

VOL. IV. No. 38.

THE MARINE OBSERVER.

FEBRUARY 1927.

## TABLE OF PRINCIPAL CONTENTS.

|  | PAGE |
|--|------|
| Observation and Seamen's Terms ... ..                      | 23   |
| The Marine Observer's Log ... ..                           | 25   |
| Wireless and Weather an Aid to Navigation, Chapter II :—   |      |
| The Eastern N. Atlantic, Weather Systems of Temperate      |      |
| Northern Latitudes (with illustrations) ... ..             | 27   |
| Weather Charting and Forecasting ... ..                    | 30   |
| Importance of Relation of Tracks of Depression and Ship in |      |
| Weather Prediction ... ..                                  | 32   |
| The Use of Humidity Observations at Sea ... ..             | 33   |
| Local Winds, Atlantic Ocean. I. West Coasts of Europe and  |      |
| Africa ... ..  | 35   |
| Weather Signals, Great Britain and Ireland :—              |      |
| II. Wireless Weather Signals ("Weather Shipping" Bul-      |      |
| letin, C.W., Spark and R/T issues; Gale Warnings,          |      |
| Spark and R/T issues) ... ..                               | 37   |
| IV. Visual Gale Warnings ... ..                            | 41   |

Lithographic Illustrations after page 42.

Charts I to VI "Wireless and Weather" (Eastern North Atlantic) :—

I. Plotted Observations, Morning of February 25th, 1923.

II. Morning of February 25th, 1923.

III. Do. do. 26th, 1923.

IV. Plotted Observations, Morning of February 24th, 1926.

V. Morning of February 24th, 1926.

VI. Do. do. 25th, 1926.

Charts of Currents on the Tracks to and from W. Indies and Panama, Eastern Portion, February, March, April; observations of ships regularly observing for British Meteorological Office, 1910-1925.

Chart showing Mean Sea Surface Temperatures, South Atlantic, for month of February from observations of British ships during the years 1855 to 1899 and 1855 to 1878.

## OBSERVATION AND SEAMEN'S TERMS.

"They that go down to the sea in ships : and occupy their business in great waters ; These men see the works of the Lord : and his wonders in the deep."

*Psalm 107.*

## Humidity.

In this Number the use of Humidity observations at sea is introduced in a short article and an example is given showing how the dew point may be found and how closely it is related to mist.

In his "Foreword" to this Volume Dr. G. C. SIMPSON drew our attention to the interest we should take in the processes of Nature as they are manifested in the atmosphere over the oceans.

Now, humidity is one of the main agents of weather. Relative humidity is the ratio of the amount of water vapour in the air to the amount which would be contained if the air were saturated. Humidity is the most variable of the meteorological elements and possibly the most difficult to observe with accuracy at sea. By its accurate measurement over the oceans much may be learned of the processes of Nature in the atmosphere and the Corps of Voluntary Marine Observers will undoubtedly contribute much in the future to the researches of those scientists whose function it is to unravel the

mysteries of Nature and to put together bit by bit the explanation of its processes. By careful observation with the dry- and wet-bulb thermometers and the calculation of humidity, Marine Observers may also improve Wireless and Weather as an aid to Navigation, and we hope later to elaborate upon this matter of the use of humidity observations at sea.

If from the beginning of the collection of data at sea the Meteorological Office required the observation of the wet- and dry-bulb thermometers, how is it that the use of the measurement of humidity has not been pressed by the Marine Division before? The answer is simple.

The old method of temperature observation by means of thermometers in a small fixed screen with a solid back introduced for sailing ships often made accuracy of observation in steamships very difficult, if not impossible, so that the data could not be relied upon. Now that the Portable and Modified screens which were described in the July Number last year are finding their place in an increasing

number of ships, it is most desirable that this branch of observation should be pursued with energy and determination.

### Wind.

The Fourth edition of the "Marine Observer's Handbook" should reach observing ships at about the same time as this Number. It has been brought up to date and all are asked to peruse it, note changes and adopt them.

The changes in this edition are made after most careful consideration as the result of experience and may be accepted as natural evolution.

To mention one of the most important of these, the BEAUFORT wind scale. At the time when the 3rd edition was published there had been a renewed effort to bring the observation of wind force afloat and ashore into line and there was some discrepancy in terms.

In 1917 in his preface to the 3rd edition of the "Seamen's Handbook of Meteorology" by Captain CAMPBELL HEPWORTH, Sir NAPIER SHAW, the then Director of the Meteorological Office, wrote: "A good deal of time might be spent in arguing whether or not a 'Moderate gale' is really a gale in a seaman's judgment without coming to any satisfactory conclusion"; and in "Weather on the British Coasts," published in 1918, "High Wind" was given for force 7 in the specification of the BEAUFORT Scale.

In drawing up "A Combination of BEAUFORT'S Scale and the Modern Specification for use at Sea," published in the 3rd edition of the "Marine Observer's Handbook," in consultation with some very experienced seamen, we endeavoured to make a handy table based upon those which Captain HEPWORTH had given in his 2nd edition.

In view of the discrepancies in some terms for land and sea, the velocities and pressures determined by Meteorologists corresponding to the BEAUFORT numbers were given as "Meteorological Wind Scale," with a "Seaman's Wind Scale" containing the BEAUFORT numbers, the Seaman's description of wind or terms and "Deep Sea and Coastal Criterion." Thus embodying the principle that sea terms could be used to convey forces equivalent not only to the BEAUFORT numbers but to the terms used in Official Meteorology ashore, which were not given, they appearing in the "Observer's Handbook," a publication for landmen.

In the "Deep Sea Criterion" we only made such alterations as were necessary to coincide with the experience of the senior officers of the time who had gained most invaluable experience in the steel, low freeboard, deep-sea sailing ships of the Merchant Service in the 'Nineties who formed the nucleus in building the post-war Corps of Marine Observers.

For instance, we contended that a modern steel, full-rigged ship, deep laden, of the period 1890 to 1900 in a seaway with force 8, a "Fresh gale," and incidentally the least force which indicates a gale according to the established custom of the Meteorological Office, would be under an excessive press of canvas in chase (wherever a modern sailing ship required to chase) if she carried reefed upper topsails (lower topsails are set then) and whole courses, foresail and mainsail, as laid down in the 1874 specification, for she would ship very heavy water under such conditions.

The 1874 specification was drawn up by Captain TOYNBEE in consultation with seamen of his time. In TOYNBEE'S time though ships carried double topsails they were mostly built of wood, with greater freeboard, and though in smooth water the steel ships of the 'Nineties would probably stand up to more canvas and with their steel masts and yards be less likely to carry something away they would bury themselves with whole courses in a seaway by the wind, with force 8, where the more buoyant wooden ships of 1874 would be comparatively comfortable. As we used to say in the 'Nineties,

"Any fool could carry on, but it took a seaman to shorten sail." Between 1874 and 1890 the crews of sailing ships of the Merchant Service had been reduced in the growing competition with steam. Therefore force 8 was indicated as when a ship full and by can just carry reefed upper topsails and whole foresail.

The 1921 table has served its purpose.

It is of little importance now, for the younger officers have learnt much since then in estimating the wind force by the appearance of the sea from the deck of a steamer and they have learnt this in great part from their seniors who have told them just how the sea looked under varying circumstances, when, for example, a ship full and by could just carry royals, force 5, a "Fresh Breeze."

We considered that "High Wind" was not a seamanlike term for a specific wind force, though that term might be used on occasion in the plural to denote winds of higher velocity than a "Fresh breeze." "Moderate gale" was and is the term in common use amongst seamen for the force between "Strong breeze," force 6, and "Gale," force 8, or "Fresh gale," namely, force 7.

To adopt terms which might be used in official publications for both land and sea was of great importance to the Meteorological Office and therefore Dr. SIMPSON proposed reverting to the 1874 recommendation of the International Meteorological Committee, and after consulting the Sub-Committee of Marine Meteorology, on which the Admiralty, Mercantile Marine Department of the Board of Trade and the Marine Division of the Meteorological Office have nautical representatives—they unanimously supporting Dr. SIMPSON'S proposal—he placed the matter before the International Meteorological Committee at the 1926 meeting at Zürich and they have re-affirmed their 1874 resolution.

We, therefore, revert to Admiral BEAUFORT'S original terms—terms of seamen for use both afloat and ashore. These terms were laid down by BEAUFORT in 1808, a few years after Trafalgar, and were those used in the Royal Navy in NELSON'S time, when seamanship under masts and yards was at its highest pitch of perfection in that great Service; they have long been used in the Merchant Service. I write this on Trafalgar Day, 1926. It is well that seamen's terms should be preserved at sea and ashore. They will surely be found acceptable for the official purpose of Meteorology.

As JOSEPH CONRAD, that great seaman author and artist in words, puts it regarding the language of seamen in "The Mirror of the Sea":—

"To take a liberty with technical language is a crime against the clearness, precision and beauty of perfected speech wrought into perfection by ages of experience, a flawless thing for its purpose."

"A sailor's phrase has all the force, precision and imagery created by simple men with keen eyes for the real aspect of the things they see in their trade, achieves the just expression seizing upon the essential."

### Sea.

The measurement of sea and swell is another observation asked for in the 4th Edition of the "Marine Observer's Handbook," and great importance is attached to the collection of such measured observations. Not only are they required to perfect the scale proposed by Captain H. P. DOUGLAS, but when these scales have definite heights attached to the different descriptions of seas they may lead to a new specification for the estimate of wind force in power-propelled ships being made; so that those who have not the benefit of the instruction of sail-trained seamen may have another aid to the estimation of wind force.

LONDON,  
October 21st, 1926.

MARINE SUPERINTENDENT.

*Note.*—Plates produced by Lithographic process, including Charts and other large diagrams, will be found in each number after "Weather Signals."



## THE MARINE OBSERVER'S LOG.

It is hoped that these pages will be filled each month with a selection of the contributions of Mariners in manuscript, or remarks from the Logs and Reports of regular Marine Observers.  
Responsibility for statements rests with the Contributor.

## MIRAGE.

## Off Singapore.

THE following is an extract from the Meteorological Log of S.S. *Empress of Scotland*, Captain R. G. LATT, Singapore to Manila. Observer, Mr. F. G. HUTCHINGS, 5th Officer.

"3rd February, 1926, 3.45 p.m. Approaching Pedro Branca, Horsburgh Light House, Latitude  $1^{\circ} 20' N.$ , Longitude  $104^{\circ} 24' E.$ , observed phenomenal mirage effect: bearing E.S.E. It was first mistaken for a flock of white birds rising from the sea, but on noticing the altitude to be increasing and decreasing with great rapidity, it was seen to be a mirage of the breakers off N.E. Point on Pulo Bintang. The effect lasted for a period of 10 minutes, during which time it was ascending and descending from and to the sea. Distance off, 14 miles."

## LUNAR CORONA.

## Persian Gulf.

THE following is an extract from the Meteorological Report of S.S. *Barpeta*, Captain G. H. A. DENNE, coasting, India and Persian Gulf. Observer, Mr. J. W. KNIGHT, 3rd Officer:—

"February 28th, 1926, 8.30 p.m. observed Lunar Corona; the colours were very distinct and bright. Around the small corona appeared a larger circle of colours about  $8^{\circ}$  in diameter, quite distinct and entirely separate from the smaller one, which was about  $3^{\circ}$  in diameter; blue sky and stars showed clearly between these two coronæ

"The colours of the larger circle were quite plain and distinct, although not quite so bright as the smaller one. These two coronæ were clearly visible for about  $2\frac{1}{2}$  hours and then gradually disappeared.

"The sky was covered with Ci/Ci-Cu/Ci-St.

"11.30 p.m. Observed a large Lunar Halo, the diameter of which was  $29^{\circ}$ . The circle was quite complete and white in colour; at the same time there appeared a small corona close round the moon. The halo lasted for thirty minutes, then gradually disappeared, leaving only the small Lunar Corona, Ci/Ci-Cu/Ci-St. Cloud amount 9.

"Position at 8 p.m., 28th February, Latitude  $28^{\circ} 30' N.$ , Longitude  $50^{\circ} 46' E.$ "

## METEOR.

## North Atlantic.

THE following is an extract from the Meteorological Log of S.S. *Matheran*, Captain W. SANDEMAN, Oran to Newport News. Observer, Mr. H. B. KELLY, 4th Officer:—

"February 16th, 1926, about 8h. 19m. 16s. G.M.T., a meteor apparently fell into the sea, being so close that its passage through the atmosphere could be distinctly heard. Our D.R. Position being Latitude  $36^{\circ} 01' N.$ , Longitude  $49^{\circ} 26' W.$ , it bore approximately S.S.E. and in falling from west to east left a trail of sparks in its wake. The light given off from the falling body was considerable, so that for the few seconds during which the incident happened the vessel was brilliantly outlined."

## SEA ILLUMINATED AS IF FROM BELOW.

## China Sea.

THE following notes have been received from Captain BYERS, S.S. *Kwangtung*:—

"Peculiar state of the sea observed on the night of the 9th February, 1926.

"Latitude  $18^{\circ} 50' N.$ , Longitude  $113^{\circ} 40' E.$  at 7 p.m. Observed a most peculiar colour in the sea. The whole sea from horizon all round appeared as if lighted up from below, making the night quite light instead of being dark owing to the sky being quite overcast. Stratus, just a few small breaks in the clouds at times. Wind, light N.E.'ly airs. Sea smooth. Swell Nil. The sea appeared to be a very light pale green, no phosphorescence, except a few spots at times, no phosphorescence being stirred up by the wake. Heavy black banks north to west about  $5^{\circ}$  above horizon and from east to south. At 9.15 the N.W. bank passed overhead and the sea became normal. At 10.15 p.m. the same appearance came on again, returning to normal at 2.15 a.m. 10.2.26. Barometer at 8 p.m. 1014.5mb. Vessel bound to Hong Kong."

## CURRENT OFF THE COAST OF ANAM.

## China Sea.

THE following remarks from H.M.S. *Carlisle*, Captain R. S. MACFARLAN, R.N., Hong Kong to Singapore. Observer, Lieutenant-Commander R. D. KING HARMAN, R.N., have been forwarded by the Hydrographer of the Navy:—

"February 24th–28th, 1925. In company with *Hawkins*. Route followed: westward of Paracels and 15 miles eastward of Cape Varella, as described in 'China Sea Pilot,' Vol. III, p. 45. The favourable current along the Anamese coast was running at  $2\frac{1}{2}$  knots between Cape Varella and Cape Padaran.

"This route, as described in the 'Sailing Directions' and 'Ocean Passages,' appears much the quickest one in N.E. Monsoon. *Foxglove*, who made the passage to Singapore a fortnight later, came down by the Main Route (eastward of Paracels) and did not experience so strong a favourable current—weather conditions being similar."

## QUEENSLAND COAST.

## Notes on Weather, Winds and Tides, etc.

BY CAPTAIN N. G. ROSKRUGE, DEPUTY DIRECTOR OF NAVIGATION, QUEENSLAND.

## Weather.

THE Queensland Coast may be divided into three divisions having distinctive general weather characteristics, viz.:—

The Gulf of Carpentaria division with a coast-line of about 500 miles;

The Tropical portion of the East Coast with a coast line of 1,100 miles; and

The Sub-tropical part of the East Coast with a coast-line of 350 miles.

In the Gulf of Carpentaria division the South-east monsoon or dry season occurs from April to November. These winds bring no rain and are from moderate to strong in force. From December to March the North-west monsoon or wet season prevails. The wind in

the early part of the season backs from East to about North during the day, getting more and more to the North-west as the season advances. Thunder squalls are frequent with heavy rains, and cyclones during this season sometimes cross the Gulf of Carpentaria.

In the Tropical portion of the East Coast the South-east trade winds prevail during May to November, particularly so in the Northern part of this division. These winds sometimes blow with considerable strength, but fine weather is mostly experienced. The North-west monsoon reaches the Torres Straits about the middle of December and extends Southwards to Cairns—sometimes as far South as Townsville—in January and February, retreating Northwards again about the end of the latter month. Thunder squalls with heavy rains are frequent during this season and cyclones are not uncommon.

In the Sub-Tropical portion of the East Coast the summer winds are north-easterly and the winter winds south-westerly; south-easterly winds, however, occur at intervals throughout the year and heavy weather from the South-east with or without rain is occasionally experienced. The winter months—all too few—bring ideal cool weather. Occasional westerly gales of moderate strength are experienced, but do not, as a rule, extend far off the land; they are always preceded by a sudden fall of the barometer. The North-easterly winds usually commence towards the end of September or early in October; they start up during the forenoon and blow from force 3 to perhaps 6 during the afternoon and well into the night, dying down after midnight, and they frequently breed thunderstorms over the land, particularly in November and December.

With drought conditions the summer winds blow more from the North and North-west, not so strong, as a rule, as the North-Easters, and are nearly always accompanied with haze, sometimes very dense, obscuring the land at a few miles' distance.

The characteristics of the South-east winds in this division are that when moderate they start up in the early morning and die down at sundown, but off the land they continue to blow during the night, changing, perhaps, to South or S.S.W. When South-east winds are strong they are often accompanied by rain squalls and on rare occasions develop into severe gales veering from E.S.E. to E.N.E.

### Cyclones.

With the exception of publications of Australian origin, few, if any books give mariners much information relating to cyclones on the Australian Coast. The writer has met many Commanders of oversea vessels, who have expressed much surprise on having experienced or heard of cyclonic disturbances on the Queensland Coast during months other than from December to April. In Bulletin No. 16, 1925, issued by the Commonwealth Bureau of Meteorology, Melbourne, on Australian Hurricanes and Related Storms, a list of cyclones which actually affected the Queensland Coast during the 34 years from 1890–1923 is given. Of the 149 cyclones in the list, January leads with 33, March has 32, February 27, April 14, December 10, June 8, July 7, May 6, September 5, October 4, November 2 and August 0. Although the majority of the cyclones occur between the months of December and April, inclusive, it cannot be said there is no risk of cyclones during the remaining seven months of the year. Cyclones are more frequent in Queensland than any other part of the Australian Coast. Those affecting Queensland usually approach the Eastern Coast from an Easterly or North-easterly direction. Many recurve near the Coast and pass Southwards sometimes as far as Cape Moreton or Danger Point, and then move off in a more Easterly direction towards Lord Howe Island or Norfolk Island. Some recurve before getting near the Coast and pass Southwards and Eastwards. A few, however, especially those which approach the Northern portion of the Cape York Peninsula, pass inland and either move across the Gulf of Carpentaria towards the Northern Territory or break up or recurve in the interior and pass out to sea again across Southern Queensland. Although the path of cyclones operating off the Queensland Coast is usually as stated above, their movements are by no means certain as some of the more Northerly disturbances have been known to form near the Coast and move Northwestwards across the Cape York Peninsula. It is not always realised by mariners that many cyclonic disturbances develop South of the tropics—off the Southern Coast of Queensland and the Northern Coast of New South Wales.

Cyclones in Queensland have been responsible for many shipwrecks—including heavy loss of life—and very serious damage has been done to property on shore. It is estimated £1,000,000 worth

of property was destroyed and 30 lives lost at Mackay in 1918 as the result of a cyclone accompanied with 10 to 12 feet rise of the tidal waters, both at Mackay and along the coast and adjacent islands. The Barograph ceased to register at 28"—the Mercurial Barometer fell to about 27·8". Cyclones which blow in on the coast frequently cause a considerable rising of tidal waters.

NOTE.—The above remarks briefly state some of the characteristics of cyclonic disturbances on the Queensland Coast as have actually taken place, but which are not mentioned in books compiled for the guidance of mariners regarding Tropical Revolving Storms generally. The Practical Rules for Seamen in Tropical Cyclones as laid down in the British Barometer Manual are nevertheless applicable to cyclonic disturbances off the Queensland Coast.

### Tides.

#### (a) General :—

At the head of the Gulf of Carpentaria—ports of Burketown and Normanton—the tidal movements are governed by the diurnal declinational components giving rise to the phenomenon of one tide in 24 hours.

At Thursday Island the Tidal movements are particularly irregular and are believed to be controlled by the trade winds, ocean currents, etc., and no means have yet been discovered to predict them with any certainty.

From Cooktown, Northwards, the tides appear to be irregular.

On the remainder of the East Coast of Queensland—from Danger Point as far North as Cooktown—the tides are of the regular semi-diurnal type, having a considerable diurnal inequality in time and height, caused by a large diurnal component. Tide Tables for the Port of Brisbane, together with the Tidal constant to be applied to find the time of High or Low Water at other Queensland Ports South of Cooktown, are issued annually by the Queensland Harbours and Rivers Department, Brisbane.

#### (b) Effect of wind and atmospheric pressure upon the height of Tides at Queensland Ports :—

The atmospheric pressure has practically no effect on the Tides on the Queensland Coast. In the Gulf of Carpentaria the Tidal range is very much smaller and the mean sea level is lower during the South-east monsoons than during the North-west monsoons, attributed locally to the effect of the prevailing off shore and on shore winds respectively.

In the Torres Straits the Tidal currents—and possibly the Tidal heights also—are influenced to some extent by the direction of the wind. The following are the opinions of practical seamen at the ports mentioned hereunder, in respect to the effect of wind on the tides at their respective ports, based on personal experience.

**Thursday Island.**—Captain W. A. FLORENCE, Harbour Master and Pilot—"During the North-West Monsoons—December to March—the lowest tides occur during the night and the highest during the day. The highest tides usually occur during January and February.

"During the South-east monsoons—April to November—the tides are highest during the night and lowest during the day.

"The tidal currents—more than the tidal heights—are influenced by the monsoonal winds; this is more noticeable in the case of the South East Monsoons when the tidal flow—Westerly—is so much prolonged that no ebb current—Easterly—is apparent for sometimes two to four days, although the rise and fall of the tides actually take place. Similarly, during the North-west monsoons the Easterly Tidal Current is greatly increased and prolonged."

**Cairns.**—Captain J. BREWSTER, Harbour Master and Pilot—"Generally speaking the S.E. winds have a tendency to back the water up in the harbour, increasing the tides above the calculated heights. Under the same conditions low tides recede less than anticipated.

"North-westerly winds have the reverse effect, inasmuch as the tides do not reach the anticipated heights."

**Townsville.**—Captain J. WILLIAMSON, Harbour Master and Senior Pilot—"South-east, east and north-east winds force the tides up, giving one foot to eighteen inches more water than would be expected under normal conditions. It is also noticed that with the wind in this vicinity the tides hang up after high water. North to North-west and Westerly winds have just the opposite effect, for the height of the



tides will not reach what is expected under normal conditions by from one foot to eighteen inches. During cyclonic weather the tides are erratic, especially at Neaps, and the usual range between High and Low Water is sometimes reduced to only a few inches."

