak, increasing	Force 13	3
4	trough in westerlies	moderate, decreasing	Force 14 or over	4
5	trough in easterlies	moderate, little or no change	Force 5	5
6	low area	moderate, increasing	Force 6	6
7	surge line	strong, decreasing	Force 7	7
8	line or zone of divergence	strong, little or no change	Force 8	8
9	tropical cyclonic circulation	strong, increasing	Force 9	9

Specification Tables—*continued*

	T_0 Tropical System Characteristic	m Movement Index Figure	
0	no specification	no specification	0
1	diffuse	stationary	1
2	sharply defined	little change	2
3	quasi-stationary	becoming stationary	3
4	existence certain	retarding	4
5	existence uncertain	curving to left	5
6	formation suspected	recurving	6
7	position certain	accelerating	7
8	position uncertain	curving to right	9
9	movement doubtful	expected to recurve	9

	$w_s w_n$ Significant Weather
00	area of heavy swell
11	„ „ strong winds (6 and 7 Beaufort)
22	„ „ middle cloud
33	„ „ low cloud
44	„ „ poor visibility
55	„ „ gales (8 Beaufort or more)
66	„ „ continuous precipitation
77	„ „ squally weather
88	„ „ heavy showers
99	„ „ thunderstorms

Table I

Y.—Day of the Week

Code Figure.

1 = Sunday.
2 = Monday.
3 = Tuesday.
4 = Wednesday.

Code Figure.

5 = Thursday.
6 = Friday.
7 = Saturday.

Table II

Q.—Octant of the Globe

Code Figure.	Longitude.	
0	0° W. — 90° W.	} North Latitude.
1	90° W. — 180° W.	
2	180° E. — 90° E.	
3	90° E. — 0° E.	
5	0° W. — 90° W.	} South Latitude.
6	90° W. — 180° W.	
7	180° E. — 90° E.	
8	90° E. — 0° E.	

Table III

N = Total amount of cloud. N_h = Amount of Low Cloud.
 N_s = Amount of Significant Cloud Layer.

Code Figure	Scale for Cloud Amount
0	None.
1	1 Okta (or $\frac{1}{8}$ of sky covered).
2	2 Oktas (or $\frac{2}{8}$ of sky covered).
3	3 Oktas (or $\frac{3}{8}$ of sky covered).
4	4 Oktas (or $\frac{4}{8}$ of sky covered).
5	5 Oktas (or $\frac{5}{8}$ of sky covered).
6	6 Oktas (or $\frac{6}{8}$ of sky covered).
7	7 Oktas (or $\frac{7}{8}$ of sky covered).
8	8 Oktas (or sky completely covered).
9	Sky obscured, or cloud amount cannot be estimated owing to darkness.

N.B.—“Trace” would be included under Figure 1 which should be used for amounts up to $\frac{1}{8}$ (i.e. not up to $\frac{3}{16}$).

“Overcast but with openings” would be included under Figure 7 which should be used for amounts down to $\frac{7}{8}$ (i.e. not down to $\frac{13}{16}$).

Table IV

dd = Direction of Surface Wind.
 $d_w d_w$ = Direction from which the waves come.

Code Figures	True Direction (degrees)	Code Figures	True Direction (degrees)
00	Calm (no waves)	19	190
01	010	20	200
02	020	21	210
03	030	22	220
04	040	23	230
05	050	24	240
06	060	25	250
07	070	26	260
08	080	27	270
09	090	28	280
10	100	29	290
11	110	30	300
12	120	31	310
13	130	32	320
14	140	33	330
15	150	34	340
16	160	35	350
17	170	36	360
18	180		

Note.—When the direction from which the waves come is indeterminate (waves confused) code figure 49 or 99 is reported, according to the height of the waves. (See Table XX.) When the wind direction is indeterminate code figure 99 should be reported. In the case of half-way values, the higher ten-degree value is coded, e.g. 125° is coded as 13.

Table V

ff = Speed of Surface Wind in knots
Beaufort Scale of Wind Force

Beaufort Wind Force	Mean Wind Speed in knots, ff.	Limits of Wind Speed in knots	Limits of Wind Speed in metres/sec.	Descriptive Terms	Sea Criterion	Probable Height of Waves in feet.*	Probable Maximum Height of Waves in feet.*
	Measured at a height of 33 ft. above sea level.						
0	00	Less than 1	0-0-2	Calm	Sea like a mirror.	—	—
1	02	1-3	0-3-1-5	Light air	Ripples with the appearance of scales are formed but without foam crests.	—	½
2	05	4-6	1-6-3-3	Light breeze.	Small wavelets, still short but more pronounced, crests have a glassy appearance and do not break.	½	1
3	09	7-10	3-4-5-4	Gentle breeze	Large wavelets. Crests begin to break. Foam of glassy appearance. Perhaps scattered white horses.	2	3
4	13	11-16	5-5-7-9	Moderate breeze.	Small waves, becoming longer; fairly frequent white horses.	3½	5
5	18	17-21	8-0-10-7	Fresh breeze	Moderate waves, taking a more pronounced long form; many white horses are formed. (Chance of some spray.)	6	8½
6	24	22-27	10-8-13-8	Strong breeze	Large waves begin to form; the white foam crests are more extensive everywhere. (Probably some spray.)	9½	13
7	30	28-33	13-9-17-1	Moderate gale.	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind. (Spin-drift begins to be seen.)	13½	19

8	37	34-40	17·2-20·7	Fresh gale	Moderately high waves of greater length; edges of crests break into spindrift. The foam is blown in well-marked streaks along the direction of the wind.	18	25
9	44	41-47	20·8-24·4	Strong gale	High waves. Dense streaks of foam along the direction of the wind. Sea begins to roll. Spray may affect visibility.	23	32
10	52	48-55	24·5-28·4	Whole gale	Very high waves with long overhanging crests. The resulting foam in great patches is blown in dense white streaks along the direction of the wind. On the whole the surface of the sea takes a white appearance. The rolling of the sea becomes heavy and shocklike. Visibility affected.	29	41
11	60	56-63	28·5-32·6	Storm	Exceptionally high waves. (Small and medium-sized ships might be for a time lost to view behind the waves.) The sea is completely covered with long white patches of foam lying along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility affected.	37	52
12	68	64-71	32·7-36·9	Hurricane	The air is filled with foam and spray. Sea completely white with driving spray; visibility very seriously affected.	45	—

Notes.—(1) It must be realised that it will be difficult at night to estimate wind force by the sea criterion.

(2) The lag effect between the wind getting up and the sea increasing should be borne in mind.

(3) Fetch, depth, swell, heavy rain and tide effects should be considered when estimating the wind force from the appearance of the sea.
* These columns are added as a guide to show roughly what may be expected in the open sea, remote from land. In enclosed waters, or when near land with an off-shore wind, wave heights will be smaller, and the waves steeper.

Table VI

VV = Visibility

Code Fig.	Distance in yards	Code Fig.	Distance in yards (n. miles)	Code Fig.	Distance in n. miles	Code Fig.	Distance in n. miles	Code Fig.	Distance in n. miles	Code Fig.	Distance in n. miles	Code Fig.	Distance in n. miles
x0	<20	10	2,000 (1)	30	3.0	50	5.0	70	7.0	90	<50 yds.		
x1	20	11	2,200	31	3.1	51	5.1	71	7.1	91	50 yds.		
x2	40	12	2,400	32	3.2	52	5.2	72	7.2	92	200 yds.		
x3	60	13	2,600	33	3.3	53	5.3	73	7.3	93	500 yds.		
x4	80	14	2,800	34	3.4	54	5.4	74	7.4	94	1,000 yds.		
x5	100	15	3,000	35	3.5	55	5.5	75	7.5	95	1 n. mile		
x6	120	16	3,200	36	3.6	56	5.6	76	7.6	96	2 n. miles		
x7	140	17	3,400	37	3.7	57	5.7	77	7.7	97	5 "		
x8	160	18	3,600	38	3.8	58	5.8	78	7.8	98	10 "		
x9	180	19	3,800	39	3.9	59	5.9	79	7.9	99	25 "		
00	<200	20	4,000 (2)	40	4.0	60	6.0	80	8.0				
01	200	21	4,200	41	4.1	61	6.1	81	10				
02	400	22	4,400	42	4.2	62	6.2	82	20				
03	600	23	4,600	43	4.3	63	6.3	83	30				
04	800	24	4,800	44	4.4	64	6.4	84	40				
05	1,000	25	5,000 (2½)	45	4.5	65	6.5	85	50				
06	1,200	26	5,200	46	4.6	66	6.6	86	75				
07	1,400	27	5,400	47	4.7	67	6.7	87	100				
08	1,600	28	5,600	48	4.8	68	6.8	88	150				
09	1,800	29	5,800	49	4.9	69	6.9	89	250				

The symbol < indicates "less than".