**Bowen.**—Captain J. M. AHERN, Harbour Master and Pilot—"The force and direction of certain winds are very distinct factors in producing a marked effect upon the behaviour of the tides :—

"South-easterly winds are, according to their strength, invariably foretold from 24 to 48 hours in advance by the acceleration and prolongation of the high water. Both high and low tides are considerably augmented under the influence of S.E. winds. Easterly winds have a similar effect to S.E. winds, only to a lesser degree.

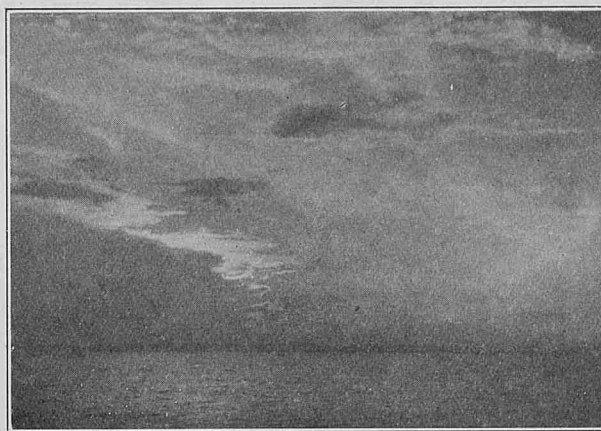
Winds from N.W. to S.W.—especially Westerlies, produce the opposite effect to the above. These winds are less frequent and their arrival does not appear to be presaged by any preliminary action of the tides.

Winds from any direction, other than those mentioned, do not appear to have any effect upon the tides."

**Gladstone.**—Captain J. PAINE, Pilot—"Strong Easterly and South-easterly winds are inclined to back up the height of the tides both at Springs and Neaps."

## CLOUD PHOTOGRAPH TAKEN AT MELBOURNE, AUSTRALIA.

The accompanying photograph has been received from Captain T. V. ROBERTS, S.S. *Euripides*, taken at Melbourne.



Sunrise. 19th February, 1926.

## WIRELESS AND WEATHER. AN AID TO NAVIGATION.

### CHAPTER II.

### THE EASTERN NORTH ATLANTIC.

#### Weather Systems of Temperate Northern Latitudes.

By charting atmospheric pressure at sea level, temperature, wind and weather conditions, continuously for many years, meteorologists have discovered that different types of pressure systems usually produce certain kinds of weather, and in 1883 the Hon. RALPH ABERCROMBY made the following important *generalisations*, and laid down the seven fundamental shapes of isobars :—

(a) That in general the configuration of the isobars takes one of seven well-defined forms.

(b) That independent of the shape of the isobars, the wind always takes a definite direction relative to the trend of these lines, and the position of the nearest area of low pressure. (There are occasional exceptions to this rule when the land interferes, marked examples have been found on the coasts of Australia.)

(c) That the velocity of the wind is always nearly proportional to the closeness of the isobars.

(d) That the weather—that is to say, the kind of cloud, rain, fog, &c.—at any moment depends on the shape and not the closeness of the isobars, some shapes being associated with good and others with bad weather.

(e) That the regions thus mapped out by the isobars were constantly shifting their position, so that changes of weather were caused by the drifting past of these areas of good or bad weather, just as on a small scale rain falls as a squall drives by. The motion of these areas was found to follow certain laws, so that forecasting weather changes in advance became a possibility.

(f) That in the temperate zones sometimes, and habitually in the tropics, rain fell without any appreciable change in the isobars, though the wind conformed more regularly to the general law of these lines; this class of rainfall is called "non-isobaric rain."

It is important always to remember BUYS' BALLOTS Law, viz. :—

*In the Northern Hemisphere face the wind and the barometer will be lower on your right than on your left.*

*In the Southern Hemisphere face the wind and the barometer will be lower on your left than on your right.*

The wind is sometimes parallel to the isobars but more often it inclines towards the nearest low pressure.

#### The Fundamental Shapes of Isobars.

These are illustrated by weather charts taken from the daily weather report of N.W. Europe, in which the land has been intentionally omitted; it must therefore be remembered that some of the winds are influenced by the land and may not in all cases conform to the rules of free air over the ocean, though generally they are similar :—

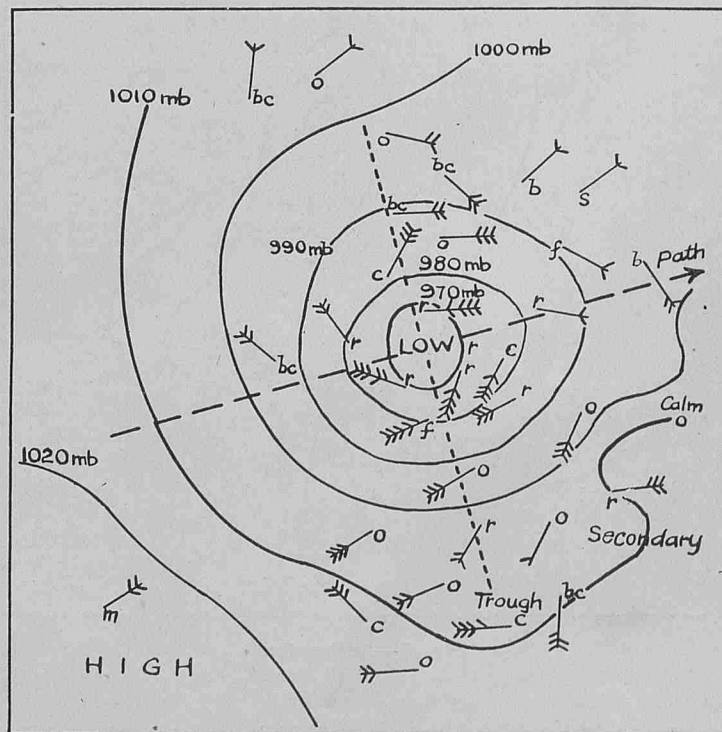


Fig. 3—Cyclone and Secondary.

1. The Cyclone.—An area of low pressure bounded by circular or oval isobars. FIGURE 3.

2. The Secondary Cyclone, or shortly "secondary," a small circular depression, subsidiary to the foregoing. FIGURES 3 and 7.

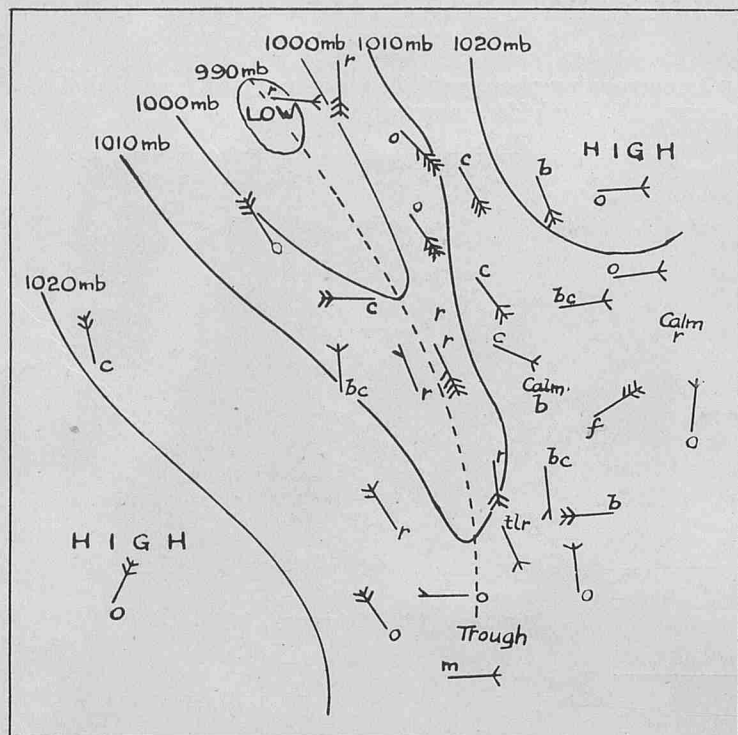


Fig. 4—V-shaped depression.

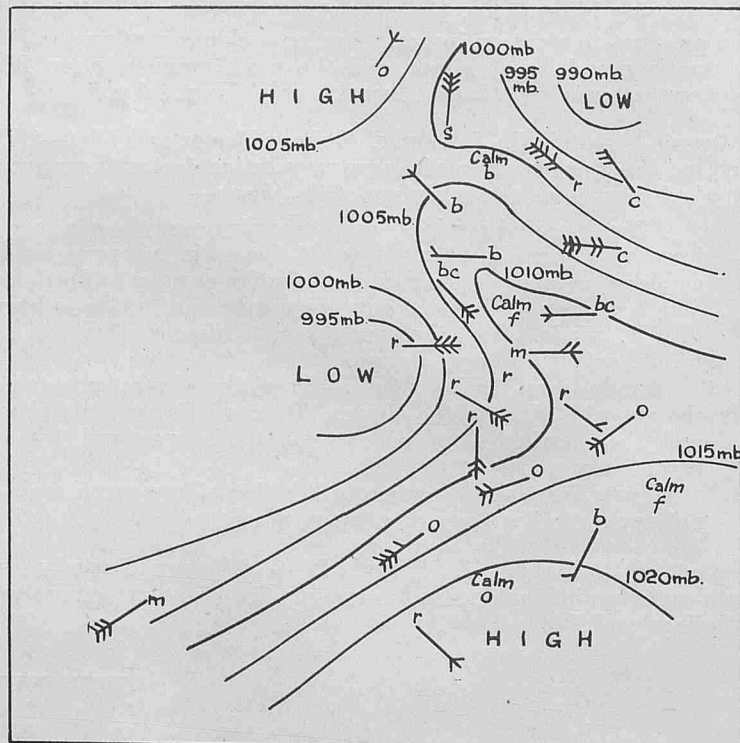


Fig. 6—Wedge.

3. The V-shaped Depression.—An area of low pressure bounded by V-shaped isobars, something like a secondary but differing from it in many important particulars. FIGURE 4.

7. The Col or neck of low pressure lying between two adjacent anticyclones. FIGURE 8.

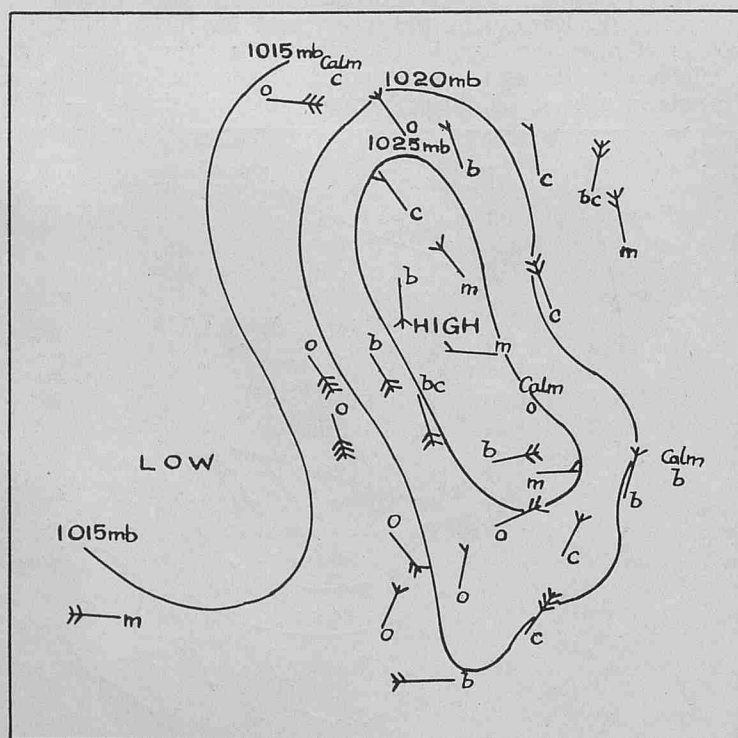


Fig. 5—Anticyclone.

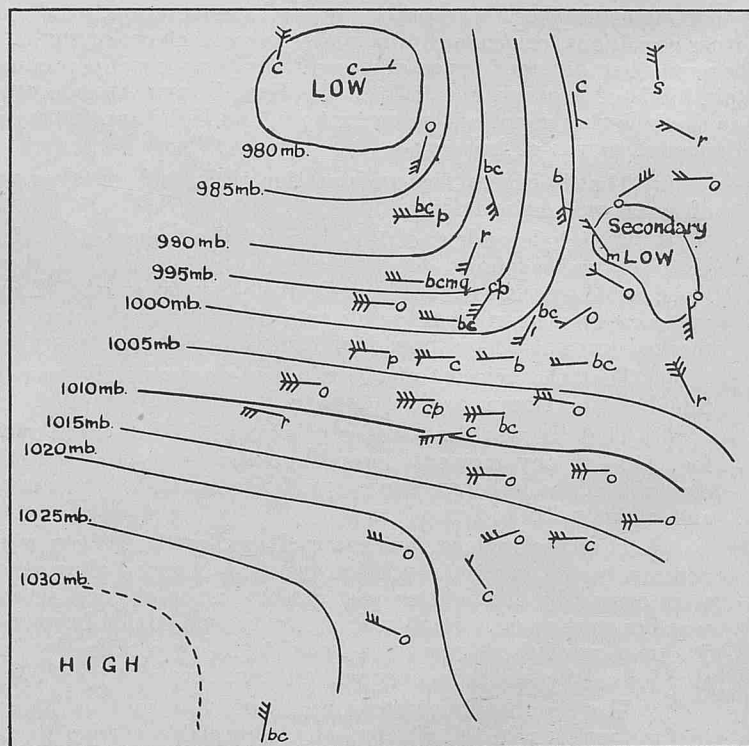


Fig. 7—Straight isobars between Cyclone and Anticyclone.

4. The Anticyclone.—An area of high pressure, bounded by circular or oval isobars. FIGURE 5.

5. Wedge-shaped Isobars.—An area of high pressure bounded by isobars converging to a point like a wedge. FIGURE 6.

6. Straight Isobars.—A barometric slope, across which the isobars lie in straight lines. FIGURE 7.

Cyclones, V's and Secondaries usually move in an easterly direction in the temperate zones, but they sometimes travel to the westward, which makes forecasting extremely difficult.

Anticyclones are sometimes stationary for long periods; they may be called the feeders of cyclones and affect their course and movement.

**Cyclones.**—Closed isobars, usually circular or elliptical in shape, with low pressure at the centre. The wind blows round and towards



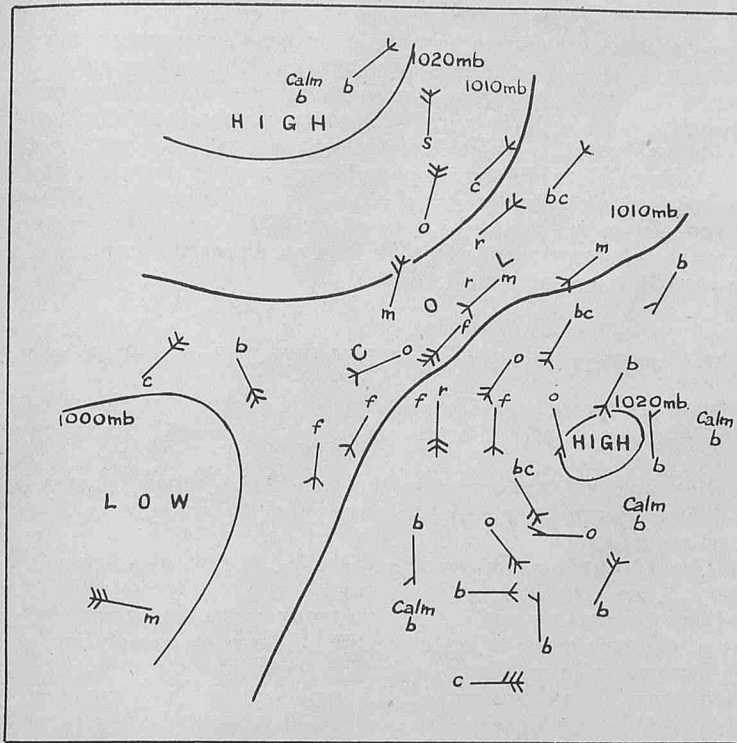


Fig. 8—Col.

the centre anti-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.

The path of a cyclone is the path taken by its centre. The trough is a line drawn through the centre, usually at right angles to the path. At places before the trough the barometer is falling, and in rear of the trough it is rising. Near the trough the wind may shift suddenly and there may be much rain. The temperature is always higher in front of the trough than in the rear. In front of a cyclone the weather is usually muggy, particularly on the right front in the Northern Hemisphere and in the left in the Southern Hemisphere. In rear the weather is usually cool and exhilarating. FIGURE 3 shows the wind circulation. FIGURE 9 illustrates the cyclone prognostics.

In extra tropical cyclones there is seldom calm at the centre, and the barometric gradient is not necessarily steepest near the centre, so that the strongest winds may sometimes be experienced at some distance from the centre. Cyclones vary in intensity; when deep they cause gales, but when shallow may only cause moderate winds; they may bring much rain or none at all.

If we imagine the conditions of the cyclone in FIGURE 3 with its isobars, wind arrows, and weather, and the prognostics in FIGURE 9 to be embodied in one system, and that we are a stationary observer in its path, we shall get an idea of the sequence of events that will pass over us in a cyclone travelling in an east-north-easterly direction, which will be valuable when by making a weather chart from W/T reports we find that one of these systems is approaching.

In a ship under way at sea it will be necessary to consider not only the movement of the system, but the course and speed of the ship with relation to it.

**Secondary Depression.**—A bend in the isobars usually on the equatorial side of cyclones.

Secondaries usually travel in the same direction as, and sometimes faster than, the main cyclone; they may have their own wind circulation or cause an alteration in the direction and force of the winds in their neighbourhood in the main cyclone.

They usually produce rain and sometimes much wind, caused by the crowding together of the isobars on the equatorial side of the main cyclone. Secondaries are often associated with thunderstorms.

Their conditions are very variable, and so make forecasting difficult.

**V-shaped Depression.**—Named thus from the shape of the isobars enclosing an area of low pressure.

The V points in an equatorial direction. The wind blows along the isobars and towards the trough which passes through the points of the V's formed by the isobars. Forward of the trough there is

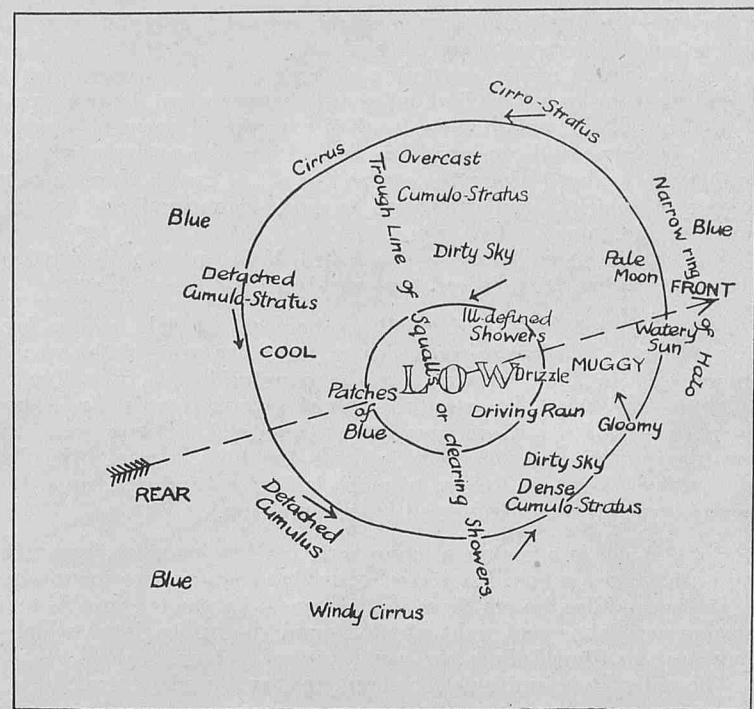


Fig. 9—Cyclone Prognostics.

much cloud and rain; as the trough passes there is a sudden shift of wind, often accompanied by heavy squalls. When the trough passes, the weather clears. Westward of V's the weather is usually very clear.

**Anticyclone.**—A high pressure system. The atmospheric pressure is highest near the centre enclosed by isobars, usually more or less circular or oval and widely separated. These systems often cover a large area in which the air is comparatively calm and cool near the centre, while at the outskirts the wind blows round the centre in the opposite direction to that of a cyclone and inclining out from it.

FIGURE 10 shows the general prognostics for summer and winter anticyclones in the region of the British Isles.

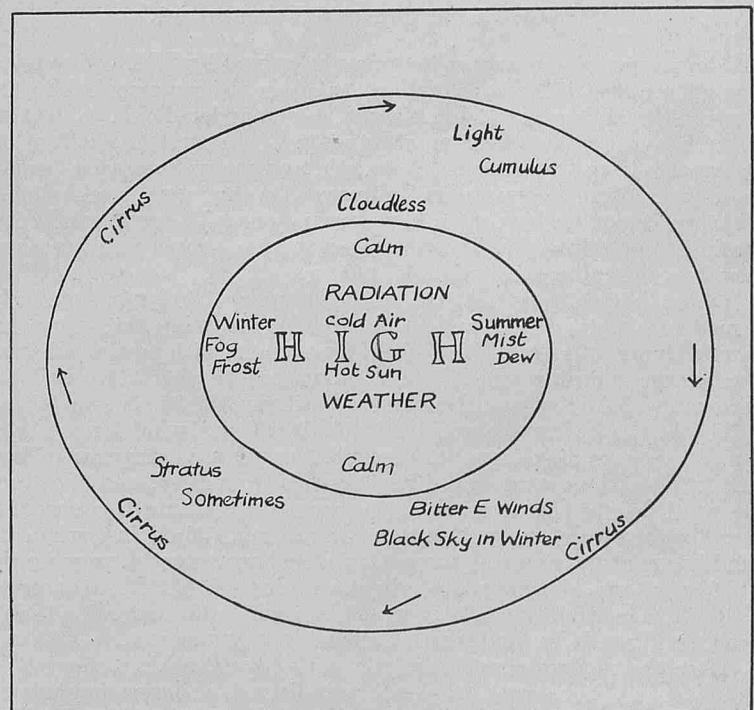


Fig. 10—Anticyclone Prognostics.

The changes of weather at places in anticyclones are often caused more by diurnal variations than by the movement of the system as in cyclones.

**Wedge.**—Just as an anticyclone is of opposite characteristics to a cyclone, so is a wedge the converse of a V.

Wedge-shaped isobars enclosing an area of high pressure, usually extending from an anticyclone polewards between two depressions.

In front of the wedge there is often a region of very fine weather, with northerly winds in northern latitudes and southerly winds in southern latitudes. Along the centre line of the wedge there is calm; in rear of this line the winds are from an equatorial and westerly direction and there is often rain.