Note.—If the distance of visibility is between two of the distances given in the table, the code figure for the lower distance is reported, e.g., if the distance is estimated to be between 200 and 500 yards, code figure 92 is reported.

The figures 90–99 are used only when the visibility cannot be determined with greater accuracy.

In the international scale, the distances for code figures x0–29 are expressed in metres. The same numbers represent the distance in yards sufficiently closely for practical purposes. Above code figure 29 the numbers are expressed in nautical miles on the basis that 2 km. = 1 nautical mile.

Table VII

ww = Present Weather

ww = 00-49. NO PRECIPITATION AT THE STATION* AT THE TIME OF OBSERVATION

ww = 00-19. No precipitation, fog, dust-storm, sand-storm, or drifting snow at the station at the time of observation or during the preceding hour.

	00	Cloud development not observed or not observable.	
No phenomena except clouds	01	Clouds generally dissolving or becoming less developed.	Characteristic change of the state of sky during the past hour.
	02	State of sky on the whole unchanged.	
	03	Clouds generally forming or developing.	
Haze, dust, sand or smoke	04	Visibility reduced by smoke, e.g., veldt or forest fires, industrial smoke or volcanic ashes.	
	05	Haze, visibility 1,000 yards or more.	
	06	Widespread dust in suspension in the air, not raised by wind at or near the station at the time of observation.	
	07	Dust or sand raised by wind at or near the station at the time of observation, but no well developed dust devil(s), and no dust-storm or sand-storm seen.	
	08	Well developed dust-devil(s) seen at or near the station within last hour, but no dust-storm or sand-storm.	
	09	Dust-storm or sand-storm within sight of station or at station during the last hour.	
Mist or shallow fog	10	Mist, visibility 1,000-2,000 yards.	
	11	Shallow fog at the station, whether on land or sea, not deeper than about 2 metres on land or 10 metres (33 ft.) at sea	in patches.
	12		more or less continuous.

* The expression "at the station" refers to a land station, a ship or an aircraft.

Table VII—continued

ww = Present Weather—continued

Special phenomena	13	Lightning visible, no thunder heard.	
	14	Precipitation within sight, not reaching the ground.	
	15	Precipitation within sight, reaching the ground, but distant (i.e. estimated to be more than 5 kms. from station).	
	16	Precipitation within sight, reaching the ground, near to but not at the station.	
	17	Thunder heard, but no precipitation at the station.	
	18	Squalls within sight	during the past hour.
19	Funnel cloud(s)**		

** Tornado cloud or water-spout.

ww = 20-29. Precipitation, fog or thunderstorm at the station *during the preceding hour but not at the time of observation.*

20	Drizzle (not freezing)	not falling as shower(s).
21	Rain (not freezing)	
22	Snow	
23	Rain and snow	
24	Freezing drizzle or freezing rain	
25	Shower(s) of rain.	
26	Shower(s) of snow, or of rain and snow.	
27	Shower(s) of hail, or of hail and rain.	
28	Fog.	
29	Thunderstorm (with or without precipitation).	

Table VII—continued

ww = Present Weather—continued

ww = 30-39. Dust-storm, sand-storm or drifting snow

30	Slight or moderate dust-storm or sand-storm	has decreased during the preceding hour.
31		no appreciable change during the preceding hour.
32		has increased during the preceding hour.
33	Heavy dust-storm or sand-storm	has decreased during the preceding hour.
34		no appreciable change during the preceding hour.
35		has increased during the preceding hour.
36	Slight or moderate drifting snow	generally low.
37	Heavy drifting snow	
38	Slight or moderate drifting snow	generally high.
39	Heavy drifting snow	

ww = 40-49. Fog at the time of observation

40	Fog at a distance at the time of observation, but not at the station during the past hour, the fog extending to a level above that of the observer.	
41	Fog in patches.	
42	Fog, sky discernible	has become thinner during the preceding hour.
43	Fog, sky not discernible	
44	Fog, sky discernible	no appreciable change during the preceding hour.
45	Fog, sky not discernible	
46	Fog, sky discernible	has begun, or has become thicker during the preceding hour.
47	Fog, sky not discernible	
48	sky discernible.	
49	Fog, depositing rime	sky not discernible.

Table VII—*continued*ww = Present Weather—*continued*

ww = 50-99. PRECIPITATION AT THE STATION AT THE TIME OF OBSERVATION

ww = 50-59. Drizzle

50	Drizzle, not freezing, intermittent	slight at time of observation.
51	Drizzle, not freezing, continuous	
52	Drizzle, not freezing, intermittent	moderate at time of observation.
53	Drizzle, not freezing, continuous	
54	Drizzle, not freezing, intermittent	heavy at time of observation.
55	Drizzle, not freezing, continuous	
56	Drizzle, freezing	slight.
57		moderate or thick.
58	Drizzle and rain	slight.
59		moderate or heavy.

ww = 60-69. Rain

60	Rain, not freezing, intermittent	slight at time of observation.
61	Rain, not freezing, continuous	
62	Rain, not freezing, intermittent	moderate at time of observation.
63	Rain, not freezing, continuous	
64	Rain, not freezing, intermittent	heavy at time of observation.
65	Rain, not freezing, continuous	
66	Rain, freezing	slight.
67		moderate or heavy.
68	Rain (or drizzle) and snow	slight.
69		moderate or heavy.

Table VII—*continued*ww = Present Weather—*continued*

ww = 70-79. Solid precipitation, not in showers

70	Intermittent fall of snow flakes	slight at time of observation.
71	Continuous fall of snow flakes	
72	Intermittent fall of snow flakes	moderate at time of observation.
73	Continuous fall of snow flakes	
74	Intermittent fall of snow flakes	heavy at time of observation.
75	Continuous fall of snow flakes	
76	Ice needles (with or without fog).	
77	Granular snow (with or without fog).	
78	Isolated star-like snow crystals (with or without fog).	
79	Ice pellets.	

ww = 80-90. Showery precipitation

No thunder at time of observation or in the preceding hour	80		slight.
	81	Rain shower(s)	moderate or heavy.
	82		violent.
	83	Shower(s) of rain and snow	slight.
	84		moderate or heavy.
	85	Snow shower(s)	slight.
	86		moderate or heavy.
	87	Showers of soft or small hail with or without rain or rain and snow mixed	slight.
	88		moderate or heavy.
	89	Showers of hail, with or without rain or rain and snow mixed, not associated with thunder	slight.
90	moderate or heavy.		

Table VII—continued

ww = Present Weather—continued

ww = 91-99. Precipitation (except ww = 98) and thunderstorm (either during the preceding hour or at the time of observation)

Thunder at time of observation or in the preceding hour	91	Slight rain at time of observation	Thunderstorm dur- ing the preceding hour, but not at time of observa- tion.
	92	Moderate or heavy rain at time of observation	
	93	Slight snow, or rain and snow mixed, or hail at time of observation	
	94	Moderate or heavy snow, or rain and snow mixed, or hail at time of observation	
	95	Thunderstorm, slight or moderate, without hail, but with rain and/or snow at time of observation	Thunderstorm at the time of ob- servation.
	96	Thunderstorm, slight or moderate, with hail at time of observation	
	97	Thunderstorm, heavy, without hail, but with rain and/or snow at time of observation	
	98	Thunderstorm combined with dust-storm or sand-storm at time of observation. No precipitation (rain, snow, hail)	
99	Thunderstorm, heavy, with hail at time of observation		

Remarks.—(1) In general, the highest applicable figure should be selected. Only one exception should be mentioned; code figure ww = 17 has preference over all figures ww = 20 to 49.

(2) Whenever the description "intermittent" is used, the precipitation has not continued without a break during the preceding hour.