The wedge usually moves eastward between two depressions; hence the saying, "It cleared too quickly to last."

**Straight Isobars.**—Occasionally isobars are straight over a large area. Usually the low pressure lies on the polar sides of the straight isobars and the high pressure on the equatorial side, therefore the winds are westerly. In areas of straight isobars there may be great diversity of weather, from overcast or cloudy skies, with some rain towards the low and blue sky towards the high. Straight isobars are not persistent in extra tropical latitudes, and the area they occupy is usually soon traversed by a depression.

**Col.**—A col is a region of comparatively low pressure, separating two anticyclones much like a kloof or ravine between two mountains.

In the middle of a col there is little or no barometric gradient; in it there are calms and light airs. Round the anticyclones which it separates the wind follows the usual laws of isobars.

The col gives conditions for cloud, fog, or thunderstorms.

Anticyclones being usually more or less stationary, the col may be considered a place of weakness through which depressions may pass. It is an area of unsettled weather without much wind.

The foregoing is a general description of the seven fundamental shapes of isobars which may be found in ever-varying complexity. These isobars being lines of equal pressure may be likened to the contour lines of sea soundings found on navigating charts. They represent lines of equal atmospheric pressure weighing down upon the earth, and if we think of the atmosphere as a great envelope of air which is suffering constant local changes of weight covering the earth, and in which the earth rotates, we shall see that these isobars are simply a graphic means of showing the distribution of pressure at any moment over an area of the surface of the globe. The wind is the flow of air from high towards low pressure influenced in direction by the rotary motion of the earth.

### Weather Charting and Forecasting.

To show some advantages which may be gained by W/T communication at sea we will first consider the observations recorded in the Meteorological log of R.M.S. *Ormuz*, Commander E. P. CAMERON, R.D., R.N.R., on the morning of Sunday, February 25th, 1923, when on passage from Gibraltar to Plymouth, and see what can be gleaned from them alone. Then we will suppose that she intercepted Wireless Weather Reports which gave her observations of a number of Coast Stations and ships at a distance, show how a simple weather chart may be constructed and what it tells us.

*Ormuz* left Gibraltar at 6 p.m. on February 23rd, wind westerly, a moderate gale which backed to W.S.W. at midnight, when the barometer was 1012 mb. (29.89 in.), sky overcast with passing showers. During the morning watch the wind veered to the N.W. and the barometer rose slowly. At noon in Latitude 37° 38' N., Longitude 9° 11' W. the barometer was 1018 mb. (30.06 in.), wind force 6, blue sky. After rounding Cape St. Vincent the swell was very heavy from N.W.; later there were two distinct swells from N.W. and West and the wind dropped to force 4. The barometer continued to rise until at midnight on February 24th it read 1023 mb. (30.21 in.), when the wind backed to west again, force 5, and the barometer fell very slowly. At 8 a.m. on February 25th in Latitude 41° 43' N., Longitude 9° 16' W., the wind was S.W., force 5, barometer 1021 mb. (30.15 in.), swell, confused N.W. and North decreasing, sky overcast.

Now the moderate westerly gale with slight backing of wind at midnight on February 23rd possibly indicated a depression passing far to the northward. The heavy N.W. swell experienced when clear of Cape St. Vincent some time later and the veering of the wind to N.W. supports this; so that *Ormuz* would have evidence of past bad weather over her intended route.

The backing of the wind to west at midnight on February 24th with slow fall of the barometer as the ship steamed to the northward,

and further backing of the wind at 8 a.m. on February 25th, would lead Captain Cameron to expect the approach of another depression from the Atlantic; but his own observations alone could not give him an idea of the extent, intensity or probable movements of this depression.

Let us see what Wireless Weather Reports charted, tell us of these and how the weather which *Ormuz* may expect will be affected by them.

Different ships different long splices; in some ships reports may be decoded on the bridge, in others in the Wireless Office. Whatever the procedure is, it will be convenient to the navigator if weather reports are always written out in the same concise form, and that on page 31 is recommended.

### Making Weather Charts of Pressure, Wind and Weather.

OVER a portion of a small scale chart for the part of the world the ship is in, pin a piece of tracing paper, or, better still, use a suitable outline chart.

Meteorologists use maps on the conical projection because these have less distortion, but for the purpose of the navigator a Mercator chart is preferable.

Take CHART I. as an example. At the position of a few suitably-disposed coast stations, with a protractor, lay off wind arrows, each feather representing one of the BEAUFORT scale; the arrows fly with the wind, their heads indicate position. Abreast these stations write the barometer in millibars or inches (both are given here for the convenience of all concerned), the tendency of the barometer, the weather indicated by the letters of the BEAUFORT Notation, and the visibility, indicated thus: Vis. V. G., Vis. Poor, and so on.

Plot the position of the reporting ships, and draw wind arrows, heads at positions. Write the name of the ship reporting, the barometer, weather, course and speed and barometric tendency. Sea and air temperatures are also written under the name of the reporting ships, but in this case we will omit temperatures, &c., in order to make the chart as simple and clear as possible. In later examples it will be shown how much more can be done if these are plotted and used also.

Next, pick out the lowest barometer reading plotted on the chart and facing the wind, to the right, with soft pencil, write LOW; also pick out the highest barometer reading on your chart and facing the wind, to the left write HIGH. When this has been done, if there is a well-defined weather system, it will be seen that the wind arrows give a general indication of how the wind is circulating at the surface.

In this case it is quite evident that *Montcalm* is in a depression, and the wind arrows of all ships shown and stations northward from Holyhead conform to the circulation of the fore part of a cyclonic depression. The wind arrows at Scilly, Jersey and Dungeness appear to differ from the main circulation and these must be carefully examined. It will be noted that the N.E. wind at Dungeness is blowing nearly athwart that at Tynemouth and in a direction nearly opposite to that at Jersey. It will also be seen that the barometer at Dungeness is lower than at Jersey, Scilly and Tynemouth, although these stations are not so far from the main Low.

Clearly some other influence to the wind circulation is indicated and BUYS BALLOT'S Law shows us that there must be another Low somewhere S.E. of Dungeness; this we indicate by the letter L. In practice we should continue on the same chart, but in order that what has been already written may be quite clear to the reader we use CHART II. The wind circulation, as now indicated upon CHART I., will give us a very good idea of the trend of the isobars for the wind blows along isobars inclined towards the Low.

Therefore, remember Buys Ballot's Law, for it helps us greatly, especially at sea, away from the land and local causes. Ashore the wind may not conform so nearly to this Law.

The lowest barometer recorded at *Montcalm's* position is 989 (29.21). For practical purposes at sea isobars drawn for every four mbs. (.12 of an inch) will be convenient, stepped from 1,000 mb. (29.53 in.).

Thus the lowest proved isobar of this stepping on this chart will be 992, but it is evident with the knowledge of experience that there are actually isobars of lower value to the N.W. It will, therefore, be convenient to dot in the 988 (29.18) isobar passing close to the N.W. of *Montcalm's* position.

The 992 isobar is lightly drawn in passing west of Malin Head and N.W. of *Berengaria*, the S. Easterly wind at Malin Head will guide



## Coast Weather Reports—0700 G.M.T. February 25th, 1923.

| Station.         | Barometer tendency. | Weather.                | Visibility.        | Barometer.    | Wind.      |        |
|------------------|---------------------|-------------------------|--------------------|---------------|------------|--------|
|                  |                     |                         |                    |               | Direction. | Force. |
| Wick - - - -     | Steady - -          | Continuous light rain - | Very good - -      | 1002<br>29.59 | S.S.E.     | 5      |
| Malin Head - - - | Steady - -          | Overcast - - -          | Moderate - -       | 993<br>29.32  | S.E.       | 4      |
| Holyhead - - -   | Steady - -          | Continuous heavy rain - | Poor - - -         | 997<br>29.44  | S.S.E.     | 3      |
| Scilly - - - -   | Rising slowly -     | Blue sky - - -          | Very good - -      | 1001<br>29.56 | N.W. by W. | 2      |
| Jersey - - - -   | Rising - - -        | Rain - - - -            | Good - - -         | 1002<br>29.59 | W.         | 3      |
| Dungeness - - -  | Rising slowly -     | Blue sky - - -          | Good - - -         | 999<br>29.50  | N.E.       | 2      |
| Yarmouth - - -   | Rising slowly -     | Continuous light rain - | Thin fog or mist - | 1001<br>29.56 | E. by N.   | 1      |
| Tynemouth - - -  | Steady - - -        | Continuous light rain - | Moderate - - -     | 1001<br>29.56 | S.S.E.     | 3      |

## Ships' Reports—0700 G.M.T., February 25th, 1923.

| Ship.                    | Lat.      | Long.     | Bar.          | Wind.      |       | Weather.                  | Course. | Speed. | Bar. Tendency.  | Current. | From |       | To   |       | Temp. |      | Swell.            | Past Weather. |
|--------------------------|-----------|-----------|---------------|------------|-------|---------------------------|---------|--------|-----------------|----------|------|-------|------|-------|-------|------|-------------------|---------------|
|                          |           |           |               | Direction. | Force |                           |         |        |                 |          | Lat. | Long. | Lat. | Long. | Air.  | Sea. |                   |               |
| <i>Ormuz</i> -           | 41° 43'N. | 9° 16'W.  | 1021<br>30.15 | S.W.       | 5     | Overcast                  | N.10°E. | 14     | Falling slowly. | —        |      |       |      |       | 56°   | 54°  | W. Heavy          | Overcast.     |
| <i>Michigan</i> -        | 49° 43'N. | 13° 36'W. | 1000<br>29.53 | S.W.       | 8     | Overcast                  | S.88°W. | 7½     | Falling         | —        |      |       |      |       | 51°   | 50°  | S.W., very heavy. | Rain.         |
| <i>La Paz</i> -          | 40° 35'N. | 21° 31'W. | 1013<br>29.92 | S.S.W.     | 6     | Overcast, damp.           | S.27°W. | 6½     | Steady          | —        |      |       |      |       | 61°   | 55°  | N.W. Heavy.       | Cloudy, damp. |
| <i>Berengaria</i>        | 48° 42'N. | 19° 36'W. | 995<br>29.38  | S.W.       | 7     | Overcast                  | N.72°E. | 24     | Falling slowly. | —        |      |       |      |       | 53°   | 56°  | Confid.           | Cloudy.       |
| <i>Montcalm</i>          | 54° 46'N. | 12° 00'W. | 989<br>29.21  | S.W.       | 6     | Cloudy                    | —       | —      | —               | —        |      |       |      |       | 48°   | 48°  | S.W. Mod.         | Cloudy.       |
| <i>Edinburgh Castle.</i> | 43° 50'N. | 9° 27'W.  | 1015<br>29.97 | W.S.W.     | 6     | Passing showers, squally. | S.30°W. | 15½    | Rising          | —        |      |       |      |       | 54°·5 | 54°  | W.S.W., heavy.    | Rain.         |

us in its S.S.E. trend past that station, and *Montcalm* and *Berengaria's* barometers and winds make us curve it rather abruptly over N.W. Ireland to the S.W., thus passing through places which are estimated to have the same barometric pressure. We are guided in drawing the 996 (29.41) isobar by the barometers and winds at Wick, Malin Head, Holyhead, *Michigan* and *Berengaria*, but to draw the 1,000 isobar is not quite such a simple matter.

It is evident that the 1,000 isobar passes South, to the westward of Wick and Tynemouth, but BUYS BALLOT'S Law forbids that we take it close to the eastward of Dungeness. Here the wind direction conforms to an isobar running in a S. Westerly direction, and as the 1,000 isobar cannot pass from the N.E. past Dungeness to the westward it must trend to the eastward somewhere between Tynemouth and Dungeness. We therefore dot it in round the L already marked and curve it to the northward to pass close west of Dungeness, thence Jersey, Scilly and *Michigan* will be our guide.

Next we rough in the 1,020 (30.12) isobar with *Ormuz* as our guide. *La Paz* and *Edinburgh Castle* guide us in placing the 1,016 (30.00) isobar. The 1,012 (29.89), 1,008 (29.77) and 1,004 (29.65) isobars are roughly spaced between.

When the isobars which it is possible to draw with the observations available are roughed in, using pencil and indiarubber we improve them, making them close together where the wind is strong and wider apart where it is light, so that their spacing will roughly show the gradient. In doing this we must be careful not to smooth out too much curves which may indicate secondaries, but remember that we only have observations at widely separated points from which we want to obtain a general idea of pressure distribution.

Our weather chart is now complete and from it we draw the following inference :—

A large cyclonic depression centred N.W. of *Montcalm's* position is causing S. Westerly strong winds to fresh gales from Latitude 40° N. over the Eastern North Atlantic as far north as Latitude 57°, with a secondary depression extending S. Eastward centred S.E. of Dungeness, causing variable winds over the English Channel.

From the chart we learn that as *Ormuz* proceeds on her course, her weather will be influenced more by the depression. She would note that the barometer was rising or rising slowly at the three stations on the coasts of the English Channel indicating an eastward movement of the secondary.

The steady barometer reported at stations northward from Holyhead gives no indication of the approach to that area of the main depression. *Michigan's* falling barometer is to be expected on her course to the westward as she approached the trough whether the depression is stationary or travelling in an easterly direction.

*Berengaria's* slow falling barometer on a N. 72° E. course steaming 24 knots with a moderate gale from S.W. requires careful examination. If the depression is stationary and is neither deepening nor filling up as *Berengaria* steams eastward at high speed, the barometer would rise slowly. If the depression is deepening and stationary, *Berengaria*, in advance of the trough steaming fast to the eastward would experience a falling or steady barometer; or if the depression was maintaining the same barometric gradient and travelling eastward faster than *Berengaria* her barometer would fall.

The chart shows that secondaries have formed. Many of the severest gales in the Eastern North Atlantic and over the British coasts have been caused by secondaries forming to the southward

of main depressions, westward of Ireland. Now with the indications that our chart gives, we see that this main depression is probably nearly stationary, and *Berengaria's* observations indicate that barometric pressure is reducing at a point eastward of the trough and south of the centre, which probably indicates the forming of a secondary, or, if not, the steepening of the barometric gradient in the main depression itself. Either would cause violent winds.

*Ormuz* therefore forecasts a heavy south-west gale in the Bay of Biscay.

According to the Meteorological Log, the wind commenced to freshen at 2.5 p.m. when Cape Villano was abeam. *Ormuz* was near the 7 a.m. latitude of *Edinburgh Castle* at about 6 p.m. when her barometer had fallen to 1,012 (29.89) approximate, showing that pressure had reduced at this position since the morning reports by about 3 mb. (.09 in.), thus adding to our expectation of a steepening gradient. With the morning chart we can almost see what is happening for there surely must be a depression deepening and stationary to the N.W., maybe it is deepening and travelling on a converging course to our own, or it may be travelling eastward without material change of gradient.

By 4 a.m. the wind increased to a heavy S.W. gale force 10, with squalls and misty rain, the ship labouring heavily to a precipitous sea.

MONDAY, FEBRUARY 26TH, 1923.

Next morning, when reports have been received, CHART III is made in the same manner. From it we see that there were good grounds for thinking that a secondary was forming in the vicinity of Latitude 50° N., Longitude 20° W., for the cyclone now centred some 100 miles to the westward of Valentia was probably developed from a secondary.

With the barometer falling very rapidly at Valentia, Malin Head and Holyhead, representing a very rapid reduction of pressure in a line N.E. from the centre, while it is falling quickly (less rapidly) at stations on either side of the line of bearing, the cyclone may be expected to travel N. Eastward as indicated by the arrow drawn upon the chart.

*Ormuz* therefore expects the gale to continue from the westward for a time along her route to Plymouth; as the cyclone passes away to the N.E. the wind may be expected to moderate. By the time the evening routine reports are received, *Ormuz* will be at Plymouth or bound up Channel, and her officers being fully occupied with the navigation of the ship in crowded narrow waters may, instead of making charts and their own forecast, prefer the forecasts made at the Meteorological Office for coastal areas which are broadcast along with the station reports. The reports of visibility at the stations will also be useful.

Even if weather charts are not made as a matter of routine, it is essential that the navigator should be conversant with the method of construction, because this will enable him better to understand forecasts issued from Weather Offices and may often enable him to visualise the general conditions over an area from Wireless Weather Reports which it may not be convenient to chart.

The writer happened to be at Avonmouth on March 1st, 1923, and, hearing that S.S. *Banffshire* (5,061 tons, gross), Captain R. H. WYNNE, outward bound from Liverpool had put in through stress of weather, visited the ship. It appears that *Banffshire* had encountered the worst of the gale on February 26th, when about 30 miles S.W. of the Scillys. There being mountainous seas and squalls of hurricane force she ran up the Bristol Channel for shelter. Asked if any Wireless Weather Reports had been received, copies were produced. Upon inspection these were found to be the Western Seaboard Forecast Messages. Asked if any figures had been taken in, the operator stated that their meaning not being known they had not been recorded.

It was explained that these figures would have given the actual observations of certain Coast Stations, which, together with ship's reports, would have shown the approach of bad weather. *Banffshire* is now a regular observer and Captain WYNNE has supplied some convincing proof of the value of Wireless Weather work at sea, including experiences in the Southern Ocean in which he co-operated with a sailing ship as well as a number of steamers. This is but one of many experiences that swell the ranks of converts.

#### Importance of Relation of Tracks of Depression and Ship in Weather Prediction.

Since the first edition was published three years ago, many have mastered the drawing of Weather Charts but others have asked for

instruction in drawing isobars. Lieut.-Commander M. CRESSWELL, R.N.R., the Port Meteorological Officer at Liverpool, and Mr. W. T. GRIEVES, the Visiting Officer for the port of London, have given assistance on board ships at the docks in this, and we have been able to help some marine observers when they have visited the Marine Division. A further example in this Chapter will help to overcome difficulty. In selecting one I have taken a case which will indicate how important the correct judgment of the probable tracks of depressions is in the prediction of wind at any position or positions towards which and through which a ship will pass.

Supposing that S.S. *Nariva*, Commander H. G. SPRIDDELL, R.D., R.N.R., from Las Palmas to London, at 0700 G.M.T. in Latitude 45° 44' N. Longitude 7° 19' W., during the remainder of the morning watch and in the forenoon intercepted and plotted the observations on CHART IV in the same way as we indicated with *Ormuz*.

The lowest barometer reported is at Reykjavik, Iceland, where the wind is S.E. The Low is therefore placed to the westward of this station. The highest barometer reported (only two millibars or .06 in. higher than *Nariva* is at Guernsey where the wind is W.S.W. and the High is therefore placed over France. We can now see that the trend of the wind arrows generally indicate a great cyclonic circulation and an anticyclone over the Bay of Biscay and neighbouring land to the S.E. of the depression. Using the 4 mb. stepping from 1000 mb., 984 mb. will be the lowest isobar and 1024 the highest.

Our only guides to the 984 mb. isobar are the barometer and wind at Reykjavik and we can only draw a short fragment of it from the eastward of that station southward and curved so that the wind arrow will be inclined to it towards the Low and with its end inclining so that if extended it would pass west of *Saxoleine* whose barometer is 993 and wind light and variable.

With the great area west of the British Isles (where we have the observations from the "Weather Shipping" Bulletin) and between Iceland and the parallel of 50° N. Latitude without a single observation, it will be difficult to the inexperienced to visualise how the isobars trend in this region; it will therefore be best to draw the 1024 mb. isobar next. This is drawn between Yarmouth, 1023, light W.S.W. airs and Dungeness, 1025, W.S.W. gentle breeze in a westerly direction curving S.W. between Scilly and Guernsey through *Nariva's* position to the S.E. to conform to BUYS BALLOT'S Law and so outlining the High.

If we take the middle pressure of our chart, 1004 next, it will help us. This isobar must pass close to the west of Thorshavn well to the west of Malin Head, thence *Verentia's* westerly wind will lead us to curve it slightly more west as we take it well to the westward of that ship and then curve more to the southward to pass east of *Orduna*. We can now return to the low value isobars. First we divide the space between Reykjavik and Thorshavn roughly into five.

Only a short fragment of the 988 isobar can be drawn parallel to the 984 isobar. The 992 isobar passes from the second spacing between Reykjavik and Thorshavn to the southward curving S.W. and passing just to the westward of *Saxoleine*. The 996 and 1000 isobars are placed by the same method at their northern end and are taken southward parallel to 992 isobar passing west of *Baltic* and east of *Orduna* respectively.

With the British coast station observations, *Verentia* and *Nariva*, we have little difficulty in drawing the 1008, 1012, 1016 and 1020 isobars. Now with a little alteration to adjust the barometer gradient to the wind (isobars close where the wind is strong and wide apart where it is light) with pencil and india-rubber we get CHART No. V.

In studying the chart it is well to remember that it only gives us detailed facts at the positions of the reporting ships and stations at the moment of observation 0700 G.M.T., February 24th, 1926, and that the isobars link the whole together giving us a general idea of the wind and pressure at the time over the area charted, but that a report from a ship in say Latitude 55° N. and Longitude 18° W. might not be wind S.S.W. 6 Barometer 1000 mb. (29.53 in.), as we should expect from the isobars in that neighbourhood; it might be quite different. We can only estimate the conditions at intermediate places between those of actual observation, and the nearer these places of reported observation are to one another so will our estimations for the intermediate positions be the more correct.

This CHART (No. V) tells us that *Nariva* is in an anticyclone which lies over the Bay of Biscay, English Channel and France and that there is a large depression to the westward of the British Isles probably centred near the 30th meridian of West Longitude. Our ship's steady barometer and the steady barometers reported at all stations except



two rising slowly at Holyhead and Tynemouth, all indicate that the anticyclone is holding its ground or intensifying. The very rapidly falling barometer at Reykjavik indicates that the depression is travelling N.E. and the tendencies reported by the four ships near the 50th parallel of N. Latitude south of the depression steaming as they are to the southward of west, all tend to confirm this.

Therefore our chart indicates that the probabilities are considerable that anticyclonic conditions will hold along *Nariva's* route to London for the next 24 hours and that the Atlantic depressions will traverse N.E. tracks too far to the N.W. to affect the weather in the English Channel. The visibility reports ahead are Good to Very Good, but until we have considered temperature of the air and sea it will be well only to surmise that with S. W'y winds in the month of February the chances are from 6 to 7 per cent. only, that there will be fog in the Channel according to The Wind and Fog Chart of Great Britain and Ireland, Volume III, No. 26, MARINE OBSERVER. Captain SPRIDDELL may predict with some confidence moderate and light at first easterly, later, veering S.E. through S. to S.W. breezes with good visibility and set his speed accordingly to arrive a little before the tide on which he wishes to dock.

On the morning of February 25th, 1926, *Nariva* is in the English Channel and the official forecast for 12 hours for the Southern Area in the "Weather Shipping" Bulletin is appropriate.