Table VIII

W = Past Weather

Code Figure	
0	Fair (clear or slightly clouded).
1	Variable sky.
2	Mainly overcast.
3	Duststorm, or storm of drifting snow (visibility less than 5 cables).
4	Fog or thick dust haze (visibility less than 5 cables).
5	Drizzle.
6	Rain.
7	Snow or sleet.
8	Showers.
9	Thunderstorm, with or without precipitation.

Table IX C_L = Type of Low Cloud (Sc, St, Cu, Cb)

Code Figure	
0	No Stratocumulus, Stratus, Cumulus, or Cumulonimbus clouds.
1	Cumulus with little vertical development and seemingly flattened.
2	Cumulus of considerable development, generally towering, with or without other Cumulus or Stratocumulus; bases all at the same level.
3	Cumulonimbus with tops lacking clear-cut outlines but distinctly not cirriform or anvil-shaped; with or without Cumulus, Stratocumulus, or Stratus.
4	Stratocumulus formed by the spreading out of Cumulus; Cumulus also often present.
5	Stratocumulus not formed by the spreading out of Cumulus.
6	Stratus or Fractostratus or both, but not Fractostratus of bad weather.
7	Fractostratus and/or Fractocumulus of bad weather ("scud") usually under Altostratus and Nimbostratus. (By "bad weather" is meant the conditions usually prevailing before, during or after precipitation.)
8	Cumulus and Stratocumulus other than those formed by the spreading out of Cumulus, with bases at different levels.
9	Cumulonimbus having a clearly fibrous (cirriform) top, often anvil-shaped, with or without Cumulus, Stratocumulus, Stratus or "scud."

Note.—If the sky is not discernible owing to fog or other surface phenomenon, an X is reported.

Table X

h = Height of base of Low Cloud

Code Figure	Feet
0	0 to 150
1	150 to 300
2	300 to 600
3	600 to 1,000
4	1,000 to 2,000
5	2,000 to 3,000
6	3,000 to 5,000
7	5,000 to 6,500
8	6,500 to 8,000
9	No low cloud below 8,000

Notes.—(1) A height exactly equal to one of the heights in the table is reported by the higher code figure, e.g. a height of 2,000 feet should be reported by code figure 5.

(2) If there is no low cloud at all, figure 9 is reported.

(3) If the sky is not discernible owing to fog or other surface phenomenon, figure 0 is reported.

(4) If there is fog, and the sky is discernible through the fog, the cloud type, height and amount are reported as if no fog were present.

Table XI

C_M = Type of Middle Cloud (Ac, As, Ns)

Code Figure	
0	No Altocumulus, Altostratus, or Nimbostratus clouds.
1	Thin Altostratus (semi-transparent everywhere) through which the sun and moon would be seen dimly as through ground glass.
2	Thick Altostratus, or Nimbostratus. (Through portions of the sheet the position of the sun or moon may be indicated by a light patch.)
3	Thin (semi-transparent) Altocumulus; cloud elements not changing much; at a single level.
4	Thin (semi-transparent) Altocumulus in patches (often almond or fish-shaped); cloud elements continually changing and/or occurring at more than one level.
5	Thin (semi-transparent) Altocumulus in bands or in a layer gradually spreading over the sky and usually thickening as a whole: it may become partly opaque or double-layered.
6	Altocumulus formed by the spreading out of Cumulus.
7	Any of the following cases: <ul style="list-style-type: none"> (a) double-layered Altocumulus, usually opaque in parts, not increasing; (b) a thick (opaque) layer of Altocumulus, not increasing; (c) Altostratus and Altocumulus both present at the same or different levels.
8	Altocumulus in the form of Cumulus-shaped tufts or Altocumulus with turrets.
9	Altocumulus of a chaotic sky; generally at different levels; dense Cirrus in patches is usually also present.

Note.—If the sky is not discernible owing to fog or other surface phenomenon, an X is reported.

Table XII

C_H = Type of High Cloud (Ci, Cs, Cc)

Code Figure	
0	No Cirrus, Cirrocumulus, or Cirrostratus clouds.
1	Filaments or strands of Cirrus, scattered and not increasing (often "Mares' Tails").
2	Dense Cirrus in patches or twisted sheaves usually not increasing; possibly but not certainly the remains of the upper part of Cumulonimbus.
3	Cirrus, often anvil-shaped; either the remains of the upper portions of Cumulonimbus or part of a distant Cumulonimbus the rest of which is not visible. (If there is any doubt as to the Cumulonimbus origin or association, Code C_H2 should be used.)
4	Cirrus (often hook-shaped) gradually spreading over the sky and usually thickening as a whole.

- 5 Cirrus and Cirrostratus, often in bands converging towards the horizon; or Cirrostratus alone: in either case gradually spreading over the sky and usually thickening as a whole, but the continuous layer not reaching 45° altitude.
- 6 Cirrus and Cirrostratus, often in bands converging towards the horizon; or Cirrostratus alone; in either case gradually spreading over the sky and usually thickening as a whole, and the continuous layer exceeding 45° altitude.
- 7 Cirrostratus covering the whole sky.
- 8 Cirrostratus not increasing and not covering the whole sky; Cirrus and Cirrocumulus may be present.
- 9 Cirrocumulus alone or Cirrocumulus with some Cirrus or Cirrostratus, but the Cirrocumulus being the main cirriform cloud present. (Cirrocumulus may be present in C_H1 to C_H8 .)

Note.—If the sky is not discernible owing to fog or other surface phenomenon, an X is reported.

Table XIII

$D_s =$ Course of ship

Code Figure	True Direction	Code Figure	True Direction
0	Ship stopped	5	S.W.
1	N.E.	6	W.
2	E.	7	N.W.
3	S.E.	8	N.
4	S.	9	No information

Table XIV

$v_s =$ Speed of ship

Code Figure	Speed in knots	Code Figure	Speed in knots
0	Ship stopped.	5	13 to 15 knots.
1	1 to 3 knots.	6	16 to 18 "
2	4 to 6 "	7	19 to 21 "
3	7 to 9 "	8	22 to 24 "
4	10 to 12 "	9	Over 24 "

Table XV

a = Characteristic of changes of the barometer in the last three hours*

Code Figure	Description of Changes
0	Rising then falling
1	Rising then steady; or rising then rising more slowly
2	Unsteady
3	Steady or rising
4	Falling or steady, then rising; or rising then rising more quickly

} Barometer now higher than, or the same as, 3 hours ago.

* See diagram in the "Marine Observers' Handbook".

Table XV—continued

5	Falling then rising	} Barometer now lower than 3 hours ago.
6	Falling then steady; or falling then falling more slowly	
7	Unsteady	
8	Falling	
9	Steady or rising then falling; or falling then falling more quickly	

Table XVI

C = Type of Significant Cloud

Code Figure	Form of Cloud	Code Figure	Form of Cloud
1	Cirrus.	6	Stratocumulus.
2	Cirrostratus.	7	Nimbostratus.
3	Cirrocumulus.	8	Cumulus or Fractocumulus.
4	Alto cumulus.	9	Cumulonimbus.
5	Altostratus.	0	Stratus or Fractostratus.

Note.—The significant cloud layer(s) are (1) the lowest layer of cloud below 20,000 ft. covering more than half the sky and (2) the lowest layer of cloud, if any, below the layer (1). If the layers (1) and (2) are both present, they are both reported, two separate groups being used. (3) If no layer of cloud below 20,000 ft. covers more than half the sky, the significant cloud layer is the lowest layer of cloud below 20,000 ft. (4) When the sky is obscured a dash is reported, and $h_s h_c$ is then reported as 00.

Table XVII

 h_1, h_2 = Height of Significant Cloud Layer

Code Fig.	Height (Feet)	Height (Metres)	Code Fig.	Height (Feet)	Height (Metres)	Code Fig.	Height (Feet)	Height (Metres)	Code Fig.	Height (Feet)	Height (Metres)
00	<100	<30	30	3000	900	60	6000	1800	90	<150	<50
01	100	30	31	3100	930	61	6100	1830	91	150 to 300	50 to 100
02	200	60	32	3200	960	62	6200	1860	92	300 to 600	100 to 200
03	300	90	33	3300	990	63	6300	1890	93	600 to 1000	200 to 300
04	400	120	34	3400	1020	64	6400	1920	94	1000 to 2000	300 to 600
05	500	150	35	3500	1050	65	6500	1950	95	2000 to 3000	600 to 1000
06	600	180	36	3600	1080	66	6600	1980	96	3000 to 5000	1000 to 1500
07	700	210	37	3700	1110	67	6700	2010	97	5000 to 6500	1500 to 2000
08	800	240	38	3800	1140	68	6800	2040	98	6500 to 8000	2000 to 2500
09	900	270	39	3900	1170	69	6900	2070	99	8000 or more	2500 or more
10	1000	300	40	4000	1200	70	7000	2100		or no clouds	or no clouds
11	1100	330	41	4100	1230	71	7100	2130			
12	1200	360	42	4200	1260	72	7200	2160			
13	1300	390	43	4300	1290	73	7300	2190			
14	1400	420	44	4400	1320	74	7400	2220			
15	1500	450	45	4500	1350	75	7500	2250			
16	1600	480	46	4600	1380	76	7600	2280			
17	1700	510	47	4700	1410	77	7700	2310			
18	1800	540	48	4800	1440	78	7800	2340			
19	1900	570	49	4900	1470	79	7900	2370			
20	2000	600	50	5000	1500	80	8000	2400			
21	2100	630	51	5100	1530	81	9000	2700			
22	2200	660	52	5200	1560	82	not used				
23	2300	690	53	5300	1590	83	10,000	3000			
24	2400	720	54	5400	1620	84	13,000	4000			
25	2500	750	55	5500	1650	85	16,000	5000			
26	2600	780	56	5600	1680	86	20,000	6000			
27	2700	810	57	5700	1710	87	23,000	7000			
28	2800	840	58	5800	1740	88	26,000	8000			
29	2900	870	59	5900	1770	89	30,000	9000			
							or higher	or higher			

In the decade 90-99, a height exactly equal to one of the heights in the table is reported by the higher code figure, e.g. a height of 2000 feet is reported by code figure 95.

The symbol < indicates "less than".

Note.—If the height of the cloud base is between two of the heights given in the table, the code figure for the lower height is reported.

Table XVIII

 P_w = Period of Waves

Code Figure	Period
2	5 seconds or less.
3	5-7 seconds.
4	7-9 "
5	9-11 "
6	11-13 "
7	13-15 "
8	15-17 "
9	17-19 "
0	19-21 "
1	Over 21 seconds.
x	Calm or period unable to be determined.

Note.—A period of an exact number of seconds is coded in the lower code figure.

Table XIX

 H_w = Mean Maximum Height of Waves

Code Figure	Height		Height (Add 50 to $d_w d_w$)	
	feet	metres	feet	metres
0	<1	< $\frac{1}{4}$	16	5
1	1 $\frac{1}{2}$	$\frac{1}{2}$	17 $\frac{1}{2}$	5 $\frac{1}{2}$
2	3	1	19	6
3	5	1 $\frac{1}{2}$	21	6 $\frac{1}{2}$
4	6 $\frac{1}{2}$	2	22 $\frac{1}{2}$	7
5	8	2 $\frac{1}{2}$	24	7 $\frac{1}{2}$
6	9 $\frac{1}{2}$	3	25 $\frac{1}{2}$	8
7	11	3 $\frac{1}{2}$	27	8 $\frac{1}{2}$
8	13	4	29	9
9	14	4 $\frac{1}{2}$	30 $\frac{1}{2}$	9 $\frac{1}{2}$
x	Height unable to be determined.		Height unable to be determined.	

The symbol < indicates "less than".

Note.—For height over 15 ft. ($4\frac{3}{4}$ metres) add 50 to $d_w d_w$.

The code figure in each case provides for a range of heights thus:—

$$1 = 1 \text{ ft. to } 2\frac{1}{4} \text{ ft.}$$

$$9 = 13\frac{1}{2} \text{ ft. to } 15 \text{ ft.}$$

For heights over 31 ft. ($9\frac{3}{4}$ metres) the wave height is reported by reporting the greatest height that can be reported by the code (31 ft. = $9\frac{3}{4}$ metres), followed by the word WAVES and the actual height of the wave in feet or metres.

If a wave height comes exactly midway between the heights corresponding to two code figures, the lower code figure is reported.

Table XX c_2 = Kind of Ice

Code Figure	Description
0	No ice. ("0" will also be used to report "ice blink" and then a direction must be reported.)
1	Slush or young ice.
2	Fast ice.
3	Drift ice.
4	Packed (compact) slush or strips of hummocked ice.
5	Open lead near shore.
6	Heavy fast ice.
7	Heavy drift ice.
8	Hummocked ice.
9	Ice jamming.

Note.—This code takes no account of icebergs which are reported at the end of the synoptic weather report in plain language (e.g. "3 bergs").

Table XXI

K = Effect of the ice on navigation

Code Figure	Description
0	Navigation unobstructed.
1	Navigation unobstructed for steamers, difficult for sailing ships.
2	Navigation difficult for low powered steamers; closed to sailing ships.
3	Navigation possible only for high powered steamers.
4	Navigation possible only for steamers constructed to withstand ice pressure.
5	Navigation possible with the assistance of ice-breakers.
6	Channel open in the solid ice.
7	Navigation temporarily closed.
8	Navigation closed.
9	Navigation conditions unknown (e.g. owing to bad weather).

Table XXII D_1 = Bearing of ice limit

Code Figure	Description
0	No ice limit can be stated.
1	Ice limit towards NE.
2	" " " E.
3	" " " SE.
4	" " " S.
5	" " " SW.
6	" " " W.
7	" " " NW.
8	" " " N.
9	" " in several directions.

Note.—If more than one ice limit can be stated, the nearest or most important one is reported.

Table XXIII

r = Distance to ice limit from reporting ship

Code Figure	Distance
0	Up to 1 mile.
1	1-2 miles.
2	2-4 "
3	4-6 "
4	6-8 "
5	8-12 "
6	12-16 "
7	16-20 "
8	More than 20 miles.
9	Unspecified or no observations.

Note.—The exact bounding distance is assigned to the lower code number in each case.

Table XXIV

e = Orientation of ice limit

Code Figure	Description
0	Orientation of ice limit impossible to estimate—ship <i>outside</i> the ice.
1	Ice edge lying in a direction NE. to SW. with ice situated to the NW.
2	Ice edge lying in a direction E. to W. with ice situated to the Northward.
3	Ice edge lying in a direction SE. to NW. with ice situated to the NE.
4	Ice edge lying in a direction S. to N. with ice situated to the Eastward.
5	Ice edge lying in a direction SW. to NE. with ice situated to the SE.
6	Ice edge lying in a direction W. to E. with ice situated to the Southward.
7	Ice edge lying in a direction NW. to SE. with ice situated to the SW.
8	Ice edge lying in a direction N. to S. with ice situated to the Westward.
9	Orientation of ice limit impossible to estimate—ship <i>inside</i> the ice.

Table XXV

E = State of Ground

Code Figure	Description
0	Surface of ground dry (no appreciable amount of dust or loose sand).
1	Surface of ground moist.
2	Surface of ground wet (standing water in small or large pools on surface).
3	Surface of ground bare and frozen.
4	Glaze on ground but no ice, slush or snow.
5	Ice, slush or snow covering less than one-half of ground.
6	Ice, slush, or firm or settled snow covering more than one-half of ground (but not completely).
7	Ice, slush, or firm or settled snow covering ground completely.
8*	Loose, dry snow covering more than one-half of surface (but not completely).
9*	Loose, dry snow covering surface completely.

* Figures 8 and 9 may be used to indicate dust or loose sand on the surface of the ground in the proportions indicated. In such a case, the word dust or sand is added at the end of the message in plain language when the temperature is below 0° C.

Note.—The definitions in the code for E for numbers 0 to 4 apply to representative bare ground and numbers 5 to 9 to an open representative area.

Table XXVI

RR = Amount of Rainfall

This is expressed in whole millimetres with the following exceptions :—

Specification of certain meanings

Code Figure	Meaning	Code Figure	Meaning
56	56–65 mm.	95	0.5 mm.
57	66–75 mm.	96	0.6 mm.
and so on to		97	Some rain but not measurable.
90	396–405 mm.	98	More than 405 mm.
91	0.1 mm.	99	Measurement impossible or unreliable.
92	0.2 mm.		
93	0.3 mm.		
94	0.4 mm.		