It is as follows:—

*Southern Area. Wind Southerly, light or moderate, freshening in district Channel. Visibility mainly moderate, but local coastal fog.*

Had *Nariva* made CHART VI confidence would be increased in this forecast for it indicates that the anticyclone has intensified over the Channel. The rising barometers reported by *Saxoleine*, *Baltic* and *Orduna* all steaming to the southward of west to the southward and westward of the depression with *Verentia's* steady barometer south of it, all indicate that this part of the depression is travelling N.E. while the barometer tendencies at Blacksod and Stornoway considered with those of the other stations indicate a steepening of the gradient, progress of which steepening gradient towards "District Channel" will cause the wind to freshen thereabouts. Local coastal fog is predicted because of conditions reported at shore stations which are not included in the 12 stations of the British "Weather Shipping" Bulletin and for reasons which will be dealt with in a later chapter.

(To be continued.)

## THE USE OF HUMIDITY OBSERVATIONS AT SEA.

PREPARED BY C. S. DURST, SENIOR PROFESSIONAL ASSISTANT, MARINE DIVISION.

FROM the very beginning of the collection of Meteorological Data at sea by the British Meteorological Office, the observation of the wet bulb thermometer has been included in the routine observation required of log-keeping ships. But it is probable that most observers have been content to know that the difference in the reading of the dry and wet bulb gave an indication of the amount of invisible water vapour in the air, but have not enquired further into the matter. In this article it is proposed to try and explain how observations of wet and dry bulb are computed and the lines along which they may be of practical use at sea.

Water in the atmosphere may be found in three forms:—

- (a) Invisible water vapour. This is a gas which mixes with air and is carried about from place to place flowing with the wind. It is derived from water or ice surfaces by the process of evaporation;
- (b) Water droplets which are seen as cloud or fog;
- (c) Ice crystals which are also seen as cloud.

The change from one of these states to another is accompanied by either an absorption or a release of heat energy; thus, when evaporation takes place from a water surface, a certain quantity of heat is absorbed from the water and the air, and this quantity of heat is dependent on the amount of water-vapour created.

In a similar manner, when ice is converted into water, heat is absorbed from the surroundings and when water is changed back into ice, or water vapour into water, heat which is, as it is termed, latent heat is released.

The reduction in temperature of the wet bulb thermometer is a measure of the amount of heat which is being absorbed in the conversion of water into vapour.

Air is said to be chemically dry if there is no water vapour present in it. It is said to be saturated if it contains as much water vapour as it is capable of absorbing at its temperature. It is found, however, that warm air will contain more water vapour than cold. So that, if saturated air should have its temperature lowered, water will form out as droplets or ice crystals. In this way cloud and fog are produced from saturated air. An example of this process may often be seen when a jug of iced water has been standing for a little time. The coldness of the jug cools down the air round it until it passes the saturation point and water drops are found formed on the outside of the jug.

When unsaturated air is cooled down it will arrive at a certain temperature when it will be just saturated. This temperature is called the **Dew Point**, because if it is cooled further dew drops will be formed out. If then we know the dew point of any sample of air we know the amount of water it contains, for by experiment we can measure how much water dry air will be able to absorb at that temperature. But this is not the only scale on which the quantity

of water vapour in air may be expressed. The water present in the air may be given as a percentage of the quantity which would be contained if the air were saturated. In this case we say the **Relative Humidity** of air at such and such a temperature is so much per cent.

A third method of expression is by the **Vapour Pressure**. When several gases are mixed together in the same space each one exerts the same pressure as it would if the others were not present. Thus if the pressure recorded by a barometer were 1026 millibars and the vapour pressure of water vapour were 15 millibars, we should know that the actual pressure recorded was due to air and water vapour in the proportion 1011 to 15.

Each of these three methods is most suitable for certain problems. For instance if we wish to know how great a fall of temperature will be necessary to produce fog, it is quite obvious that we should need the Dew Point of the air we were dealing with, but if we were discussing whether a country were of a "Muggy" climate we should want to know if the Relative Humidity were high. Tables are published by the Meteorological Office giving the Relative Humidity, Vapour Pressure, and Dew Point for temperatures between 0° F. and 120° F. with all depressions of the wet bulb which are likely to be met with in Meteorology. These tables are too long to quote extensively but the following abridgement may be used with fair accuracy by interpolation.

### Relative Humidity (per cent.).

#### Depression of Wet Bulb.

DRY.  
BULB.

| °F. | 0   | 1° | 2° | 3° | 4° | 5° | 6° | 7° | 8° | 9° | 10° | 11° | 12° |
|-----|-----|----|----|----|----|----|----|----|----|----|-----|-----|-----|
| 90  | 100 | 96 | 92 | 88 | 84 | 81 | 77 | 74 | 70 | 67 | 63  | 60  | 57  |
| 85  | 100 | 96 | 92 | 87 | 83 | 79 | 76 | 72 | 68 | 65 | 62  | 58  | 55  |
| 80  | 100 | 96 | 91 | 87 | 83 | 79 | 74 | 70 | 66 | 63 | 59  | 55  | 52  |
| 75  | 100 | 95 | 91 | 86 | 81 | 77 | 73 | 68 | 65 | 60 | 56  | 52  | 48  |
| 70  | 100 | 95 | 90 | 85 | 80 | 75 | 71 | 66 | 62 | 57 | 53  | 49  | 44  |
| 65  | 100 | 95 | 89 | 83 | 78 | 73 | 68 | 63 | 58 | 53 | 49  | 44  | 40  |
| 60  | 100 | 94 | 88 | 82 | 77 | 71 | 65 | 60 | 55 | 50 | 44  | 39  | 34  |
| 55  | 100 | 93 | 87 | 81 | 75 | 68 | 62 | 56 | 50 | 44 | 39  | 33  | 27  |
| 50  | 100 | 93 | 86 | 79 | 72 | 65 | 59 | 52 | 45 | 38 | 32  | 26  | 20  |
| 45  | 100 | 92 | 84 | 76 | 68 | 61 | 53 | 46 | 38 | 31 | 24  |     |     |
| 40  | 100 | 91 | 82 | 73 | 65 | 56 | 47 | 39 | 30 | 27 |     |     |     |
| 35  | 100 | 90 | 79 | 70 | 60 | 52 | 43 | 33 | 24 |    |     |     |     |
| 30  | 100 | 88 | 76 | 65 | 53 | 43 | 33 | 22 |    |    |     |     |     |

**Dew Point (° F.).**  
**Depression of Wet Bulb.**

DRY  
BULB.

| °F. | 0° | 1° | 2° | 3° | 4° | 5° | 6° | 7° | 8° | 9° | 10° | 11° | 12° |
|-----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|
| 90  | 90 | 89 | 87 | 86 | 85 | 83 | 82 | 80 | 79 | 77 | 76  | 74  | 73  |
| 85  | 85 | 84 | 82 | 81 | 79 | 78 | 77 | 75 | 73 | 72 | 70  | 69  | 67  |
| 80  | 80 | 79 | 77 | 76 | 74 | 73 | 71 | 69 | 68 | 66 | 64  | 62  | 61  |
| 75  | 75 | 74 | 72 | 71 | 69 | 67 | 66 | 64 | 62 | 60 | 58  | 56  | 54  |
| 70  | 70 | 69 | 67 | 65 | 63 | 62 | 60 | 58 | 56 | 54 | 52  | 50  | 47  |
| 65  | 65 | 63 | 62 | 60 | 58 | 56 | 54 | 52 | 50 | 48 | 45  | 43  | 40  |
| 60  | 60 | 58 | 56 | 55 | 53 | 51 | 48 | 46 | 44 | 41 | 38  | 35  | 32  |
| 55  | 55 | 53 | 51 | 49 | 47 | 45 | 42 | 40 | 37 | 34 | 30  | 26  | 22  |
| 50  | 50 | 48 | 46 | 43 | 41 | 39 | 36 | 33 | 29 | 25 | 21  | 16  | 10  |
| 45  | 45 | 43 | 40 | 38 | 35 | 32 | 29 | 25 | 21 | 16 | 10  | 3   |     |
| 40  | 40 | 38 | 35 | 32 | 29 | 26 | 22 | 17 | 11 | 8  |     |     |     |
| 35  | 35 | 32 | 29 | 26 | 23 | 19 | 14 | 9  | 3  |    |     |     |     |
| 30  | 30 | 27 | 23 | 20 | 15 | 10 | 4  |    |    |    |     |     |     |

**Vapour Pressure (millibars).**

**Depression of Wet Bulb.**

DRY  
BULB.

| °F. | 0°   | 1°   | 2°   | 3°   | 4°   | 5°   | 6°   | 7°   | 8°   | 9°   | 10°  | 11°  | 12°  |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 90  | 48.2 | 46.2 | 44.3 | 42.5 | 40.7 | 38.9 | 37.1 | 35.4 | 33.8 | 32.1 | 30.5 | 29.0 | 27.4 |
| 85  | 41.1 | 39.4 | 37.7 | 36.0 | 34.4 | 32.8 | 31.2 | 29.6 | 28.1 | 26.7 | 25.2 | 23.8 | 22.4 |
| 80  | 35.0 | 33.4 | 31.9 | 30.3 | 28.9 | 27.4 | 26.0 | 24.6 | 23.3 | 21.9 | 20.6 | 19.3 | 18.0 |
| 75  | 29.7 | 28.2 | 26.8 | 25.5 | 24.1 | 22.8 | 21.5 | 20.3 | 19.0 | 17.8 | 16.6 | 15.5 | 14.3 |
| 70  | 25.1 | 23.8 | 22.5 | 21.3 | 20.0 | 18.9 | 17.7 | 16.5 | 15.4 | 14.3 | 13.2 | 12.2 | 11.1 |
| 65  | 21.1 | 19.9 | 18.8 | 17.6 | 16.5 | 15.5 | 14.4 | 13.3 | 12.3 | 11.3 | 10.3 | 9.4  | 8.4  |
| 60  | 17.7 | 16.6 | 15.6 | 14.5 | 13.5 | 12.5 | 11.6 | 10.6 | 9.7  | 8.8  | 7.8  | 6.9  | 6.1  |
| 55  | 14.8 | 13.8 | 12.8 | 11.9 | 11.0 | 10.1 | 9.2  | 8.3  | 7.4  | 6.6  | 5.7  | 4.9  | 4.1  |
| 50  | 12.3 | 11.4 | 10.5 | 9.6  | 8.8  | 8.0  | 7.1  | 6.3  | 5.5  | 4.7  | 4.0  | 3.2  | 2.4  |
| 45  | 10.2 | 9.4  | 8.5  | 7.7  | 6.9  | 6.2  | 5.4  | 4.6  | 3.9  | 3.2  | 2.4  | 1.7  |      |
| 40  | 8.4  | 7.6  | 6.9  | 6.1  | 5.4  | 4.7  | 4.0  | 3.3  | 2.5  | 2.2  | 1.6  |      |      |
| 35  | 6.9  | 6.2  | 5.5  | 4.8  | 4.2  | 3.6  | 2.9  | 2.3  | 1.7  | 1.1  |      |      |      |
| 30  | 5.6  | 4.9  | 4.3  | 3.7  | 3.0  | 2.4  | 1.8  | 1.2  |      |      |      |      |      |

The method of use will be quite apparent by an example.

We wish to know the Dew Point when the dry bulb reading is  $66.2^{\circ}$  and the wet bulb  $61.8^{\circ}$ . The depression of the wet bulb is  $66.2^{\circ} - 61.8^{\circ} = 4.4^{\circ}$ . Looking in the Dew Point table the nearest figure to  $66.2^{\circ}$  and  $4.4^{\circ}$  is  $58^{\circ}$  for the value  $65^{\circ}$  and  $4^{\circ}$ . For an increase of  $1^{\circ}$  in the depression of the wet bulb at this point in the table the dew point temperature is lowered by  $2^{\circ}$ , so for an increase of  $.4^{\circ}$  in the depression of the wet bulb the dew point temperature will be lowered  $.8^{\circ}$ . Hence for dry bulb  $65^{\circ}$  depression of wet bulb  $4.4^{\circ}$  the dew point temperature will be  $58^{\circ} - .8^{\circ} = 57.2^{\circ}$ .

But an increase of  $5^{\circ}$  in the dry bulb temperature at this point in the table gives an increase of  $5^{\circ}$  in the dew point temperature, so an increase of  $1.2^{\circ}$  gives an increase of  $1.2^{\circ}$  in the dew point temperature. The dew point temperature with dry bulb reading  $66.2^{\circ}$  and depression of wet bulb  $4.4^{\circ}$  is then  $57.2^{\circ} + 1.2^{\circ} = 58^{\circ}$  to the nearest degree of temperature.

In each table a line is ruled to call attention to the fact that above the line evaporation is going on from a water surface but below the line it is going on from an ice surface. Owing to this interpolation cannot be made between figures on different sides of this line.

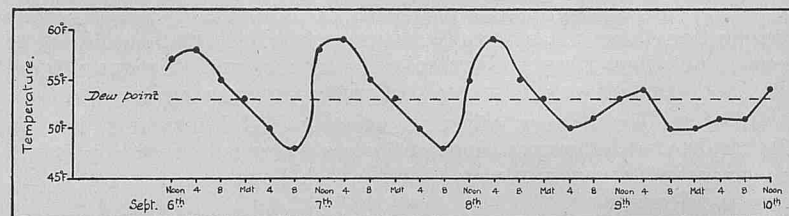
As an example of one of the practical uses of humidity tables let us take the case of C.S. *Cambria*, Captain H. G. E. WIGHTMAN, at Walvis Bay in September, 1924.

Her temperature observations from noon of the 6th to noon of 9th were as follows:—

| 1924. | Dry Bulb. | Wet Bulb. | Dew Point. | Cloud Amount. | Remarks. |  |
|-------|-----------|-----------|------------|---------------|----------|--|
| Sept. |           |           |            |               |          |  |
| 6     | Noon      | 57        | 54         | 51            | 4        |  |
|       | 4         | 58        | 55         | 52            | 4        |  |
|       | 8         | 55        | 54         | 53            | 2        |  |
|       | Midt.     | 53        | 53         | —             | 2        | Heavy dew falling.                             |
| 7     | 4         | 50        | 50         | —             | 2        | Heavy dew falling, stars brilliant throughout. |
|       | 8         | 48        | 48         | —             | 10       | 7.0 thick mist set in. 9.0 same cleared away.  |
|       | Noon      | 58        | 54         | 50            | 4        |  |
|       | 4         | 59        | 55         | 51            | 4        |  |
|       | 8         | 55        | 55         | 55            | 4        |  |
|       | Midt.     | 53        | 53         | —             | 4        |  |
| 8     | 4         | 50        | 50         | —             | 10       | Thick misty weather.                           |
|       | 8         | 48        | 48         | —             | 10       | Thick misty weather.                           |
|       | Noon      | 55        | 53         | 51            | 2        | 10.30 mist cleared.                            |
|       | 4         | 59        | 56         | 53            | 4        |  |
|       | 8         | 55        | 54         | 53            | 4        | Stars brilliant.                               |
|       | Midt.     | 53        | 53         | —             | 4        |  |
| 9     | 4         | 50        | 50         | —             | 10       | Thick mist similar to light rain.              |
|       | 8         | 51        | 51         | —             | 10       | Thick mist.                                    |
|       | Noon      | 53        | 53         | —             | 4        | 10.45 mist cleared.                            |
|       | 4         | 54        | 54         | —             | 8        |  |
|       | 8         | 50        | 50         | —             | 10       | 6.0 thick mist set in.                         |
|       |           |           |            |               |          | Misty weather.                                 |
|       | Midt.     | 50        | 50         | —             | 10       | No change.                                     |
| 10    | 4         | 51        | 51         | —             | 4        | 1.0 mist cleared but heavy dew falling.        |
|       | 8         | 51        | 51         | —             | 10       | 6.0 thick mist set in.                         |
|       |           |           |            |               |          | Misty.   |
|       | Noon      | 54        | 53         | 52            | 8        |  |

On the average during this period when there was an appreciable difference between the wet bulb and the dry the dew point was  $52^{\circ}$ .

If now we draw a graph of the temperatures it will be quite apparent how the mist was formed each night.



**Temperatures at Walvis Bay, C.S. "Cambria," September 6-10, 1924.**

The broken line across the graph shows the position of the dew point. When the temperature falls below that line dew and mist may be expected to form. When this curve is compared with the remarks of the observer it will be seen how close the agreement is.

By calculating out the dew point during daylight hours and the early part of the night and estimating what fall of temperature is likely to occur before morning it is often possible to obtain a fairly accurate forecast of the probability of coastal mist. The great difficulty is to estimate what fall of temperature is probable since this largely depends on the extent to which radiation is taking place from the earth to space, and this radiation in turn is facilitated by clear sky and hampered by cloud.



## LOCAL WINDS, ATLANTIC OCEAN.

PREPARED IN THE MARINE DIVISION BY H. KEETON, PRINCIPAL CLERICAL ASSISTANT.

DURING last year a series of five articles on the local winds of the Pacific Ocean was published in this Journal; and the following is the first of a similar series, compiled from the same sources, on the local winds of the Atlantic, which it is proposed to publish during the present year.

**I. WEST COASTS OF EUROPE AND AFRICA.**

The main factors governing the winds on these coasts are as follows:—

Northward of Latitude 30° to 35° N. the Atlantic Ocean is subject at all times of the year to the influence of atmospheric disturbances of a temporary nature, that is travelling depressions and anticyclones, generally following tracks to the eastward or north-eastward. The winds of this region are in consequence very variable in direction, westerly winds becoming more prevalent as we proceed northward.

South of this zone, is the permanent North Atlantic anticyclone, its geographical position following the seasonal march of the sun's declination. On the eastern side of this anticyclone, winds are from N. to N.E., the N.E. trades; the direction being considerably modified when under the influence of land.

There is a similar anticyclone in the South Atlantic, its position likewise varying with the seasons, producing on its eastern side winds from South to South-east, the South-east trades; while southward of the trade wind limits is a region of variables, merging into the westerlies as latitude increases.

Between the equatorial limits of the North-east and South-east trade winds, is the belt of calms and light variable airs known as the Doldrums.

The influence of the great land mass of Africa is very marked, and causes Southerly and South-westerly winds, known as the South-west Monsoon, to blow over a great part of the area between the North-east and South-east trades. In February this monsoon blows to the north-eastward of a line drawn from Cape Palmas, Latitude 4° N., to Loanda, Latitude 10° S. From then, the monsoon area spreads north, south, and west, until in August or September it occupies the region within a line drawn from Cape Verde, Latitude 15° N., to a position in Latitude 10° N., Longitude 35° W., thence to the African coast at Cape Frio, Latitude 18° S. From August or September, its limits progressively decrease again until February.

**British Isles and Bay of Biscay.**

The winds over the British Isles are in general very changeable, and are dependent on the passage and position of the depressions and anticyclonic systems which cross over or near these islands. The most prevalent direction throughout the year is from S.W. to West, with gales from this direction most frequent during the months October to March. Limitations of space do not permit of a full description of the winds of these coasts, and the reader is referred to the monthly charts of wind and fog frequency of the south-western approaches to Great Britain and Ireland, and at coast stations, published in the 1926 numbers of this journal.

Over the Bay of Biscay, the winds are but little different from those of the British coasts, the prevailing direction being from South-west to North-west. Severe gales, principally due to the cyclonic systems which visit the British Isles, are frequently experienced during the winter months. These gales usually commence at South or South-west, with rain, squalls, and thick weather, and veer to West and North-west, after which the weather clears.

In spring and summer, northward of the Gironde River, the most frequent winds are those between North-east and South-west (through North), and westerly gales are less frequent. Southward of that river, easterly as well as westerly and north-westerly winds predominate; and at the head of the Bay, winds from the East and South-west, are mostly experienced. The easterly winds, south of the Gironde, especially in spring and autumn, often increase to gales of long duration, accompanied by clear weather and a high barometer. This wind is known as the "Autanblanc."

**West Coasts of Spain and Portugal.**

From April to September, when the North Atlantic anticyclone reaches its farthest north position, northerly winds predominate on

these coasts. They are to all intents and purposes an extension of the North-east trades, and are known to seamen as the "Portuguese Trades."

From October to April, southerly winds prevail alternating with winds from West and North-west. Heavy gales are experienced on these coasts, but they become less frequent and violent as the latitude of Gibraltar is approached, though they sometimes extend to about Latitude 28° N.

**Gibraltar Strait and its approach.**

The predominant winds in the Gibraltar Strait are those from East and West, being called locally "Levantes" and "Ponientes" respectively. These winds are, generally speaking, outside either entrance of the Strait, from between North-east and South-east or between North-west and South-west, and on reaching the narrows become East and West. Strong south-easters are occasionally experienced in the strait, causing serious damage in Algeciras Bay, particularly in winter; more severe are the South-westers, commonly called "Vendavales," which veer in squalls suddenly to West or North-west, and even to North. Between the squalls are intervals of fine weather, with moderate wind. If the wind settles between North-west and North-east it moderates and brings fine weather; if, on the other hand, after changing suddenly to North-west, it backs to South-west, its strength continues, and it brings heavy rain.

Easterly winds are most frequent in summer, June to September; and during this season land and sea breezes are experienced on the coasts near Huelva and Cadiz. The sea breeze, varying from West to N.N.W., sets in about 9 a.m., reaching its maximum strength after mid-day and fading away to a calm between 8 p.m. and 9 p.m. After two to three hours calm, the land breeze sets in and lasts until sunrise.

**Morocco.**

On the coast of Morocco during the summer, the N.E. trade wind blows freshly, the prevailing direction being N.E., tending to become N. and N.N.W. during the afternoon.

During the winter, N. to N.N.E. winds prevail, but westerly winds are frequent, very occasionally reaching gale force, when a North Atlantic depression follows a more southerly track than usual. In these cases the sequence of wind changes is from S.E. through S.W. to N.W., the southerly winds bringing rain; but with the wind from N.W. the weather clears.

**Cape Bojador to Cape Verde.**

From October to May, the fine season, the predominant wind is from between E. and N.E., backing gradually to N.N.W. as the day advances. The rainy season is from June to September, and during these months, westerly winds are frequent, and are generally light and often interrupted by calms. South-westerly to westerly winds occasionally blow with violence, but are not of long duration.

During the fine season, land and sea breezes blow with great regularity along the whole of the West African coast from Cape Verde in the north to Cape Frio in the south. They are generally confined to a comparatively narrow strip in the immediate neighbourhood of the coasts.

During the rainy season, particularly at its commencement and termination, the coast between Cape Bojador and the Congo, Latitude 6° S., is liable to tornadoes.

The tornado of the West Coast of Africa is a line squall, and should not be confused with the American tornado, which is a whirlwind; see sketch of tornado, page 191, Volume II, No. 24.