Table XXVII

w₂ = Code to indicate the principal element on account of which the special message is sent

Code Figure	Element	Code Figure	Element
3	Visibility.	7	Thunderstorm or squall.
4	Low cloud.	8	Drifting snow.
5	Precipitation.	9	Waves.
6	Wind.		

Table XXVIII
Symbols for Fronts

Fronts or Boundaries between masses of air of different origin are indicated, wherever their characteristics are well pronounced, in the following way:—

Character of Front	Used on Printed Charts	Used on Working Charts
Warm front on the surface		Continuous red line
Warm front above the ground		Broken red line
Cold front on the surface		Continuous blue line
Cold front above the ground		Broken blue line
Occluded front (or occlusion)		Continuous purple line
Warm occlusion		Continuous thin red line behind a thin purple line
Cold occlusion		Continuous thin blue line behind a thin purple line
Stationary front at the surface		Alternate red and blue lines joined together to form a continuous line
Stationary front above the ground		Alternate red and blue broken line

Note.—The symbols used on printed charts are placed on the side of the line towards which the front is moving.

Table XXIX

Beaufort notation to indicate the state of the weather (*see also* Table XXX).

Weather	Beaufort Letter	Weather	Beaufort Letter
Blue sky (0-2/8 clouded)	b	Overcast sky. (The whole sky covered with unbroken cloud).	o
Sky partly clouded (3-6/8 clouded).	bc	Squally weather ..	q
Cloudy (6-8/8 clouded)	c	Rain	r
Drizzle	d	Sleet (i.e. rain and snow together).	rs
Wet air (without precipitation).	e	Snow	s
Fog	f	Thunder	t
Gloom	g	Thunderstorm with rain or snow.	tlr or tls
Hail	h	Ugly threatening sky..	u
Precipitation in sight of ship or station.	jp	Unusual visibility ..	v
Line squall	kq	Dew	w
Storm of drifting snow..	ks	Hoar frost	x
Sandstorm or dust storm	kz	Dry air.. .. .	y
Lightning	l	Dust haze	z
Mist	m		

Table XXX

Beaufort letter abbreviations for plotting on weather chart Present and Past Weather (Tables VII and VIII) also Total Amount of Cloud (N) (Table III)

		Present Weather (ww) Second Figure										N	Past weather
0	1	2	3	4	5	6	7	8	9				
0	Clouds dissolving	Sky unchanged	Clouds forming	Smoke	z	Dust in suspension	Dust raised by wind	Dust-devil	Dust-storm				
1	Low fog patches	Low fog	1	jp	jp	jp	tl	/q	Funnel cloud	1	b	bc	
2	/r	/s	/rs	/d freezing	/pr	/ps	/ph	/t	/tl	2	b	o	
3	kz--	kz+	KZ--	KZ	KZ+	k/s ₀	k/s	s ₀ /k	s/k	3	bc	kz	
4	jf	f-- sky visible	f--	f sky visible	f	f+ sky visible	f+	f (Rime) sky visible	f (Rime)	4	bc	f	
5	ido	id	dd	id	DD	d ₀ freezing	d freezing	d ₀ r ₀	dr	5	bc	d	
6	ir ₀	ir	ir	iR	RR	r ₀ freezing	r freezing	r ₀ s ₀	rs	6	c	r	
7	is ₀	is	ss	iS	SS	ice needles	granular snow	snow crystals	ice pellets	7	c	s	
8	pr ₀	PR	pr ₀ s ₀	prs	ps ₀	ps	ph ₀ soft hail	ph soft hail	ph ₀	8	o	p	
9	ph	r/tlr	Slight snow or hail/tl	Snow or hail/tl	tlr	tlh	TLR	tlkz	TLH	9		tlr	

To facilitate plotting, some of the specifications used in the table are given in an abridged form. For full meanings, see Table VII.

Capital letters denote intensity: thus PR = Heavy passing showers of rain.

A suffix "0" denotes slight: thus s₀ = slight snow.

Letters repeated denote continuity: thus RR = Heavy continuous rain.

Except in decade 30, a solidus "/" divides actual existing weather from preceding conditions: thus r/tlr denotes rain after thunderstorm, and /d denotes drizzle in last hour but not at time.

i = intermittent; -- = decreasing; + = increasing; thus f- = fog has decreased in thickness; p = shower of.

tlr(s) denotes "thunderstorm with rain" or "thunderstorm with snow".

jp denotes "precipitation within sight of station".

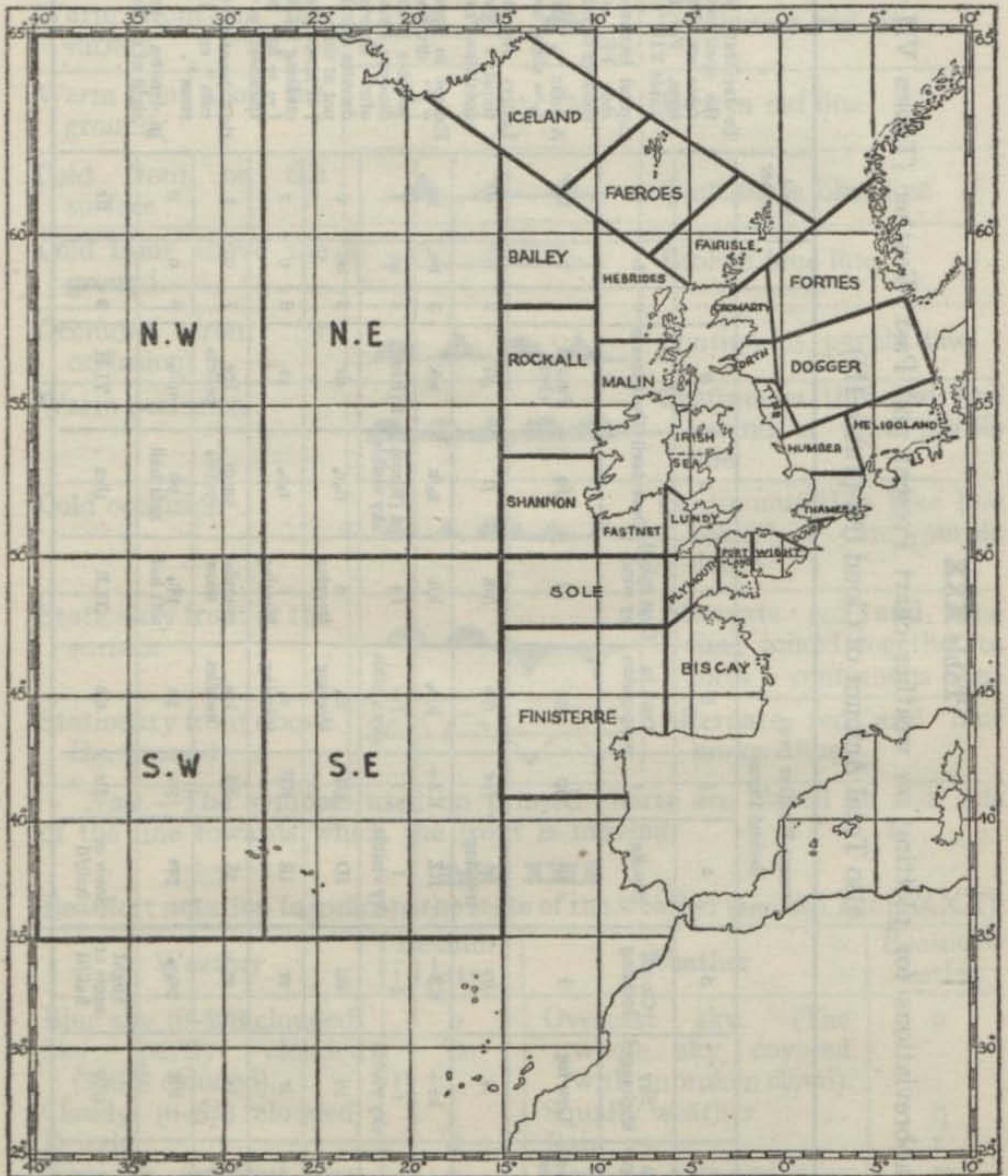


Chart showing the areas referred to in Weather Bulletins for Shipping (Great Britain).

ATLANTIC WEATHER BULLETIN FOR SHIPPING (GREAT BRITAIN)

The bulletin consists of six parts, and is broadcast from Portishead as follows:—

Parts	G.M.T.	October to March		April to September	
		Call Sign	Frequencies	Call Sign	Frequencies
I II III	0930*	GIY	51.5 (5830)	GIY	51.5 (5830)
		GKB5	16440 (18.25)	GKB5	16440 (18.25)
		GKC3	8210 (36.54)	GKC5	16885 (17.77)
		GKC5	16885 (17.77)	GKC6	22010 (13.63)
V VI	2130*	GBZ	19.4 (15465)	GBZ	19.4 (15465)
		GKB3	8340 (35.97)	GKB4	12678 (23.66)
		GKC4	12612 (23.79)	GKC5	16885 (17.77)
		GKC6	22010 (13.63)	GKC6	22010 (13.63)
IV	1145	GIY	51.5 (5830)	GIY	51.5 (5830)
		GKB6	22020 (13.62)	GKB5	16440 (18.25)
		GKC5	16885 (17.77)	GKC5	16885 (17.77)
		GKC6	22010 (13.63)	GKC6	22010 (13.63)

Part I. Storm Warnings in plain language. Warnings are issued when the wind is expected to reach Beaufort force 10 or over in the area concerned. When there are no storms in the forecast area, that fact is indicated by the words "No storm warnings."

Part II. Synopsis of weather conditions in plain language.

Part III. Forecasts in plain language for areas Biscay, Finisterre and the NE., NW., SE., and SW. sections of the region of the North Atlantic from 35° N. to 65° N., between 15° W. and 40° W. These subdivisions are as shown on the accompanying chart. The forecasts are based on 0600 and 1800 G.M.T. observations and cover a period of 24 hours from time of issue.

Part IV. Particulars of pressure and frontal systems, including essential isobars in I.A.C. (FLEET).†

Part V. Selection of ships' reports based on 0600 and 1800 G.M.T. observations in form: YQL_aL_aL_a L_oL_oL_oGG Nddff VVwwW PPPTT.

Part VI. Selection of shore station reports based on 0600 and 1800 G.M.T. observations in form: (999II) iiiT_aT_a Nddff VVwwW PPPTT.

* Preceded by marine intelligence.

† See page 6.

Index Numbers of Stations included in Part II

Country (Block number)	Main Stations	Alternatives
British Isles (03) and Faeroes (06)	011 Thorshavn (Faeroes)	005 Lerwick
	026 Stornoway	100 Tiree
	075 Wick	068 Lossiemouth
	262 Tynemouth	185 St. Abbs Head
	795 Lympne	797 Manston
	804 Scilly	814 Lizard
	953 Valentia	952 Roches Point

Index Numbers of Stations included in Part II—*continued*

Country (Block number)	Main Stations	Alternatives
Norway (01) ..	262 Nordoyan	228 Sula Lt.
	203 Kraknes Lt.	306 Hellisoy Lt.
Iceland (04) ..	030 Reykjavik	048 Vestmannaeyjar
Greenland (04) ..	280 Narssak	281 Simiutak
France (07) ..	102 St. Mathieu	207 Le Talut
	510 Bordeaux	600 Socoa
Spain ..	001 Corunna	046 Vigo
Azores (08) ..	506 Horta	515 Santa Maria
Bermuda (78) ..	005 King's Point	

Note.—Reports from shore stations in N. America and from ships west of 40° W. are broadcast from Washington. For details of these broadcasts, see the Admiralty List of Radio Signals, Vol. III.

Example of Atlantic Weather Bulletin for Shipping

From "Dunstable Weather" to "All Ships". 29th August, 1946.

Part I. Storm Warnings. No storm warnings.

Part II. Synopsis of Weather Conditions

At 1800Z deep depression 986 mbs. Scotland moving very slowly north. Depression 995 mbs. 54 North 41 West moving ENE at 30 knots, decreasing in speed later. Anticyclone Azores.

Part III. Forecasts

Forecast for 35 to 65 N between 15 and 40 W next 24 hours.

Northeast Section.—Strong north wind, gale locally. Occasional rain. Visibility moderate.

Northwest Section.—Freshening east wind backing northeast, strong. Occasional rain. Visibility moderate.

Southwest Section.—Freshening southwest wind in north of section becoming strong. Occasional drizzle. Fog patches.

Biscay.—Fresh or strong west to northwest wind. Showers. Visibility good.

Finisterre.—Moderate north wind. Local showers. Visibility good.

Part V. Ships' Reports

50448	29518	62513	99022	22870
50380	34518	70000	99022	25177
50560	00218	72010	99022	92358
50484	05218	62719	98022	06155
50464	29618	82519	97525	21065
50588	20818	83525	99022	08155
50338	59818	70903	99022	21980
50559	12618	83529	99032	96156
50585	18718	83630	96505	05255
50561	11018	83631	97032	92157
50477	33718	42314	96051	16063
50427	09418	42709	98011	16163
50563	18018	83530	98032	04254
50571	24818	43612	99021	15054
50560	14718	83529	98032	00257
50528	35518	92314	xx454	01958
50610	33018	80705	98022	16347
50444	45118	42514	99011	18779
50492	41818	82424	97022	10166

Part VI. Station Reports

British Isles				Iceland and Greenland			
99903				99904			
95353	52618	99161	02455	03048	43620	99011	11154
97353	62822	98216	95355	28142	81105	98502	12244
26252	42310	97051	90858	France			
49754	82313	98218	00753	99907			
80455	52720	99168	03857	51059	72709	99022	15264
02655	70517	97218	88257	20753	62712	99022	08859
Faeroes				Spain and Azores			
99906				99908			
00553	80515	96656	01753	00160	62712	98808	17163
				50667	70505	98022	24370

Part IV. International Analysis Code for use of Shipping

10001	33300	02918					
81395	54415	81186	57046				
85226	41318						
88015	54268						
66450	45476	51425	53416				
66950	53416	54475	53536				
66150	53416	52356	50315	43295			
66950	60100	62001	62065				
44992	58105	55105	55015	59017			
44000	58155	53115	53005	57040	62055		
44008	67095	60207	50155	48055	50040		
44016	69235	65275	56278	61365	63506		
44000	52655	52525	51418	53367	56435	56505	58585
44008	40785	44715	48655	49555	49428	51328	55335
	58405	60535					
44016	40697	45585	45476	49305	52275	46195	43008
	40065	33106					
44024	37517	35386	38276	40207	44295	42385	
19191							

Notes on the use of the Atlantic Weather Bulletin for Shipping

The Bulletin is broadcast in parts for the benefit of those desiring only part of the available information. Masters are recommended, however, to use the whole of the Bulletin if possible and to derive the maximum benefit from it by constructing a daily weather chart.

It is hoped that the following notes will be found useful in the plotting and drawing of weather charts.

Plotting the Observations

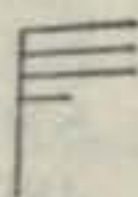
The most suitable working chart for use with the Atlantic Weather Bulletin for Shipping is Form 1258. Copies of this chart are supplied free to all ships regularly co-operating with the Meteorological Office. They may be purchased by applying to "The Director, Meteorological Office, M.O.10, Air Ministry, Kingsway, London, W.C.2".

The specimen chart in this pamphlet has been plotted and drawn from the observations contained in the example on page 34. By referring from this example to the chart the method of plotting is easily understood. It will be noticed that on the chart the index numbers of the stations used in the Bulletin are printed alongside the station circles, the block numbers for the different land areas being printed in large figures. The elements contained in the message are plotted in the positions depicted in the station model given below.

Station Model

TT	PPP	PPP	= Barometric pressure.
VVNww	○	TT	= Air Temperature.
T _d T _d	↑	VV	= Visibility.
(Station circle)		N	= Cloud amount—equivalent Beaufort letters.
		ww	= Present weather.
		W	= Past weather.
		T _d T _d	= Dew Point (available from land station messages only).

Direction of wind is always represented by an arrow flying with the wind and speed by the number of feathers on the arrow, each long feather representing two units on the Beaufort scale and each short feather one unit. A north wind of Beaufort force 7 is indicated thus



Beaufort letters are used for plotting Cloud Amount (N), Present Weather (ww) and Past Weather (W): details for doing this are given in Table XXX. Barometric Pressure (PPP), Temperature (TT), Visibility (VV) and Dew Point (T_dT_d) are plotted as reported.