These tornadoes are heavy thunder squalls of short duration, usually blowing off shore. Their approach is indicated by the formation of a well defined and regular arch of cloud in the N.E., coming up against the prevailing wind, accompanied by incessant lightning and thunder. The clearer the arch is outlined, the greater the wind force to be expected when the storm breaks. A short calm usually precedes the breaking of the storm from N.E., after which the wind veers through South to West, moderating from that direction. The barometer gives no indication of the approach of these storms.

### Cape Verde to Cape Palmas.

Over the northern half of this area, the fine season lasts from November to May, during which period North-easterly winds prevail in the early part of the day, changing to N. and N.W. after noon, until by evening it has become westerly. During the night a light breeze blows from East to E.N.E.

On the coast of Sierra Leone the prevailing winds during the fine season, November to April, are from between N.N.W. and W.; and land and sea breezes are regularly felt, extending 20 to 30 miles from the coast. The sea breeze blows from North to North-west, and sometimes W.N.W., during the day, and is followed almost immediately without the usual interval of calm, by the land breeze from N.E. to E.N.E.

Further south towards Cape Palmas, the winds become progressively more Westerly and South-westerly, under the extending influence of the South-west Monsoon, until at Cape Palmas they come from this quarter throughout the year.

During the fine season, the whole of this coast is subject to a very dry easterly wind known as the "Harmattan," which occasionally lasts five or six days, and has been known to continue as long as a fortnight, blowing with moderate force. It is always accompanied by a thick haze, due to reddish dust from the interior, which extends 12 to 15 miles off shore. In the northern half of this area it blows most strongly from November to January and moderately in February and March, its direction being from E.N.E. to E.S.E. On the coast of Sierra Leone it is experienced chiefly between November and January.

The rainy season between Cape Verde and Cape Palmas extends from May to September or October, during which period the S.W. monsoon is the predominating wind, its direction varying between South and W.N.W.

Tornadoes are experienced during April and May and from September to the end of October. They blow from East to South-east; and occasionally from the southward, with great violence, but seldom last more than three hours.

### Gulf of Guinea.

On the northern shores of the Gulf of Guinea generally, moderate S.W. to W. winds predominate throughout the year.

From October to February, in the immediate neighbourhood of the land, light land and sea breezes prevail. The land breeze blows from N.N.W. until 11 a.m., then the sea breeze sets in from S.S.W. and lasts till 9 p.m.

The "Harmattan" blows in November, December and January with moderate force from the eastward.

Tornadoes may occur at any time from the beginning of March to the end of June, and also from mid-September to November. In the Bight of Benin, they may be expected at intervals of not more than 48 hours, and sometimes twice in one day. On the Ivory and Gold Coasts they chiefly occur in June.

### The Cameroons to the Congo.

The prevalent winds on this coast throughout the year are from between S.S.W. and W., modified by the daily alternation of land and sea breezes.

At the Cameroons, during the mornings the winds are light and very variable in direction. The afternoon winds are almost invariably south-west, drawing more westerly between December and March, and are frequently moderate or fresh in strength. Calms and light S.W. winds prevail in the evening.

Near the Gaboon River the sea breeze sets in generally about 11 a.m. and attains its greatest force between 3 p.m. and 4 p.m. Its direction varies from S.W. in the dry season to W.N.W. in the wet season. The land breeze begins between 11 p.m. and midnight from the eastward, and is strongest from 6 a.m. to 7 a.m., and during the dry season lasts until 10 a.m. followed by an interval of calms or variable airs.

Tornadoes occur from February to April and sometimes between November and January.

Between Cape Lopez and the Congo River, from October to April, the sea breezes are rather irregular and blow from S.S.W. and S.W., heavy squalls occurring at times in December and January from between W. and S.W. From May to September they are more regular, and at this time often set in from W.N.W. and blow during the night from S.S.W. or S.W. The land breezes are seldom strong and are only felt close inshore.

Tornadoes appear between March and May, and in September and October. They are not so violent as those further north, and usually commence from E. or S.E., veering to S. and S.W.

### The Congo to Cape Frio.

On the coast of Portuguese West Africa the prevalent wind throughout the year is from S. to S.W., with variations to S.E., as land winds, when in shore. At a distance of 80 to 100 miles from the land, the S.W. winds change to the southward and eastward and imperceptibly unite with the South East trade wind. From July to October there are daily alternations of land and sea breezes, the sea breeze from S.W. setting in about 9 or 10 a.m. and persisting until after sunset. The following land breeze is light and blows until 8 or 9 a.m. from S.S.E. to E.S.E.

The S.W. winds are frequently fresh to strong, creating a heavy sea, and the resulting swell breaks on the coast with much violence.

### Cape Frio to Table Bay.

Along the coast from Cape Frio to Orange River during nine months of the year, from August to May, S.S.W. to S.W. winds blow with great regularity. These winds, which are moderate in the north, become stronger as south latitude increases, and frequently reach gale force. During the remaining three months of the year irregular light N.N.W.'ly winds prevail and are generally accompanied by dense fogs.

From Orange River to Cape St. Martin throughout nearly the whole year, winds from S. to S.W. prevail, and are sometimes very violent. During the winter months, May to August, the winds vary from W.S.W. to S.S.E. and generally moderate towards sunset. In the bays, easterly winds are sometimes experienced during the night, and occasionally light northerly winds. Apart from the southerly winds, north-westerly winds are the most frequent, especially in winter, and bring rain.

Along this coast dangerous squalls, known as white squalls, are experienced, which come on without any of the usual indications, the only sign of their approach being the disturbance of the sea on the horizon.

In Table Bay during summer, October to April, S.S.E.'ly winds largely predominate, frequently blowing with violence, and usually bringing settled weather. The ordinary indications of a strong "South-easter" as they are called, are well marked—a high barometer, a clear sky, and the formation of a white cloud cap on Table Mountain, known as the "Table cloth."

In January, February and March, these winds blow at times with gale force, driving the clouds in great rolls over the mountains. Sometimes there occurs a fall of the barometer while such a gale is blowing, when a change of wind to the northward may be expected; if this does not come a "Black South-easter" ensues, which is distinguished from the regular South-easter by the Nimbus or rain tint of the cloud on Table Mountain, and is frequently accompanied by light rain.

North-westerly winds are experienced at all seasons of the year, but during winter, April to October, they are more prevalent than the south-easterly winds. They are most violent during these months, often blowing in severe storms from N. or N.N.W. for several days, with a cloudy sky, and sometimes accompanied by rain.

(To be continued.)



## WEATHER SIGNALS.

## II. WIRELESS WEATHER SIGNALS.

## Bulletins.

It is necessary to make careful distinction between weather reports and weather forecasts.

A *weather report* is a statement, in plain language or code, of the observed conditions prevailing at a place at a given time.

A *weather forecast* is a statement, usually in plain language, of weather which may be expected at a place or over an area in the near future.

For forecasts issued to shipping by wireless it is usual to publish full descriptions giving abbreviated names of areas with prescribed limits and the length of period; if such published description is not given, the place or area and the period to which the forecasts applies are included in the message.

WIRELESS WEATHER BULLETINS,  
GREAT BRITAIN AND IRELAND.

## C.W. ISSUES, "WEATHER SHIPPING" BULLETIN.

W/T Station, Air Ministry. Latitude  $51^{\circ} 27' 50''$  N.

Longitude  $0^{\circ} 01' 35''$  E.

Call sign G.F.A.

Wave length 4,100 metres, C.W.

Times of transmission 0900 G.M.T.\* and 2000 G.M.T.

The message issued at 0900 G.M.T. is based upon 0700 G.M.T. observations. The message issued at 2000 G.M.T. is based upon 1800 G.M.T. observations.

During the time of S.O.S. lookout, from 0915 to 0918, and 2015 to 2018, there will be a pause in the transmission of these weather signals.

These messages are preceded by the words "Weather shipping" and consist of six parts. Part II. is in code, the remaining parts in plain language.

\* All times are G.M.T., i.e., the day commencing at Midnight, and the hours reckoned from 00 to 23.

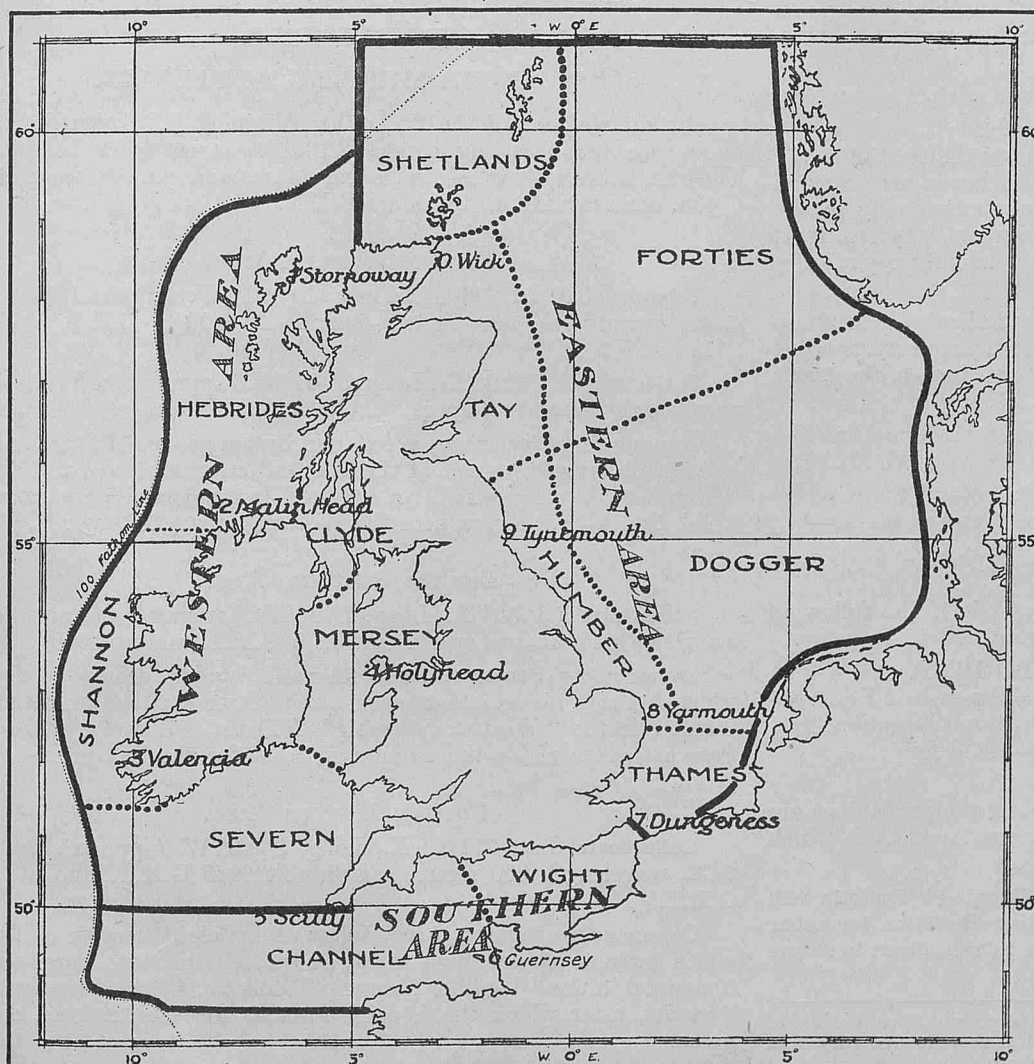
**Part I.** is a general inference of weather conditions over the British Isles, which usually includes information of the pressure system, with whereabouts, which influences the weather.

**Part II** is a report in code giving actual observations, with station number, of Barometer tendency, weather, visibility, Barometric Pressure, Direction and Force of Wind, at the ten British stations shown upon the accompanying Chartlet numbered from 1 to 10 (the initial 1 being omitted in the case of Station 10).

Two stations not shown on the Chartlet also follow in this part. They are No. 1, Reykjavik, Latitude  $64^{\circ} 09' N.$ , Longitude  $21^{\circ} 55' W.$  (approx.) and No. 2, Thorshavn, Latitude  $62^{\circ} 03' N.$ , Longitude  $6^{\circ} 45' W.$  (approx.) preceded by the word "Foreign."

**Parts III., IV. and V.** are forecasts of wind and visibility for the 12 hours following the time of observations for the areas shown upon the Chartlet.

## CHARTLET SHOWING STATIONS, FORECAST AREAS AND DISTRICTS.



## WESTERN AREA.

The sea and coasts eastward of the hundred fathom line from Cape Wrath to Scilly.

## DISTRICTS.

**HEBRIDES.**—That part of Western which lies N. and W. of Bloody Foreland, Rathlin I. and Islay.

**SHANNON.**—West coast of Ireland from Bloody Foreland to the Fastnet.

**SEVERN.**—South coast of Ireland, Bristol Channel, and approaches.

**MERSEY.**—The Irish Sea and approaches.

**CLYDE.**—The North Channel and approaches to Clyde.

## SOUTHERN AREA.

The English Channel from Dover to the 100 fathom line.

## DISTRICTS.

**CHANNEL.**—West of Portland.

**WIGHT.**—East of Portland.

## EASTERN AREA.

The North Sea south of Lat.  $61^{\circ} N.$ , and east of Long.  $5^{\circ} W.$  to the north and to the Straits of Dover in the south.

## DISTRICTS.

**THAMES.**—Thames Estuary and its approaches.

**HUMBER.**—East coasts from Yarmouth to Tweed.

**TAY.**—East coast of Scotland, including Moray Firth.

**SHETLANDS.**—Orkneys and Shetlands.

**FORTIES.**—Eastward to Norway and N. of line Tweed to Naze.

**DOGGER.**—Eastward to coast of Denmark and S. of line Tweed to Naze.

**Part VI.** commencing "outlook" is a general statement as to expectation of weather after the period of the forecasts, when it can be made.

**Note.**—In order to avoid ambiguity between the words Ireland and Iceland, the latter word is always repeated whenever it occurs in Part I.

### Explanation of Chartlet.

The numbers before the names of the stations indicate their code number (in the event of any station being substituted, the name of the substitute will be given in the message in place of this figure until such time as correction has been adequately made in Notices to Mariners and in THE MARINE OBSERVER).

The boundaries of the areas are defined by the plain black lines and the coast line.

These areas are sub-divided into districts, named after islands, rivers or banks within them, so that they may be readily memorised. The boundaries of these districts should only be taken as an approximate indication of their extent.

These districts are for the purpose of giving information of different weather within an area, without unduly lengthening the wording of a message.

## DESCRIPTION OF CODE

AND

### INSTRUCTIONS FOR DECODING PART II.

The code is arranged in five-figure groups, which are paired. Each pair of groups refers to one station, and contains an odd and an even group.

**Odd Groups.** The 1st Figure indicates the station to which the pair of groups refers. From 1 to 9 and 0 for British stations. The Foreign groups being numbered 1 and 2 as above and indicated by the word "Foreign."

The 2nd Figure gives the Barometer tendency, Table XIV.

The 3rd and 4th Figures give the weather, Table V., p. 19, Vol. IV, No. 37.

The 5th Figure gives the visibility, Table VI., p. 20, Vol. IV, No. 37. Caution is necessary in the use of these visibility reports owing to the conditions of view to seaward at some stations. The two foreign stations' visibility reports are landward.

**Even Groups.** The 1st and 2nd Figures indicate the last two whole figures of the corrected barometer reading in millibars\*. To convert to inches, see Table XIII., p. 21, Vol. IV, No. 37.

The 3rd and 4th Figures give the True Direction of the Wind, Table III., p. 19, Vol. IV, No. 37.

The 5th Figure gives the force of the wind by Beaufort scale. All forces 9 and above, as 9.

In all cases when a figure cannot be given, a hyphen (-) is given to preserve the order.

It will be of assistance in memorising the code if the following initial letters of the various elements are committed to memory.

|                            |                           |
|----------------------------|---------------------------|
| $I_n K' ww V_s$            | BB DD F.                  |
| Thus $I_n$ = Station.      | BB = Barometric Pressure. |
| $K'$ = Barometer tendency. | DD = Wind Direction.      |
| ww = Weather.              | F = Wind Force.           |
| $V_s$ = Visibility.        |                           |

It will be noticed that the above symbols and their meanings are taken from the Abridged Key to the New International Code which was published in Vol. IV., No. 37.

This description of the British "Weather Shipping" Bulletin will serve as an example of the method of decoding Bulletins for other countries, where the New International Code is in use, given in future numbers.

\* It will be seen that the coded figures may represent two values of barometric pressure, but this only takes place with a very low or very high barometer, so that Mariners will be able to decide which value is intended.

Though at first decoding may be tedious a little practice will show that this can be done with ease and rapidity. A form ruled and used as suggested in the specimens shown on pp. 39 and 40 will be of great assistance.

### A Sample Message.

Call Sign :—CQ CQ CQ V GFA GFA GFA (repeated twice).

Weather Shipping.

**Inference** A deep depression over the North Channel which is moving East North East will cause strong winds or gales in all districts with much rain at first. Improving weather will spread across the country in its rear.

|         |       |       |         |       |       |             |
|---------|-------|-------|---------|-------|-------|-------------|
| Station | 17535 | 99041 | 2155-   | 93283 | 34117 | 12266       |
| Reports | 46356 | 97208 | 55167   | 13267 | 65417 | 19185       |
|         | 77124 | 15206 | 87526   | 14186 | 97275 | 99206       |
|         | 0856- | 00146 | Foreign | 1112- | 96162 | 2012- 05000 |

**Forecasts** Western Area Districts Mersey Severn Shannon westerly gale veering and moderating visibility becoming good Districts Clyde Hebrides strong northerly winds moderating visibility moderate full stop Southern area strong westerly to north westerly winds District Wight visibility poor District Channel visibility becoming good full stop Eastern Area Districts Dogger Humber Thames southwesterly gales visibility poor Districts Tay Forties southerly winds strong to Gale backing visibility poor District Shetlands fresh easterly winds visibility moderate full stop Outlook Eastern Area northerly gales western area temporary improvement.

Though these reports are intended for the use of ships at sea, they will be found useful to shipping and seamen at the ports, if intercepted by local wireless receiving stations and passed to Mercantile Marine Offices and Harbour Masters.

## SPARK ISSUES.

### "WEATHER SHIPPING" BULLETIN.

Certain portions of the "Weather Shipping" Bulletin described above are broadcast by coast W/T stations on spark as follows. The a.m. issues refer to 7 a.m. observations and p.m. issues refer to 6 p.m. observations, all times are G.M.T.

#### For the Western Area.

Valentia, Lat. 51° 56' N., Long. 10° 21' W. (approx.), call sign GCK, wavelength 600 metres spark. At 0948 G.M.T. and at 2048 G.M.T.

Seaforth, Lat. 53° 28' N. Long. 3° 01' W. (approx.), call sign GLV, wavelength 600 metres spark. At 0930 G.M.T. and at 2030 G.M.T.

Commencing Western Area followed by ten groups of figures which indicate observations made at the five stations numbered 1 to 5 in the "Weather Shipping" Bulletin followed by the word Forecast after which the 12-hour forecast for the Western Area will be given.

#### For the Southern Area.

Niton, Lat. 50° 35' N., Long. 1° 17' W. (approx.), call sign GNI., wavelength 600 metres spark. At 0930 G.M.T. and at 2030 G.M.T.

Commencing Southern Area followed by six groups of figures which indicate observations made at the three stations numbered 5, 6 and 7 in the "Weather Shipping" Bulletin, followed by the word Forecast, after which the 12-hour forecast for the Southern Area is given.

#### For the Eastern Area.

Cullercoats, Lat. 55° 02' N., Long. 1° 26' W. (approx.), call sign GCC, wavelength 600 metres spark. At 0948 G.M.T. and at 2048 G.M.T.

Commencing Eastern Area, followed by eight groups of figures which indicate observations made at the four stations numbered 7, 8, 9 and 0 in the "Weather Shipping" Bulletin, followed by the word Forecast, after which the 12-hour forecast for the Eastern Area is given.



For the purpose of decoding and recording the W/T Weather Bulletin for all coasts, the following form may be ruled and used with advantage. The code figures should be entered under the names of the Stations. An example is recorded and decoded on this form overleaf.

Day.....

Month.....

Year.....

0700 G.M.T. 1800 G.M.T.

(Delete observation time  
which does not apply.)

Weather Shipping.

**Part I  
INFERENCE**
**Part II  
Station Reports  
Code figures**

Key  
Odd Groups    Even Groups  
I<sub>n</sub>K'wwV<sub>s</sub>    BBDDF

Bar Tendency

Weather

Visibility

Barometer

Wind

Force

1 Stornoway

2 Malin Head

3 Valentia

4 Holyhead

5 Scilly

6 Guernsey

7 Dungeness

8 Yarmouth

9 Tynemouth

0 Wick

Foreign

1 Reykjavik

2 Thorshavn

**Part III**
**District**
Western  
AreaHebrides  
Clyde  
Mersey  
Severn  
Shannon
**Part IV**
Southern  
AreaChannel  
Wight
**Part V**
Eastern  
AreaThames  
Humber  
Dogger  
Tay  
Shetlands  
Forties
**FORECAST**
**Part VI. OUTLOOK**

Day.....Friday, 3rd.

Month.....December.

Year.....1920.

0700 G.M.T. 1800 G.M.T.

Weather Shipping.

(Delete observation time  
which does not apply.)Part I  
INFERENCE

*A deep depression over the North Channel which is moving E.N.E. will cause strong winds or gales in all districts with much rain at first. Improving weather will spread across the country in its rear.*

Part II  
Station Reports  
Code figures

## Key

 Odd Groups  $I_N K' w w V_s$  Even Groups BBDDF

|                                    | Bar Tendency         | Weather                        | Visibility | Barometer              | Wind   | Force |
|------------------------------------|----------------------|--------------------------------|------------|------------------------|--------|-------|
| <b>1 Stornoway</b><br>17535 99041  | Falling quickly      | r. mod. but has decreased      | poor       | 999 mb.<br>29.50 in.   | N.E.   | 1     |
| <b>2 Malin Head</b><br>2155- 93283 | Rising slowly        | r. continuous                  | —          | 993 mb.<br>29.32 in.   | N.W.   | 3     |
| <b>3 Valentia</b><br>34117 12266   | Rising very rapidly  | c. or o. no apparent change    | good       | 1,012 mb.<br>29.89 in. | W.N.W. | 6     |
| <b>4 Holyhead</b><br>46356 97208   | Falling              | p. heavy with rain             | moderate   | 997 mb.<br>29.44 in.   | S.W.   | 8     |
| <b>5 Scilly</b><br>55167 13267     | Falling slowly       | c. or o. after rain or drizzle | good       | 1,013 mb.<br>29.92 in. | W.N.W. | 7     |
| <b>6 Guernsey</b><br>65417 19185   | Falling slowly       | d. slight continuous           | good       | 1,019 mb.<br>30.09 in. | S.S.W. | 5     |
| <b>7 Dungeness</b><br>77124 15206  | Falling quickly      | c. or o. cloud has increased   | very poor  | 1,015 mb.<br>29.97 in. | S.W.   | 6     |
| <b>8 Yarmouth</b><br>87526 14186   | Falling quickly      | r. slight but has increased    | moderate   | 1,014 mb.<br>29.94 in. | S.S.W. | 6     |
| <b>9 Tynemouth</b><br>97275 99206  | Falling quickly      | f. or m. apparently overcast   | poor       | 999 mb.<br>29.50 in.   | S.W.   | 6     |
| <b>0 Wick</b><br>0856- 00146       | Falling very rapidly | r. moderate but has increased  | —          | 1,000 mb.<br>29.53 in. | S.S.E. | 6     |
| <b>Foreign</b>                     |                      |                                |            |                        |        |       |
| <b>1 Reykjavik</b><br>1112- 96162  | Rising slowly        | c. or o. cloud has increased   | —          | 996 mb.<br>29.41 in.   | S.     | 2     |
| <b>2 Thorshavn</b><br>2012- 05000  | Steady               | c. or o. cloud has increased   | —          | 1,005 mb.<br>29.68 in. | —      | Calm  |

## Part III

## District

Western Area

 Hebrides  
Clyde  
Mersey  
Severn  
Shannon

Strong northerly winds, moderating, visibility moderate.  
Westerly gale, veering and moderating, visibility becoming good.

## Part IV

Southern Area

 Channel  
Wight

Strong westerly to north-westerly winds. Visibility becoming good.  
Visibility poor.

## Part V

Eastern Area

 Thames  
Humber  
Dogger  
Tay  
Shetlands  
Forties

South westerly gales, visibility poor.  
Southerly winds, strong to gale, backing, visibility poor.  
Fresh easterly winds, visibility moderate.  
Southerly winds, strong to gale, backing, visibility poor.

## FORECAST

## Part VI. OUTLOOK

Western area, temporary improvement.

Eastern area, northerly gales.



## WIRELESS TELEPHONY (R/T) ISSUES.

## "WEATHER SHIPPING" BULLETIN.

Certain portions of the "Weather Shipping" Bulletin are broadcast from the BRITISH BROADCASTING COMPANY'S station at Daventry by Wireless Telephony as follows:—

**Daventry.** Latitude  $52^{\circ} 15' N.$ , Longitude  $1^{\circ} 08' W.$  (approx.), call sign 5XX, wavelength 1,600 metres (R/T). At 1030 and shortly after 2200 G.M.T., on weekdays, and at 1030 and shortly after 2100 G.M.T. on Sundays.

This station broadcasts Parts I, III, IV and V of the "Weather Shipping" Bulletin, i.e., a general inference, followed by 12-hour forecasts for the Western, Southern and Eastern Areas, based on observations at 0700 G.M.T. for the a.m. issue and on observations at 1800 G.M.T. for the p.m. issue.

When British Summer Time is in operation the above times of issue should be retarded one hour.

As changes in the Time of issue of Parts I, III, IV and V through the BRITISH BROADCASTING COMPANY'S station at Daventry are occasionally necessary at short notice, mariners are referred to the "Radio Times," the official organ of the BRITISH BROADCASTING COMPANY, which is published weekly for notice of the exact times of issue of this message; these are also given in the daily press.

It should be noted that the times given in the "Radio Times" are G.M.T. only when summer time is not in operation, while all times for Wireless Weather Telegraphy in THE MARINE OBSERVER are G.M.T.

It should also be noted that forecasts for the General Public and Farmers are broadcast by Daventry, and as these are for land areas it is necessary to distinguish them from the parts of the "Weather Shipping" Bulletin which gives information to Mariners.

## NEW INTERNATIONAL CODE, WEATHER TELEGRAPHY TABLE.

Table XIV. K'.—Barometer Tendency.

|   |                           |  |                   |
|---|---------------------------|--|-------------------|
| 0 | Barometer steady.         | (The barometer has not fallen or risen more than $\frac{1}{4}$ millibar in 3 hours.) |                   |
| 1 | Do. rising slowly.        | (The barometer has risen 1 to $1\frac{1}{2}$ mb. (.03--04 in.) in last 3 hours.)     |                   |
| 2 | Do. rising.               | Do. do. 2 to $3\frac{1}{2}$  | (.06--10 in.) do. |
| 3 | Do. rising quickly.       | Do. do. 4 to 6   | (.12--18 in.) do. |
| 4 | Do. rising very rapidly.  | Do. do. over 6   | (.18 in.) do.     |
| 5 | Do. falling slowly.       | Do. do. fallen 1 to $1\frac{1}{2}$   | (.03--04 in.) do. |
| 6 | Do. falling.              | Do. do. 2 to $3\frac{1}{2}$  | (.06--10 in.) do. |
| 7 | Do. falling quickly.      | Do. do. 4 to 6   | (.12--18 in.) do. |
| 8 | Do. falling very rapidly. | Do. do. over 6   | (.18 in.) do.     |

## WIRELESS GALE WARNINGS.

## Spark Issues.

These warnings are broadcast in plain language and refer to the area which lies within about 150 miles of the station broadcasting the warning.

The warnings are broadcast on a wavelength of 600 metres (spark) preceded by the International Safety Signal TTT (— — —) repeated at short intervals 10 times on full power; the warning being broadcast one minute later, once only.

Should the warning be sent during the period when one-operator ships do not keep watch it will be repeated at the commencement of the next single operator watch.

## Stations broadcasting these warnings.

| Station.                  | Call Sign. | Latitude (approx.)  | Longitude (approx.) |
|---------------------------|------------|---------------------|---------------------|
| Niton (Isle of Wight) - - | GNI        | $50^{\circ} 35' N.$ | $1^{\circ} 17' W.$  |
| Land's End - - - -        | GLD        | $50^{\circ} 07' N.$ | $5^{\circ} 40' W.$  |
| Fishguard - - - -         | GRL        | $52^{\circ} 01' N.$ | $4^{\circ} 59' W.$  |
| Seaforth (Liverpool) - -  | GLV        | $53^{\circ} 28' N.$ | $3^{\circ} 01' W.$  |
| Wick - - - - -            | GKR        | $58^{\circ} 26' N.$ | $3^{\circ} 06' W.$  |
| Cullercoats - - - -       | GCC        | $55^{\circ} 02' N.$ | $1^{\circ} 26' W.$  |
| Valentia (Ireland) - -    | GCK        | $51^{\circ} 56' N.$ | $10^{\circ} 21' W.$ |
| Malin Head (Ireland) -    | GMH        | $55^{\circ} 22' N.$ | $7^{\circ} 20' W.$  |

**Example.**—"Gale Warning.—Deep depression off N.W. Ireland moving East. Gales from S.E., backing North, probable North of Lat.  $54^{\circ}$ . Southerly gales veering N.W. other coasts."

**NOTE.**—For locating depressions the use of the words Ireland or

Iceland is frequent and in order that they shall not be confused when Iceland is appropriate it will be repeated thus—Iceland Iceland.

## Wireless Telephony (R/T) Issues.

Gale warnings will be broadcast as necessary by Radio Telephony, by the BRITISH BROADCASTING COMPANY'S station at Daventry, on the wavelength of 1,600 metres as follows:—

## Weekdays.

Immediately after the time signals at 1300 and 1600 G.M.T. and immediately following the ordinary weather report broadcast at 1900 G.M.T. Gale warnings issued at 1300 G.M.T. will be repeated both at 1600 and 1900 G.M.T. and a warning issued at 1600 G.M.T. will be repeated at 1900 G.M.T.

## Sundays.

At 1530 G.M.T. only.

When British Summer Time is in operation the above times should be retarded one hour.

The warnings will be made in the following manner by word of mouth:—

"The Meteorological Office issued the following gale warning to shipping at 1430 G.M.T. to-day:—Secondary depression off S.W. Ireland moving North-eastward, Southerly gales expected North of line from Exmouth to Spurn Head."

These R/T gale warnings are simply a repetition of the W/T gale warnings at fixed times convenient to the B.B.C.

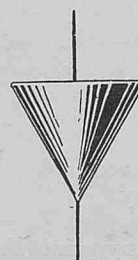
Changes in the times of issue by R/T of these gale warnings for shipping are necessary at shorter notice than can be given by THE MARINE OBSERVER. Mariners are, therefore, referred to "The Radio Times," the official organ of the BRITISH BROADCASTING COMPANY, published weekly, for the exact times of issue. The times given in "The Radio Times" are only G.M.T. when summer time is not in operation.

## IV. VISUAL GALE WARNINGS.

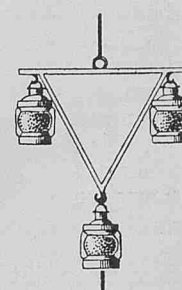
## Great Britain and Ireland.

## SOUTH CONE.

By Day.



By Night.



## Hoisted for Gales.

From S.E., veering to S.W., W., or N.W.

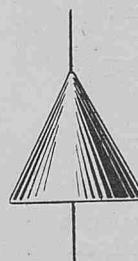
„ S.W., veering to W. or N.W.

„ W., veering to N.W.

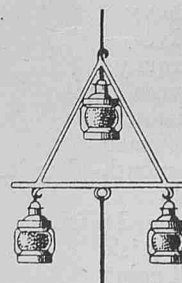
And also from E., veering to S. or S.W.

## NORTH CONE.

By Day.



By Night.



## Hoisted for Gales.

From S.E., E., or N.E., backing to N.

„ N.W., veering to N., N.E. or E.

„ N., veering to N.E. or E.

„ N.E., veering to E.

When one of these signals is hoisted it indicates that a telegram has been received from the Meteorological Office by the station exhibiting the signal, that a gale is expected in the vicinity of the station.

At present only those stations marked † in the list show the night signal.

The stations are as follows:—

#### England, East Coast.

|                    |                                       |
|--------------------|---------------------------------------|
| Berwick-upon-Tweed | Boston                                |
| Holy island        | King's Lynn                           |
| Amble              | Weybourne                             |
| Blyth              | Cromer                                |
| Tynemouth          | Yarmouth                              |
| North Shields      | Gorleston                             |
| Souter point       | Lowestoft                             |
| Sunderland         | Southwold                             |
| Seaham             | Orfordness                            |
| Hartlepool         | Ipswich                               |
| Middlesbrough      | Landguard                             |
| Redcar             | Gunfleet                              |
| Whitby             | Burnham                               |
| Filey              | Kentish Knock light-vessel.           |
| Scarborough        | Greenhithe (H.M.S. <i>Worcester</i> ) |
| Flamborough head   | Chatham                               |
| Bridlington        | Sheerness                             |
| Aldborough         | †Southend                             |
| Spurn head         | Tilbury                               |
| Hull               | Rotherhithe                           |
| Goole              | Reculvers                             |
| Grimsby            | Herne bay                             |
| Mablethorpe        | Margate                               |

#### England, South Coast.

|                             |                              |
|-----------------------------|------------------------------|
| Ramsgate                    | Jersey (Channel Is.)         |
| North Goodwin light-vessel. | Exmouth                      |
| Deal                        | Torquay                      |
| Dover                       | Dartmouth                    |
| Sandgate                    | Berry head                   |
| Dungeness                   | Prawle point                 |
| Rye                         | Salcombe                     |
| Eastbourne                  | Plymouth                     |
| Beachy head                 | Devonport                    |
| †Newhaven                   | Rame head                    |
| Brighton                    | Portwrinkle                  |
| Littlehampton               | Looe                         |
| Hayling island              | Fowey                        |
| Portsmouth                  | Gorran haven                 |
| Soutnampton                 | Mevagissey                   |
| Cowes                       | Coverack                     |
| Ryde                        | St. Anthony point (Falmouth) |
| St. Catherine point         | Lizard                       |
| Needles (Freshwater)        | Mullion                      |
| Poole                       | Porthleven                   |
| Swanage                     | Mousehole                    |
| St. Alban's head            | Tol Peden Penwith            |
| Weymouth                    | Scilly (St. Mary's)          |
| Portland                    |                              |

#### England, West Coast, and Wales.

|                   |                    |
|-------------------|--------------------|
| Sennen            | Nells point        |
| Godrevy           | Barry dock         |
| St. Ives          | Nash               |
| Newquay           | Briton ferry       |
| Trevoise head     | Mumbles            |
| Padstow           | Rhos-sili          |
| Port Isaac        | Burry port         |
| Lynmouth—Foreland | Tenby              |
| Bude              | Caldy island       |
| Hartland point    | Pembroke dock      |
| Lundy isle        | St. Ann's head     |
| Bull point        | Fishguard          |
| Ilfracombe        | Newquay (Cardigan) |
| Weston-super-Mare | Aberystwith        |
| Avonmouth         | Carnarvon          |
| Newport (Mon.)    | South Stack        |
| Cardiff           | Holyhead           |
| Penarth           | Point Lynus        |

Hilbre island  
Hoylake  
Bar light-vessel  
Formby light-vessel  
Crosby light-vessel  
Runcorn  
Liverpool  
Preston  
Blackpool  
Fleetwood

Heysham  
Morecambe  
Barrow  
Walney island  
Maryport  
Whitehaven  
Douglas (Isle of Man)  
Ayre point (Isle of Man)  
Ramsey (Isle of Man)

#### Scotland, West Coast.

|                  |                 |
|------------------|-----------------|
| Stranraer        | Campbeltown     |
| Mull of Galloway | Mull of Cantyre |
| Port Patrick     | Rinns of Islay  |
| Corsewall point  | Rudha Mhail     |
| Ballantrae       | Glas island     |
| Ardrossan        | Stornoway       |
| Greenock         | Ru Stoer        |
| Kildonan         |                 |

#### Scotland, North and East Coasts, with Orkneys and Shetlands.

|                          |               |
|--------------------------|---------------|
| Cape Wrath               | Peterhead     |
| Lerwick                  | Collieston    |
| Sumburgh head            | Aberdeen      |
| Fair isle                | Law point     |
| Noup head                | Girdleness    |
| Kirkwall                 | Stonehaven    |
| Stronsay                 | Gourdon       |
| Stromness (Orkney isles) | Johnshaven    |
| Cantick head             | Montrose      |
| Broughness               | Scurdyness    |
| Dunnet head              | Arbroath      |
| Wick                     | Fifeness      |
| Helsmdale                | Anstruther    |
| Tarbetness               | Methil        |
| Cromarty                 | Rosyth        |
| Burghead                 | Grangemouth   |
| Lossiemouth              | North Berwick |
| Buckie                   | Dunbar        |
| Port Knockie             | Cockburnspath |
| Portsoy                  | St. Abbs head |
| Banff                    | Eyemouth      |
| Fraserburgh              | Burnmouth     |

#### Ireland, North and East Coasts.

|            |           |
|------------|-----------|
| Rathmullen | Belfast   |
| Malin head | Kingstown |
| Portrush   |           |

#### Ireland, South Coast.

|            |             |
|------------|-------------|
| Queenstown | Galley head |
| Cork       |             |

#### Ireland, West Coast.

|                              |            |
|------------------------------|------------|
| Killybegs (St. John's point) | Loop head. |
|------------------------------|------------|

#### Special Notices regarding Personnel.

*The Marine Superintendent will be glad to receive information of special distinctions gained and retirements, &c., of Marine Observers.*

#### OBITUARY.

The death of Commander W. H. HATCHER, R.D., R.N.R., Captain of the CUNARD Liner *Antonia*, which took place on December 19th, 1926, on board his ship when on passage from New York to Plymouth, is noted with deep regret.

Captain HATCHER had been a regular member of the Corps of Voluntary Marine Observers since 1921.



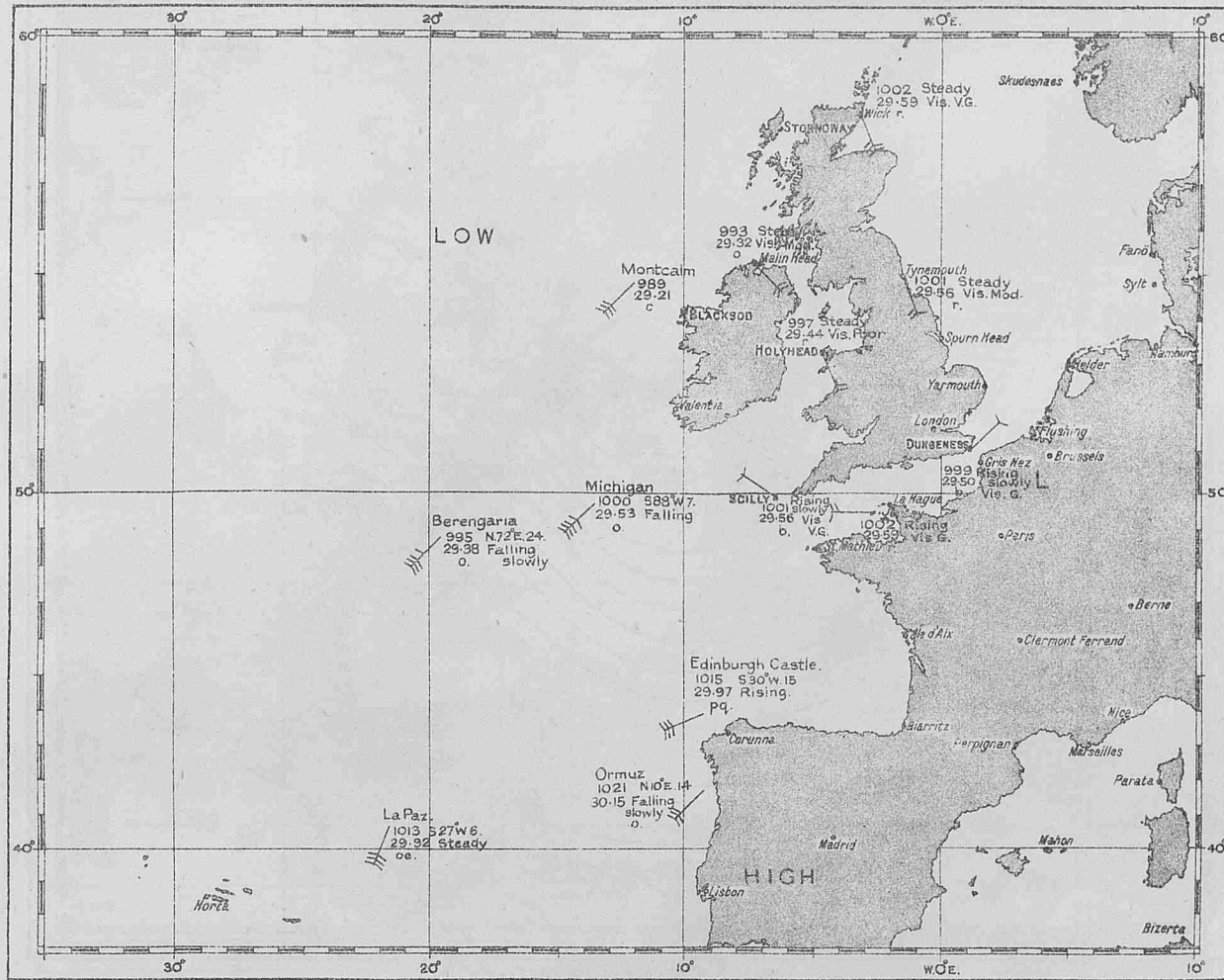
PLOTTED OBSERVATIONS FOR WEATHER CHART, MORNING OF FEBRUARY 25<sup>TH</sup>, 1923.

Chart I.—"Wireless and Weather"

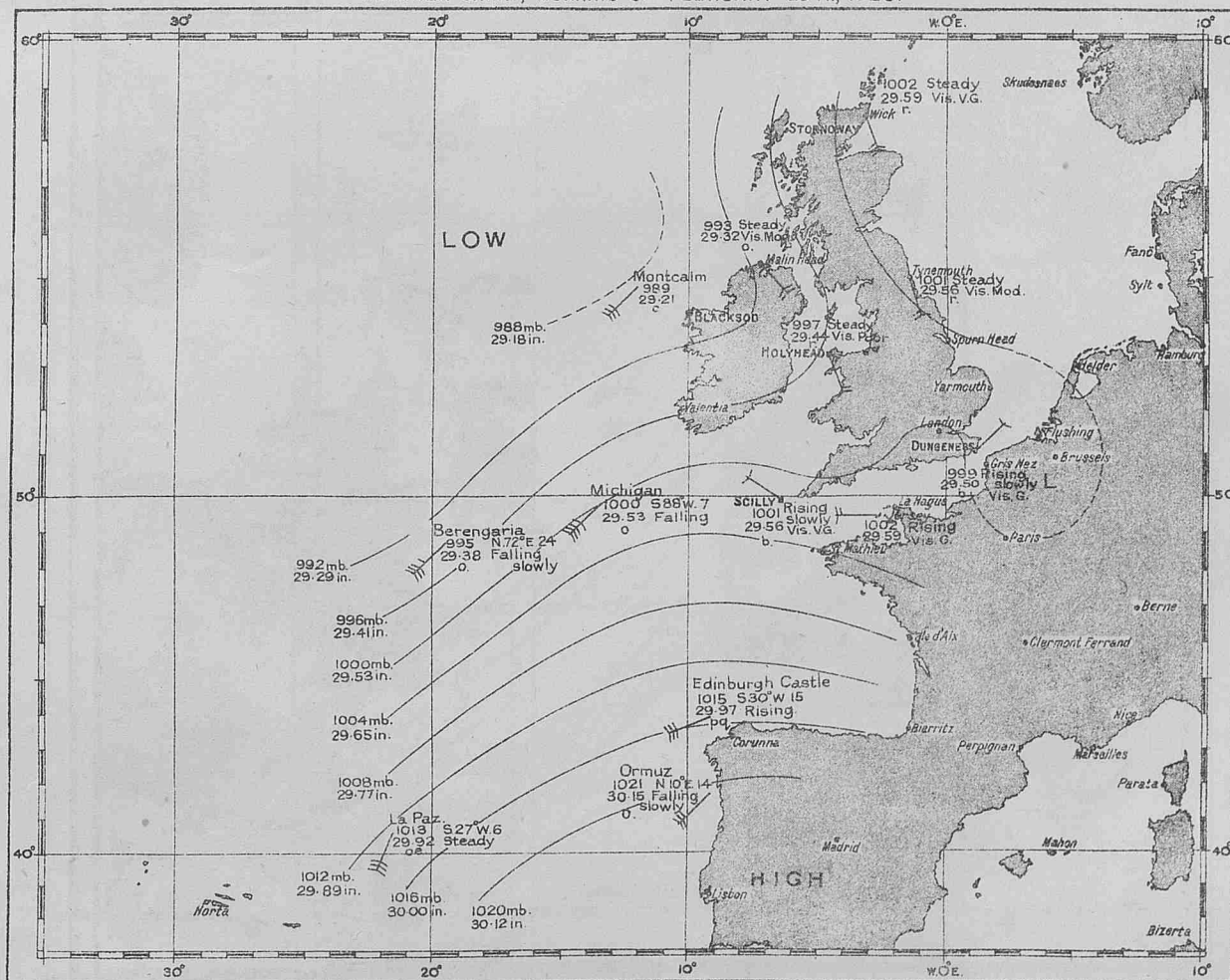
WEATHER CHART, MORNING OF FEBRUARY 25<sup>TH</sup>, 1923.