Drawing the Isobars

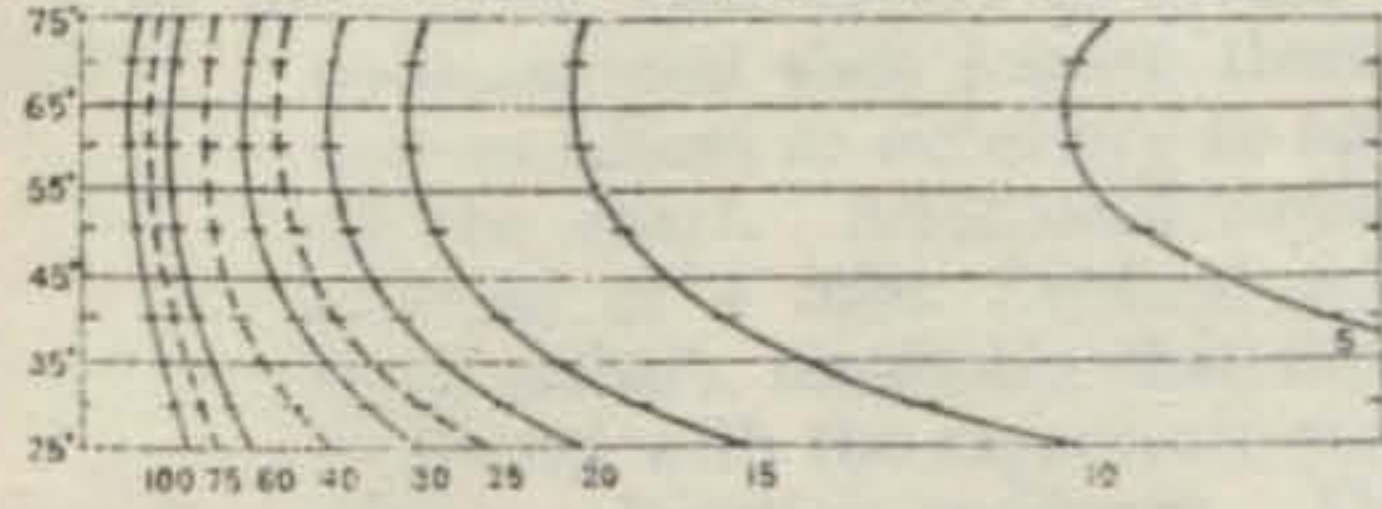
Isobars are lines drawn on the chart through places having the same barometric pressure. If a sufficient number of observations were available the drawing of isobars would be a simple routine procedure. In practice, the number of observations available is small and the winds are used to indicate the run of the isobars. This is possible because Buys Ballots law tells us to look for the low pressure on the right-hand side, facing into wind. Isobars are usually drawn in pencil for the practical reason that they often need adjustment as more information becomes available.

While it is occasionally advantageous to draw up the chart as soon as the observations have been received it will be found better as a routine measure to await the receipt of Part IV of the Bulletin. This contains not only the positions of all the main pressure centres but also the positions of the fronts and information enabling the isobars to be correctly drawn.

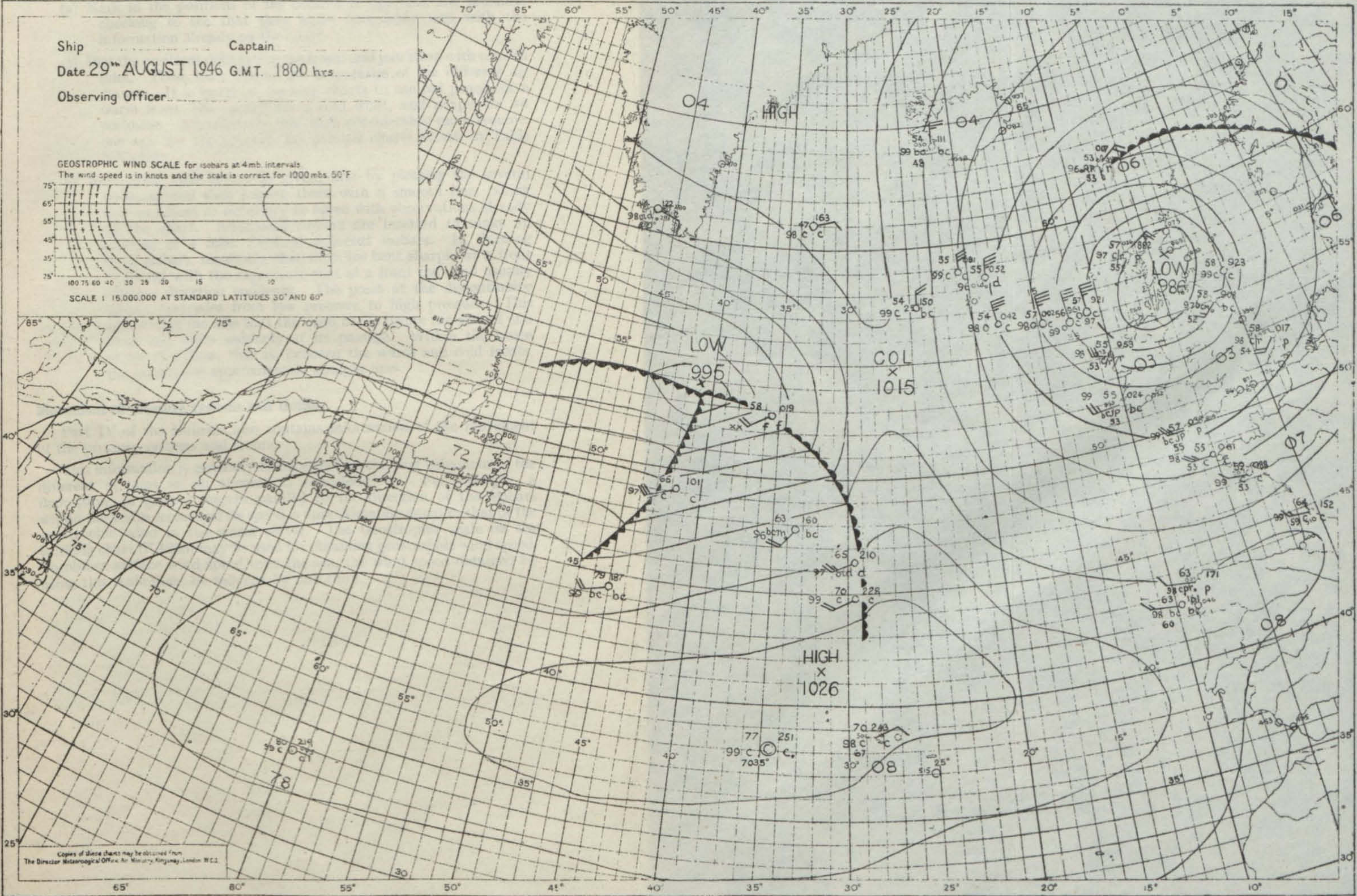
METEOROLOGICAL OFFICE AIR MINISTRY
Plotting Chart for use with Atlantic Weather Bulletin for Shipping

Ship _____ Captain _____
Date 29th AUGUST 1946 G.M.T. 1800 hrs.
Observing Officer _____

GEOSTROPHIC WIND SCALE for isobars at 4mb. intervals.
The wind speed is in knots and the scale is correct for 1000 mbs. 50°F



SCALE 1:15,000,000 AT STANDARD LATITUDES 30° AND 60°



Copies of these charts may be obtained from
The Director Meteorological Office Air Ministry, Kingsway, London W.C.2.

Completing the chart, the best procedure to adopt is as follows:—

- (a) Mark in the positions of the centres of high and low pressure, checking to see that they agree reasonably well with the information already on the chart.
- (b) Plot the positions delineating the fronts and join them with smooth lines. These lines denote the boundaries of the different air masses. It is usual on working charts to use red pencil for a warm front, blue pencil for a cold front, and purple for an occlusion. Alternatively, but with considerably more trouble, one can use the symbols for printed charts shown in Table XXVIII.
- (c) Next draw each isobar as given, first by plotting the several positions and then joining them with a smooth line, taking care to adjust as necessary to agree with observations already on the chart. Additional isobars are inserted to make an interval of 4 mbs. between adjacent isobars. In drawing these isobars, remember that they are bent sharply at a front to accord with the experience that at a front the wind usually changes direction suddenly. The point of the discontinuity always protrudes from low pressure to high pressure. This agrees with the rule that the wind backs before the arrival of a front and veers suddenly at its passage. Within the warm sector of a Low, that is, between the warm and cold fronts, the isobars are approximately straight lines.