Chart II.—"Wireless and Weather"

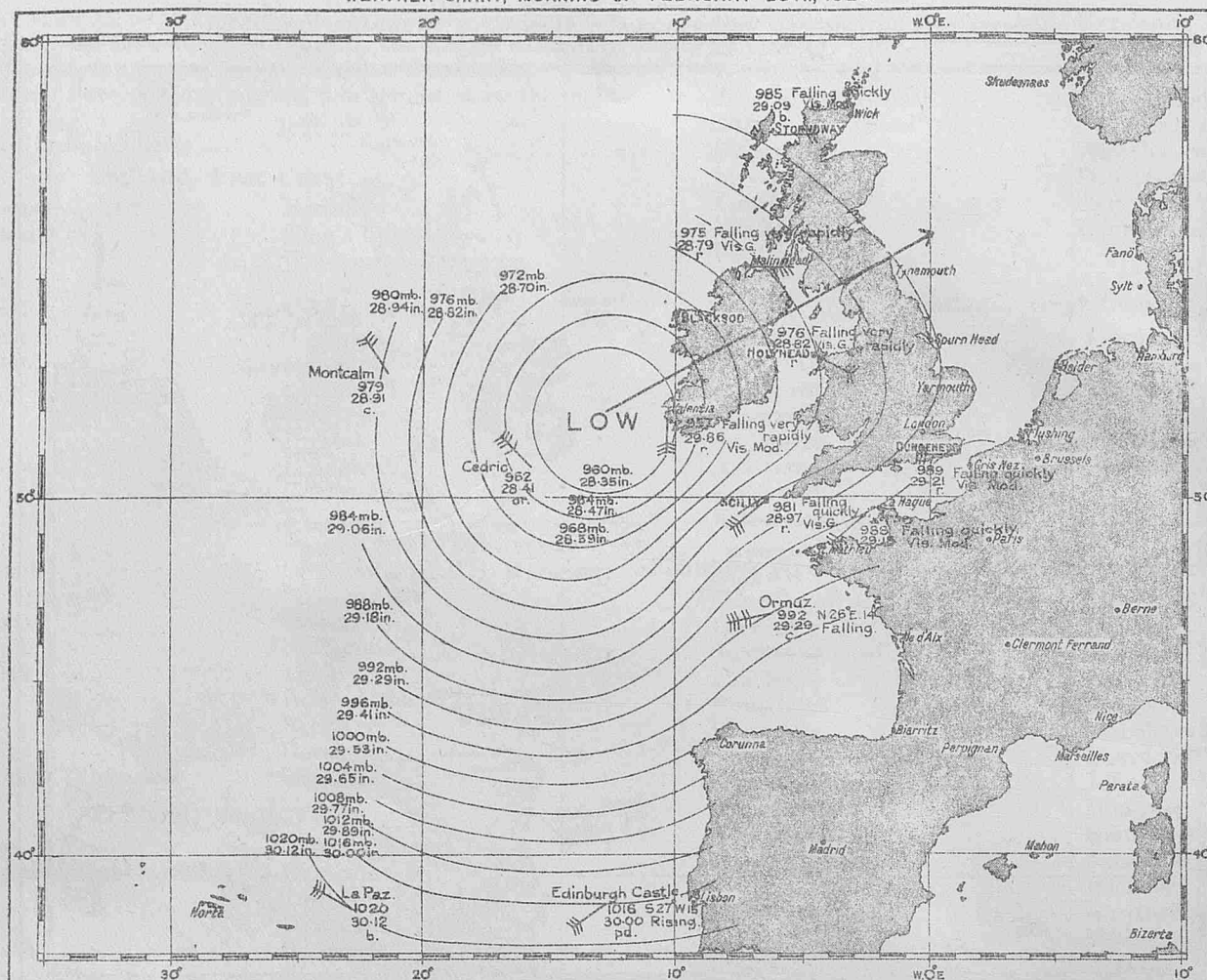
WEATHER CHART, MORNING OF FEBRUARY 26<sup>TH</sup>, 1923.

Chart III.—"Wireless and Weather."

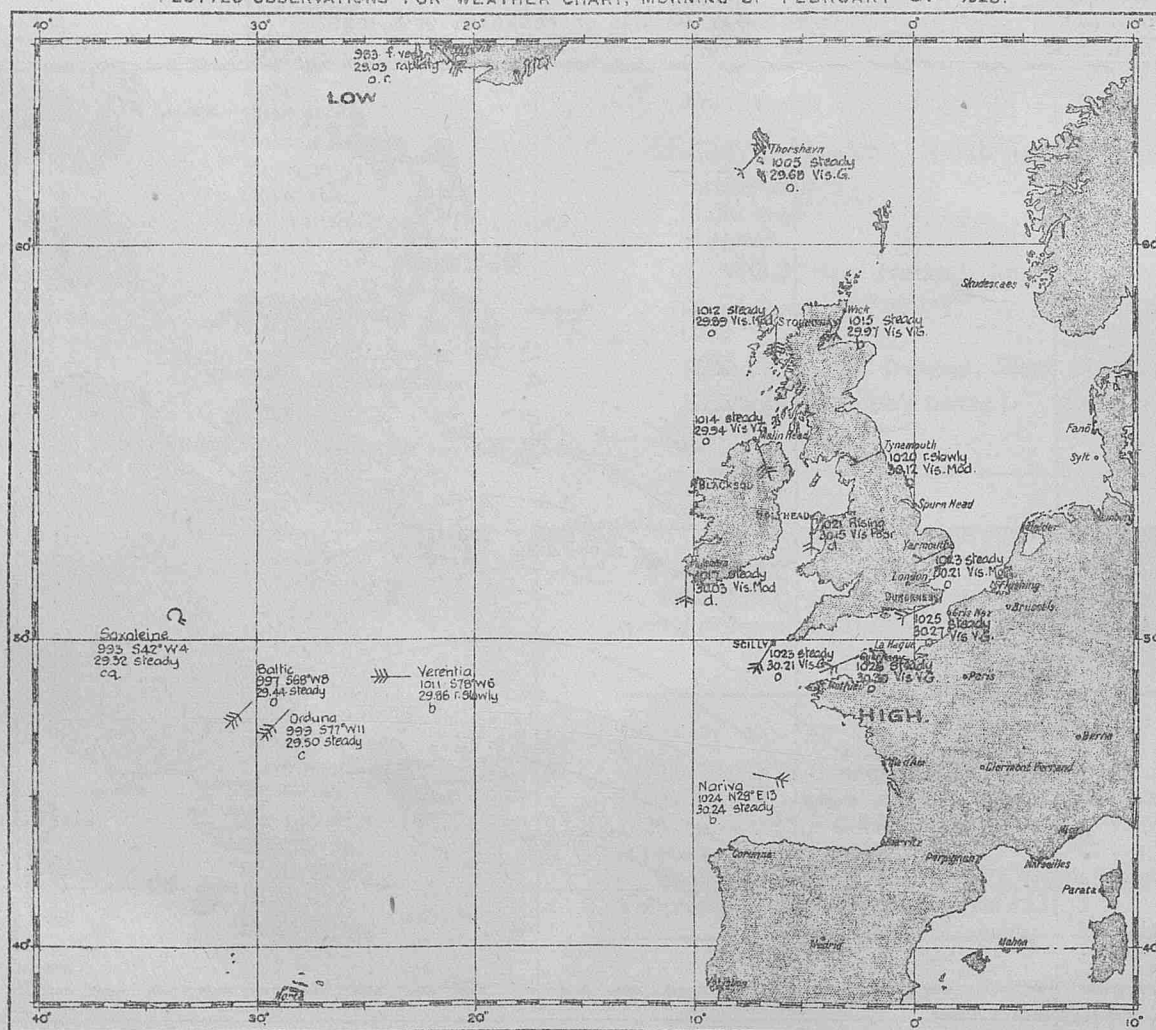
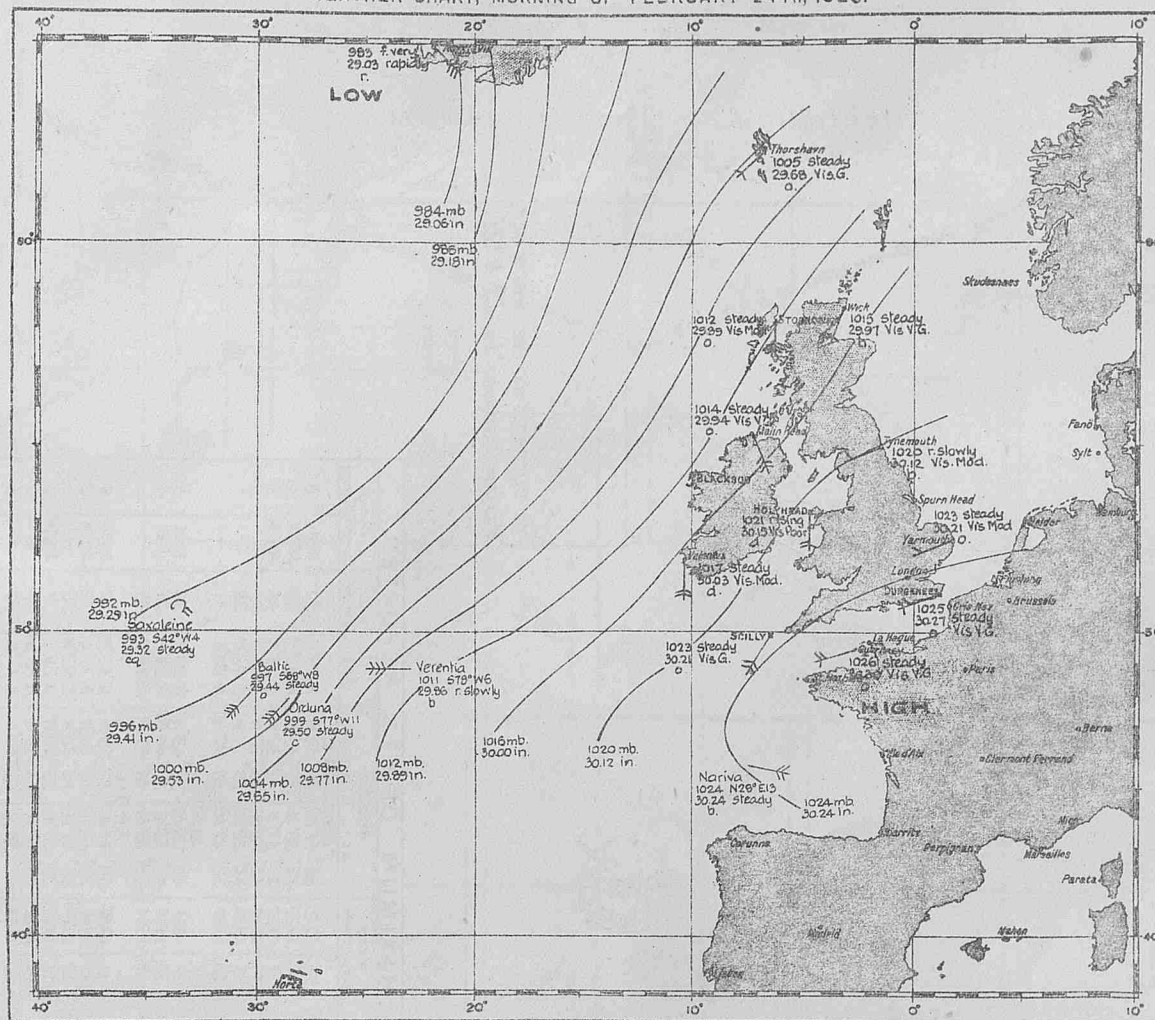
PLOTTED OBSERVATIONS FOR WEATHER CHART, MORNING OF FEBRUARY 24<sup>TH</sup>, 1926.

Chart IV.—"Wireless and Weather."



## WEATHER CHART, MORNING OF FEBRUARY 24TH, 1926.

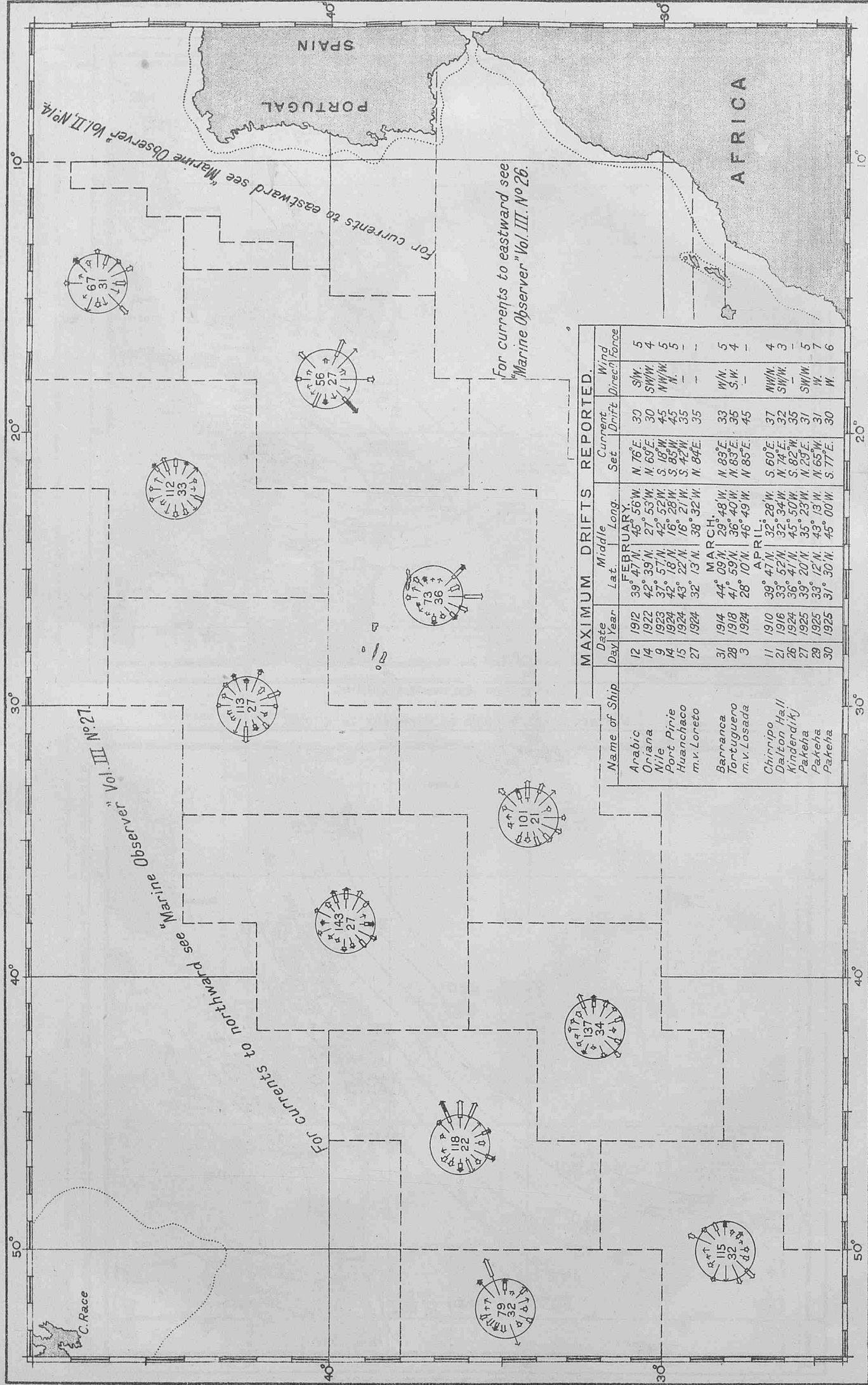


CURRENTS ON THE TRACKS TO AND FROM THE WEST INDIES AND PANAMA.  
(EASTERN PORTION)

Vol. IV. No 38.

FEBRUARY, MARCH AND APRIL.

Observations of ships regularly observing for British Meteorological Office 1910-1925.



EXPLANATION OF CURRENT ROSES

The current roses are drawn from observations within the pecked lines.

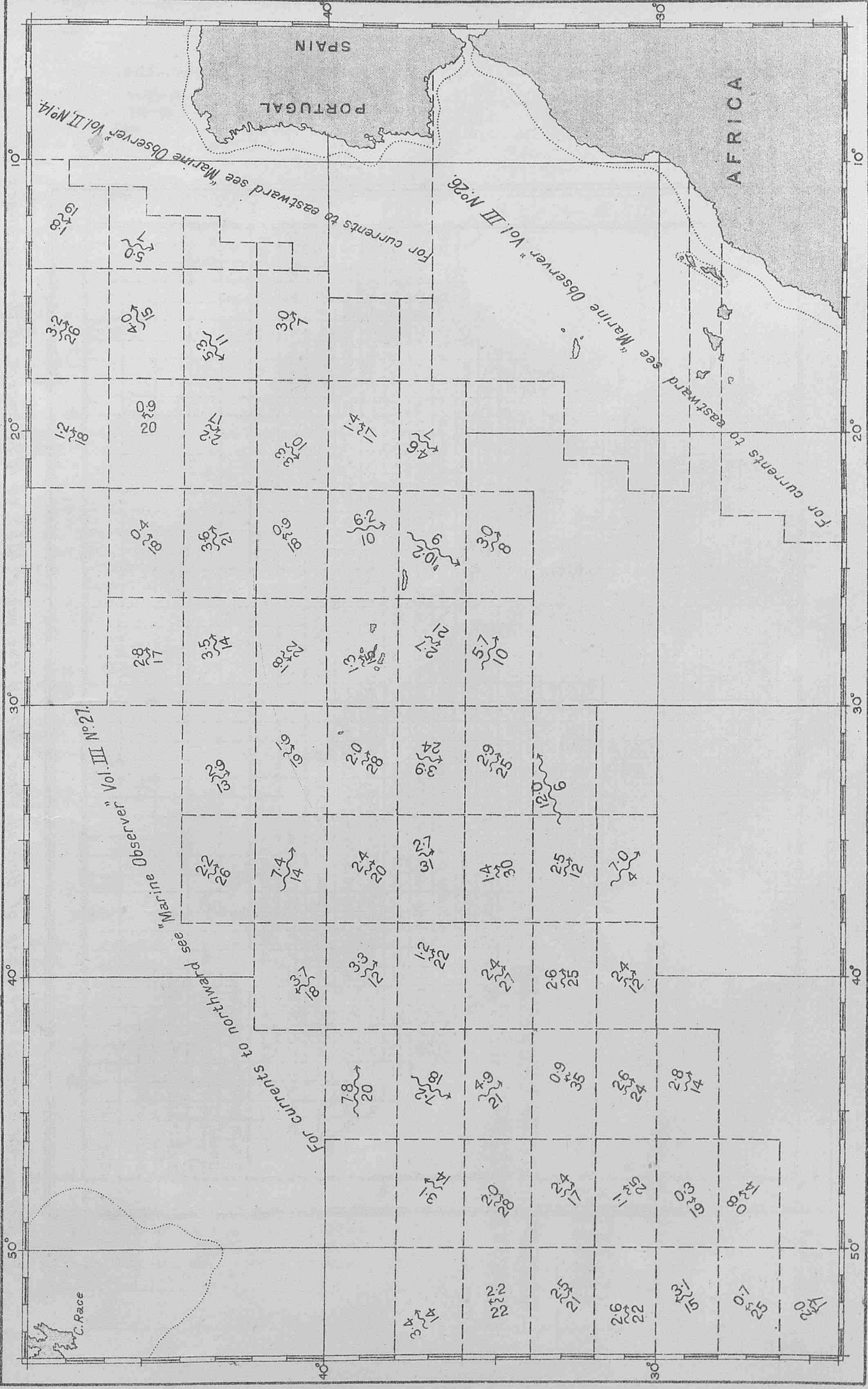
Arrows flow with the current, length represents frequency, thickness strength.

6-12 miles per day  
13-24  
25-48  
49-72  
73  
" and above

Distance from tail of arrow to circle represents 5%.  
Scale 0 10 20 30 40 50%  
The upper figure in centre of rose gives total number of observations, the lower figure the frequency



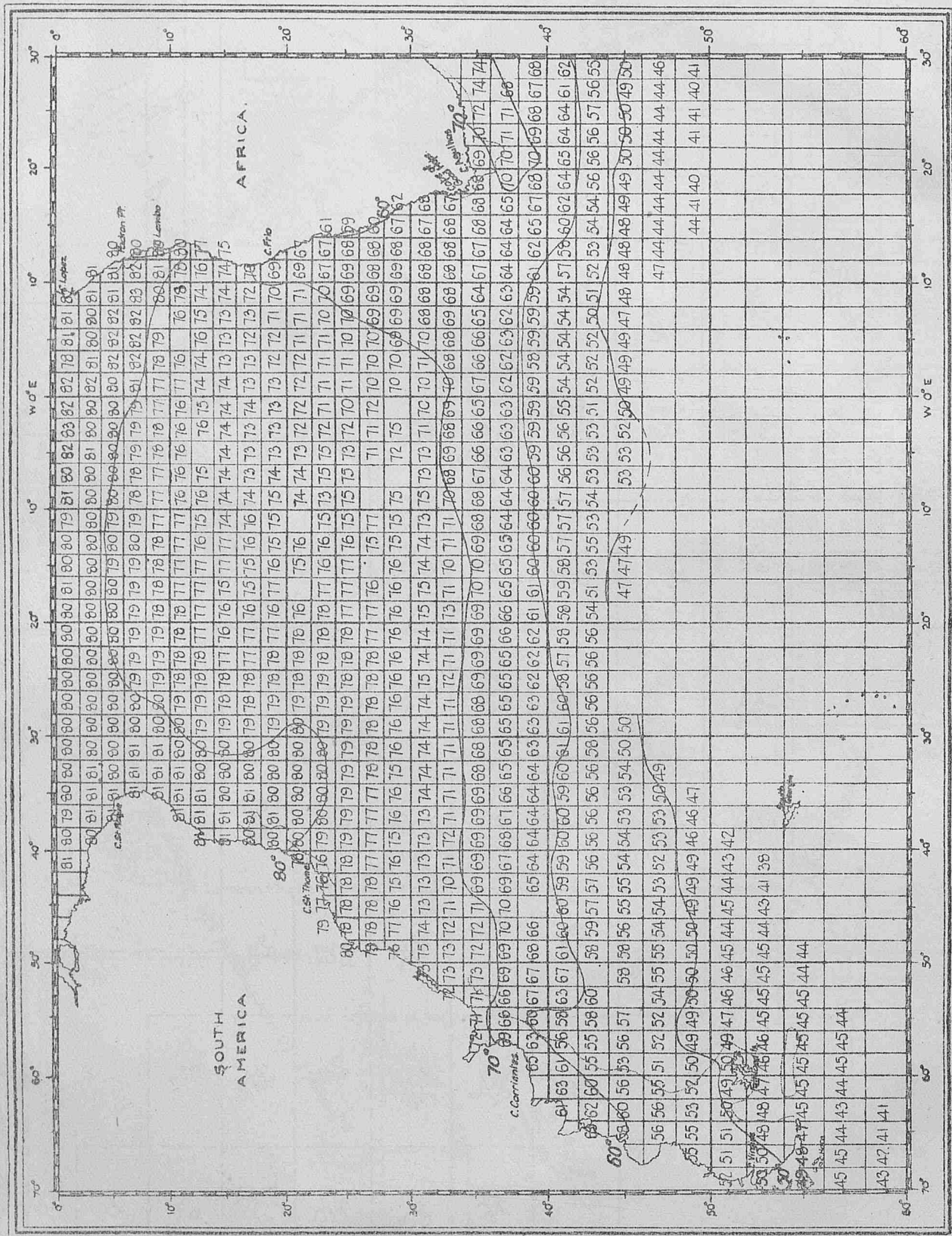
CURRENTS ON THE TRACKS TO AND FROM THE WEST INDIES AND PANAMA.  
(EASTERN PORTION)  
FEBRUARY, MARCH AND APRIL.  
Observations of ships regularly observing for British Meteorological Office 1910-1925.