Movement of pressure systems and fronts

Part IV of the Bulletin also contains information of the movement of the pressure systems and fronts.

This information is generally based either on the past behaviour of the different systems or on theoretical considerations. For example, a depression, in general, moves parallel to the direction of the isobars within the warm sector and its speed is approximately equal to that of the geostrophic wind in the warm sector. The Geostrophic scale on the working chart (F.1258) may be used for obtaining geostrophic wind speed. To obtain surface wind speed over the sea, the wind speed obtained by using this scale must be reduced by one third.

WEATHER BULLETIN FOR SHIPPING (COASTAL AREAS) (GREAT BRITAIN)

For the benefit of coastwise shipping, fishing vessels and yachts, appropriate portions of the Weather Bulletin for Shipping (Coastal Areas) are broadcast daily through British Radio coast stations by W/T and/or R/T as follows:—

Station	Position	W/T Transmission		R/T Transmission	
		Time G.M.T.	Coastal areas to which Forecast refers	Time G.M.T.	Coastal areas to which Forecast refers
*Wick (GKR)	58° 26'N. 3° 06'W.	0848 2048	<i>Northern Area</i> : Iceland, Faeroes, Fair Isle, Cromarty, Forties.	0930 2030	<i>Northern Area</i> : Iceland, Faeroes, Fair Isle, Cromarty, Forties.
Stonehaven (GND)	56° 57'N. 2° 13'W.	0830 2030	<i>Eastern Area</i> : Forth ..	0930 2030	<i>Eastern Area</i> : Forth.
Cullercoats (GCC)	55° 02'N. 1° 26'W.	0830 2030	<i>Eastern Area</i> : Dogger, Tyne, Humber, Heligoland, Thames.	0930 2030	<i>Eastern Area</i> : Tyne, Dogger.
Humber (GKZ)	53° 20'N. 0° 17'E.	—	—	0930 2030	<i>Eastern Area</i> : Humber, Heligoland.
North Foreland (GNF)	51° 22'N. 1° 25'E.	—	—	0930 2030	<i>South Eastern Area</i> : Thames, Dover.
Niton (GNI)	50° 35'N. 1° 17'W.	0848 2048	<i>Channel Area</i> : Dover, Wight, Portland.	0930 2030	<i>Channel Area</i> : Wight, Portland.
Lands End (GLD)	50° 07'N. 5° 40'W.	0848 2048	<i>South Western Area</i> : Sole, Plymouth, Biscay, Finisterre.	0930 2030	<i>South Western Area</i> : Sole, Plymouth, Biscay, Finisterre.
Portpatrick (GPK)	54° 51'N. 5° 07'W.	0848 2048	<i>Western Area</i> : Irish Sea	0930 2030	<i>Western Area</i> : Irish Sea.
Burnham-on-Sea (GRL)	51° 29'N. 2° 48'W.	0848 2048	<i>Western Area</i> : Lundy..	0930 2030	<i>Western Area</i> : Lundy.
Valentia (GCK)	51° 56'N. 10° 21'W.	0848 2048	<i>Western Area</i> : Shannon, Fastnet.	0930 2030	<i>Western Area</i> : Shannon, Fastnet.
Malin Head (GMH)	55° 22'N. 7° 21'W.	0830 2030	<i>North Western Area</i> : Hebrides, Bailey, Rockall, Malin.	0930 2030	<i>North Western Area</i> : Hebrides, Bailey, Rockall, Malin.

Station will first make announcement on 600 metres (500 kc/s.) for W/T transmission and on 181·8 metres (1,650 kc/s.) for R/T transmission and then request ships to transfer to working frequency of the particular station for reception of Weather Forecast. R/T transmissions will be broadcast at dictation speed. Forecasts cover next 24 hours after time of issue.

* The bulletins broadcast from Wick by W/T at 0848 and 2048 include ice warnings for the Iceland area

During the ice season, as necessary, warnings are broadcast when conditions in the Denmark Strait are favourable for ice to appear within 10 miles of the North Cape of Iceland. Each warning is repeated at 12-hour intervals, four times in all.

PRESSURE VALUES

EQUIVALENTS IN MILLIBARS AND MERCURY MILLIMETRES OF INCHES
OF MERCURY AT 32° F. IN LATITUDE 45°

Mercury Inches.	Milli- bars.	Mercury Milli- metres.	Mercury Inches.	Milli- bars.	Mercury Milli- metres.	Mercury Inches.	Milli- bars.	Mercury Milli- metres.
27.02	915	686.3	28.35	960	720.1	29.68	1,005	753.8
27.05	916	687.1	28.38	961	720.8	29.71	1,006	754.6
27.08	917	687.8	28.41	962	721.6	29.74	1,007	755.3
27.11	918	688.6	28.44	963	722.3	29.77	1,008	756.1
27.14	919	689.3	28.47	964	723.1	29.80	1,009	756.8
27.17	920	690.1	28.50	965	723.8	29.83	1,010	757.6
27.20	921	690.8	28.53	966	724.6	29.86	1,011	758.3
27.23	922	691.6	28.56	967	725.3	29.89	1,012	759.1
27.26	923	692.3	28.59	968	726.1	29.92	1,013	759.8
27.29	924	693.1	28.62	969	726.8	29.94	1,014	760.6
27.32	925	693.8	28.65	970	727.6	29.97	1,015	761.3
27.35	926	694.6	28.67	971	728.3	30.00	1,016	762.1
27.38	927	695.3	28.70	972	729.1	30.03	1,017	762.8
27.41	928	696.1	28.73	973	729.8	30.06	1,018	763.6
27.44	929	696.8	28.76	974	730.6	30.09	1,019	764.3
27.46	930	697.6	28.79	975	731.3	30.12	1,020	765.1
27.49	931	698.3	28.82	976	732.1	30.15	1,021	765.8
27.52	932	699.1	28.85	977	732.8	30.18	1,022	766.6
27.55	933	699.8	28.88	978	733.6	30.21	1,023	767.3
27.58	934	700.6	28.91	979	734.3	30.24	1,024	768.1
27.61	935	701.3	28.94	980	735.1	30.27	1,025	768.8
27.64	936	702.1	28.97	981	735.8	30.30	1,026	769.6
27.67	937	702.8	29.00	982	736.6	30.33	1,027	770.3
27.70	938	703.6	29.03	983	737.3	30.36	1,028	771.1
27.73	939	704.3	29.06	984	738.1	30.39	1,029	771.8
27.76	940	705.1	29.09	985	738.8	30.42	1,030	772.6
27.79	941	705.8	29.12	986	739.6	30.45	1,031	773.3
27.82	942	706.6	29.15	987	740.3	30.48	1,032	774.1
27.85	943	707.3	29.18	988	741.1	30.51	1,033	774.8
27.88	944	708.1	29.21	989	741.8	30.53	1,034	775.6
27.91	945	708.8	29.24	990	742.6	30.56	1,035	776.3
27.94	946	709.6	29.26	991	743.3	30.59	1,036	777.1
27.97	947	710.3	29.29	992	744.1	30.62	1,037	777.8
28.00	948	711.1	29.32	993	744.8	30.65	1,038	778.6
28.03	949	711.8	29.35	994	745.6	30.68	1,039	779.3
28.05	950	712.6	29.38	995	746.3	30.71	1,040	780.1
28.08	951	713.3	29.41	996	747.1	30.74	1,041	780.8
28.11	952	714.1	29.44	997	747.8	30.77	1,042	781.6
28.14	953	714.8	29.47	998	748.6	30.80	1,043	782.3
28.17	954	715.6	29.50	999	749.3	30.83	1,044	783.1
28.20	955	716.3	29.53	1,000	750.1	30.86	1,045	783.8
28.23	956	717.1	29.56	1,001	750.8	30.89	1,046	784.6
28.26	957	717.8	29.59	1,002	751.6	30.92	1,047	785.3
28.29	958	718.6	29.62	1,003	752.3	30.95	1,048	786.1
28.32	959	719.3	29.65	1,004	753.1	30.98	1,049	786.8

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