EXPLANATION OF CURRENT ARROWS.

The arrows flow with the current and represent the resultant of currents observed within the pecked lines. The centre of each arrow lies in the mean position of observation. The figures above the arrows give the velocity of current in miles per day; the figures below the arrows the number of observations.

SOUTH ATLANTIC.  
MEAN SEA SURFACE TEMPERATURES FOR MONTH OF FEBRUARY.



Computed from observations of British ships during the years 1855 to 1899 except to the Southward and Eastward of Latitude 30° South and Longitude 10° East where the observations are for the years 1855 to 1878.



## CURRENT OBSERVATION.

It is very desirable that good current data should be recorded. Spaces are provided for current experienced throughout the day and for current determined at shorter intervals in Meteorological Logs, while Form 911 provides for either or both.

Generally the difference between the *Dead Reckoning Position* at noon, reckoned from previous noon, and the *observed position* has been accepted as attributable to a single current for the whole 24 hours.

It is necessary to make careful distinction between *Dead Reckoning Position* and *Estimated Position*, the former being the position as reckoned from the last fix by courses steered and distances run, corrected for all known errors and disturbances *except* current. When a fix cannot be obtained, an estimation for current (when one is known generally to exist) is sometimes applied to the D.R.; the result may then be conveniently termed the *Estimated Position*.

If this estimated position is given in the Meteorological Log or Form 911, it should be clearly stated, otherwise it may be misleading.

Currents of varying velocity and direction may be experienced along the track made in 24 hours; therefore, when reliable fixes such as by Stellar observations at twilight are obtained, the current should be determined for the intervals, and all should be checked with the noon to noon result. Each of these currents determined at shorter intervals than 24 hours should be entered in the Meteorological Log in the appropriate column, and the time and latitude and longitude of each observation position should be given in the latitude and longitude columns. The times given on Form 911 indicate the interval. The period of short interval currents should usually not be less than, say, six hours. The best interval is probably from twilight to twilight.

It is desirable that whenever possible two methods of ascertaining the distance run through the water should be used, as recent investigation goes to show that with one means of measuring the speed the inclination has been to credit the ship. When possible it is recommended that both patent log and revolutions should be used.

For working out the set and drift of current the position *from* as well as the position *to* must always be *fixes*. Some observers have used an *estimated* position *from*, which makes the set and drift false. The same remarks apply to course allowances for set; the latter are naturally necessary to make an *estimated* course.

## ICE REPORTS.

Commanders of ships in the Trans-North Atlantic and Southern Ocean Trades are earnestly requested to have the Ice Report Form 912 completed and returned at the end of each passage. A nil return is desired if no ice is seen.

These forms are supplied with THE MARINE OBSERVER each month to regular observing ships in these Trades.

## COVER FOR MARINE OBSERVER.

Marine observers, regular recipients and subscribers to this Journal are hereby informed that a binding cover for Volume III of "The Marine Observer" may be obtained from H.M. Stationery Office, through any bookseller, price 2s.

The arrangements for assembling the numbers for binding is described in Volume III, No.36 page 203

It should be clearly understood that this cover is not the cover used for binding "Excellent" awards, which is far superior; but it will be found to be of good quality and a useful means of preserving the yearly numbers, for which a title page is issued with each December number.

## POSTAL ARRANGEMENTS.

THE MARINE OBSERVER is published, when circumstances permit, on the first Wednesday of the month previous to that to which the number refers.

If captains of observing ships will forward to the Office the particulars required hereunder, endeavour will be made as far as mails permit to post the latest number for use on their homeward passage.

S.S. .... Captain .....

Port of Call. ....

Date of Homeward Departure .....

Postal Address .....

When this information is not given THE MARINE OBSERVER is addressed to the Commanding Officer, s.s. ...., c/o the owners, and captains are requested to make their own arrangements for forwarding.

## CONVERSION TABLE.

To Convert Inches into Millibars.

| Inch. | mb.   | Inch. | mb.     | Inch. | mb.     |
|-------|-------|-------|---------|-------|---------|
| 27.50 | 931.2 | 28.65 | 970.2   | 29.85 | 1,010.8 |
| 27.55 | 932.9 | 28.70 | 971.9   | 29.90 | 1,012.5 |
| 27.60 | 934.6 | 28.75 | 973.6   | 29.95 | 1,014.2 |
| 27.65 | 936.3 | 28.80 | 975.3   | 30.00 | 1,015.9 |
| 27.70 | 938.0 | 28.85 | 976.9   | 30.05 | 1,017.6 |
| 27.75 | 939.7 | 28.90 | 978.6   | 30.10 | 1,019.3 |
| 27.80 | 941.4 | 28.95 | 980.3   | 30.15 | 1,021.0 |
| 27.85 | 943.1 | 29.00 | 982.0   | 30.20 | 1,022.7 |
| 27.90 | 944.8 | 29.05 | 983.7   | 30.25 | 1,024.4 |
| 27.95 | 946.5 | 29.10 | 985.4   | 30.30 | 1,026.1 |
| 28.00 | 948.2 | 29.15 | 987.1   | 30.35 | 1,027.7 |
| 28.05 | 949.9 | 29.20 | 988.8   | 30.40 | 1,029.4 |
| 28.10 | 951.6 | 29.25 | 990.5   | 30.45 | 1,031.1 |
| 28.15 | 953.2 | 29.30 | 992.2   | 30.50 | 1,032.8 |
| 28.20 | 954.9 | 29.35 | 993.9   | 30.55 | 1,034.5 |
| 28.25 | 956.6 | 29.40 | 995.6   | 30.60 | 1,036.2 |
| 28.30 | 958.3 | 29.45 | 997.3   | 30.65 | 1,037.9 |
| 28.35 | 960.0 | 29.50 | 999.0   | 30.70 | 1,039.6 |
| 28.40 | 961.7 | 29.55 | 1,000.7 | 30.75 | 1,041.3 |
| 28.45 | 963.4 | 29.60 | 1,002.4 | 30.80 | 1,043.0 |
| 28.50 | 965.1 | 29.65 | 1,004.0 | 30.85 | 1,044.7 |
| 28.55 | 966.8 | 29.70 | 1,005.7 | 30.90 | 1,046.4 |
| 28.60 | 968.5 | 29.75 | 1,007.4 | 30.95 | 1,048.1 |
|       |       | 29.80 | 1,009.1 |       |         |



# ICE CHART.

## WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE.

- (B) From 1st February to 31st August, inclusive.
- (D) From 15th February to 10th April, inclusive.
- (E) From 1st December to 14th February.

These routes are liable to alteration when, owing to abnormal ice conditions, it is considered advisable by the steamship lines who are parties to the Track agreement.

### ROUTE NOTICES.

For latest information *re* Tracks see Board of Trade "Notices to Mariners," 1st December, 1926. pp. 141-5.

### SYMBOLS USED ON THE CHART.

- Iceberg.
- Floesberg.
- Growler.
- Field Ice, Floe Ice, Pack Ice, Hummocky Ice, Bay Ice.
- Drift Ice, Brash Ice, Sludge Ice, Pancake Ice.
- Indicates W/T Ice.
- Warning Station.

### PHENOMENAL DRIFT OF ICE.

| Date.        | Ship or Source of Report. | Position.         | Remarks.                    |
|--------------|---------------------------|-------------------|-----------------------------|
| Feb. 3, 1922 | S.S. Weehawken ...        | 41°42'N. 58°59'W. | Ice (sustained bow damage). |

Reports of Ice sighted between December 1st and December 31st, 1926, which have been received by the Meteorological Office, are shown by the Symbols plotted in the indicating the day of the month.

### LATEST ICE REPORT FROM CANADA.

The following cablegram, dated 15th December, 1926, was received from the Superintendent, Canadian Signal Service, Quebec :—  
 "Montreal to Sorel, no ice in sight. Eastward to Lake St. Peter, river solid. Three Rivers to Cap des Rosiers, light open ice inshore and light open ice distant. Belle Isle, berg in sight. Other points, no ice in sight."



**Co-operation of Shipowners, Masters and Mates.**

The Director of the Meteorological Office is authorised to lend tested Instruments to Captains of British-owned ships who undertake to make 4 hourly observations and keep Meteorological Logs for the Office.

The instruments supplied for this purpose are one barometer, four thermometers with screen, two hydrometers and in some cases a Barograph and rain gauge is added to the equipment.

Tested instruments are also lent to a number of British Atlantic Liners which make special coded W/T weather reports to the Office.

The number of ships co-operating with the M.O. using official tested instruments on loan is limited.

Vessels observing regularly for the Meteorological Office to which office instruments are not lent, keep Form 911, Ship's Meteorological Report, using the ship's instruments, the barometer being compared with Standards. The number of ships regularly contributing approved forms of all descriptions to the Marine Division is limited to 500.

Captains and Officers who wish to co-operate with the Meteorological Office should apply by letter to The Director, Meteorological Office, Air Ministry, Kingsway, London, W.C.2; or in person between the hours of 10 a.m. and 4 p.m., to the Marine Superintendent at the same address or to any of the gentlemen whose names and addresses are given below acting as agents at the respective ports. A waiting list is kept of the names of ships whose commanders have offered to regularly co-operate.

Marine Observers (i.e., Captains and Officers who regularly observe for the Meteorological Office) will greatly assist if they will send in Meteorological Logs immediately on completion through the Port Meteorological Officer or Agent, at the same time notifying him of any possible instrumental defects.

Defective instruments will then be replaced and new Log Books, etc., provided.

In London and at base ports where there is not an Agency, notification of defects should be sent to headquarters on arrival, with the Meteorological Log.

Vessels making voyages of less than two months' duration are requested to retain their logs until nearly filled up, but the log should be returned in all cases at least twice yearly.

W/T Registers and Forms 911 should in all cases be sent directly to the Meteorological Office, London. The Port Meteorological Officer at Liverpool and the Visiting Officer in London board vessels co-operating with the Meteorological Office, and the agents visit ships at their ports when circumstances permit.

Postage abroad incurred on behalf of the Meteorological Office in returning logs will be refunded. Postage from British Empire ports need not be prepaid, if the envelope is marked O.H.M.S., and addressed to the Director, Meteorological Office, London.

Captains and Officers whether they observe regularly for the Meteorological Office or not are urged to report exceptional phenomena in air or sea. Reports of weather experienced in or near Tropical Cyclones or hurricanes, also abnormal currents are specially desired.

Ships on the List of Voluntary Observers to the Meteorological Office which have a mercurial barometer are indicated by the letters M.L., W.T. and M.

These are selected ships for reporting weather observations made at specified times by W/T to "All Ships," and they are invited to perform this service, which is for the benefit of all shipping fitted for W/T reception.

For sample weather report message see pages 15 and 17 of Vol. IV. No. 37.

THE MARINE OBSERVER is sent monthly to all ships regularly contributing Logs, Forms and W/T Registers to the Meteorological Office. It is hoped that each ship will preserve all her copies. Personal copies of Numbers are sent to those whose special contributions are published in them. A suitable cover may be obtained from H.M. Stationery Office, price 2s.

**DERELICTS AND FLOATING WRECKAGE.**

| Date.                   | Position.                |            | Description.   |
|-------------------------|--------------------------|------------|--|
|                         | Latitude.                | Longitude. |  |
| <b>NORTH SEA.</b>       |                          |            |  |
| 9.12.26                 | 53°03'N.                 | 1°25'E.    | Floating spars with wreckage attached.   |
| 22.12.26                | 3. m. W. ½ S. Dyck Lt.V. |            | Unlighted buoy adrift, dangerous to navigation.  |
| <b>ENGLISH CHANNEL.</b> |                          |            |  |
| 2.12.26                 | 50°20'N.                 | 1°37'W.    | Paravane, floating nose up, dangerous to navigation.   |
| 9.12.26                 | 50°51'N.                 | 1°01'W.    | Drifting derelict.   |
| 12.12.26                | 49°35'N.                 | 3°10'W.    | Black and white buoy drifting.   |
| 15.12.26                | 49°48'N.                 | 3°23'W.    | Red conical buoy, bell or light fixture on top, adrift.  |
| <b>MEDITERRANEAN.</b>   |                          |            |  |
| 19.12.26                | 38°32'N.                 | 25°—E.     | Wreck of small sailing vessel, awash.  |
| <b>NORTH ATLANTIC.</b>  |                          |            |  |
| 1.12.26                 | 26°05'N.                 | 76°06'W.   | Large derelict, bottom up, with about 50 feet of keel showing.   |
| 4.12.26                 | 29°52'N.                 | 79°37'W.   | Derelict, bottom up, awash.  |
| 5.12.26                 | 40°57'N.                 | 69°12'W.   | Derelict, decked motor launch marked <i>Sarah P.M.B.</i> on stern, and <i>C 6256</i> on bow.                           |
| 6.12.26                 | 40°—'N.                  | 69°35'W.   | Black sailing vessel, 80 to 100 feet long.   |
| 7.12.26                 | 51°19'N.                 | 11°09'W.   | Floating tree trunk.   |
| 7.12.26                 | 51°14'N.                 | 10°20'W.   | Large bell-shaped red painted buoy, wire turns attached on top.  |
| 7.12.26                 | 35°53'N.                 | 72°40'W.   | American schooner <i>Ena M. McKnight</i> , dismasted and waterlogged.  |
| 7.12.26                 | 33°45'N.                 | 75°10'W.   | Derelict from 40 to 60 feet long, bottom up.   |
| 7.12.26                 | 33°28'N.                 | 76°56'W.   | Obstruction about 50 feet long and 20 feet wide, 1 foot out of water.  |
| 10.12.26                | 34°18'N.                 | 75°56'W.   | Spar about 35 feet long, rigging attached.   |
| 11.12.26                | 36°36'N.                 | 70°43'W.   | Derelict sailing boat.   |
| 12.12.26                | 24°24'N.                 | 58°02'W.   | Bell buoy.   |
| 13.12.26                | 46°22'N.                 | 14°05'W.   | Can buoy adrift.   |
| 14.12.26                | 28°22'N.                 | 66°04'W.   | Black bell buoy.   |
| 18.12.26                | 39°49'N.                 | 13°32'W.   | Three masted schooner <i>Eufrosine</i> abandoned, flying <i>Q.U.R.C.</i> flags, hauled down, floating high, dangerous. |
| 18.12.26                | 37°31'N.                 | 15°47'W.   | Ship <i>Guarnieri</i> dismasted and abandoned, dangerous.  |
| 23.12.26                | 40°51'N.                 | 17°18'W.   | Black can buoy <i>seven a</i> , painted white on side.   |
| <b>CARIBBEAN SEA.</b>   |                          |            |  |
| 1.12.26                 | 9°41'N.                  | 79°48'W.   | Large tree trunk about 60 feet long, with roots and branches projecting out of water.                                  |
| <b>GULF OF MEXICO.</b>  |                          |            |  |
| 1.12.26                 | 21°58'N.                 | 91°51'W.   | Barge marked <i>JFMCO No. 100</i> , stern submerged, bow riding high, no sign of life.                                 |
| 11.12.26                | 21°17'N.                 | 95°44'W.   | Large square-ended oil barge 150 feet long, awash.   |
| 15.12.26                | 23°46'N.                 | 81°45'W.   | Waterlogged derelict and abandoned barge <i>Caibarien</i> , awash, dangerous to navigation.                            |
| <b>NORTH PACIFIC.</b>   |                          |            |  |
| 9.12.26                 | 35°42'N.                 | 121°32'W.  | Derelict fish lighter marked <i>KHCO 2</i> .   |

**NAUTICAL OFFICERS AND AGENTS OF THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE, AIR MINISTRY.**

**LONDON ...** Captain L. A. BROOKE SMITH, R.D., R.N.R.,  
Marine Superintendent.  
Commander J. Hennessy, R.D., R.N.R., Senior  
Nautical Assistant.  
Room 319, Adastral House, Kingsway, W.C.2.  
(Telephone No.: *Holborn 3434 Extension 421*).  
Nearest station Temple, District Railway.  
Mr. W. T. GRIEVES, Visiting Officer for the Port  
of London.

**LIVERPOOL ...** Lieut. Commander M. CRESSWELL, R.N.R., Port  
Meteorological Officer, Dock Office.  
(Telephone No.: *Bank 8959*).

**Agents.**

**BELFAST ...** Captain J. MCINTYRE, Harbour Master, Harbour  
Office.  
(Telephone No.: *Belfast 4090*).  
**CARDIFF ...** Captain T. JOHNSTON, Technical College, Cathays  
Park.  
**GLYDE ...** Captain M. C. CORRANCE, Board of Trade Sur-  
veyor's Office, 73, Robertson Street, Glasgow.

**Agents (contd.).**

**FREMANTLE,**  
W. Australia.  
Captain J. J. AIREY, Deputy Director of Naviga-  
tion, Dalgety's Buildings.  
**HONG KONG,**  
China.  
Lieut. Commander O. C. G. LEVESON-GOWER,  
R.N., Superintendent, Admiralty Chart and  
Chronometer Depot, H.M. Dockyard.  
**HULL ...** Captain Geo. B. STURDY, c/o Mr. W. HAKES,  
Commercial Road.  
**LEITH ...** Captains G. BLACK and C. G. BONNER, V.C.,  
D.S.C., Leith Salvage and Towage Co., Ltd.,  
2, Commercial Street.  
**SOUTHAMPTON**  
Captain D. FORBES, Nautical Academy, 1, Albion  
Place.  
**SYDNEY,**  
New South Wales.  
Commander G. D. WILLIAMS, D.S.O., R.D., R.N.R.,  
Deputy Director of Navigation, Customs House.  
**TYNE ...** Captain J. J. MCEWAN, Marine School, South  
Shields.  
**VANCOUVER,**  
British Columbia.  
Mr. T. S. H. SHEARMAN, Room 40, Post Office  
Building.



# LIST OF VOLUNTARY OBSERVING SHIPS

i

The following is a complete list of ships regularly contributing observations to the Meteorological Office.

The names of the Captains and Officers, as ascertained from logs and reports received, are given with the date and description of last log, register or report received up to the time of going to press.

Marine Observers are requested to take this as complete and grateful acknowledgment for the work they have contributed, as it has been found necessary to reduce as far as possible the correspondence of the Marine Superintendent, which was largely composed of letters acknowledging logs and reports, in order that more time may be devoted to obtaining results from the data received.

Only in special cases will individual letters be sent.

Excellent awards will be made at the end of the financial year. The names of Commanders and Officers gaining these awards will be published in a special list in THE MARINE OBSERVER.

Ships not contributing logs or reports within a reasonable period will automatically be removed from the list and the free issue of THE MARINE OBSERVER discontinued; it is, therefore, earnestly requested that changes of service, probable periods of lay up or transfer of Commanders may be notified whenever possible.

A waiting list is kept of the names of vessels whose Commanders have offered to regularly co-operate.

The number of voluntary observing ships is limited to a maximum total of 500.

Commanders are requested to point out any errors which may occur in the list.

Unless otherwise stated, vessels on the following list are s.s.

M.L. = Equipped with tested Instruments for keeping Meteorological Log.

W.T. = Equipped with tested Instruments for making coded W/T reports to the Meteorological Office, London.

No. = Keeps Ship's Meteorological Report Form 911 with ship's instruments. Letter M after No. indicates ship's barometer Mercurial; A ship's barometer Aneroid.

C.C. = Equipped with tested Instruments for making Cross Channel Telegraphic Reports to the Meteorological Office, London.

The numbers which appear before the names of ships equipped for making coded W/T reports to the Meteorological Office, London, are used for the purpose of identification when the observations are re-transmitted in synoptic messages by Wireless or Cable.

| Name of Vessel.           | Captain.  | Observing Officers.                                    | Official Meteorological Equipment. | Line                   | Last Log, Register, or Report Contributed. Received up to 15.12.26. | Date Received. |
|---------------------------|---|--|------------------------------------|------------------------|---|----------------|
| <i>Aba</i> ...            | Yardley, H. A., D.S.C.                                    | J. Doyle, L. B. Silvester, S. J. Bristowe.             | M.L.                               | Elder Dempster         | Met. Log. 28.4.25 to 25.9.26  | 14.10.26.      |
| <i>Abinsi</i> ...         | Millson, H. E.  | E. W. Bascombe   | No. A.                             | "                      | Form 911 6.10.26 to 1.12.26   | 8.12.26        |
| <i>Achilles</i> ...       | Hill, R.  | D. MacTavish   | " A.                               | A. Holt                | 8.10.25 to 19.10.25   | 18.11.25.      |
| <i>Actor</i> ...          | Haylett, E.   | A. Frew, J. McKay, G. Penston.                         | M.L.                               | Harrison               | Met. Log. 12.5.26 to 2.7.26   | 14.8.26.       |
| <i>Adda</i> ...           | Toft, J. T.   | R. G. Roberts, O. V. Lucas                             | No. M.                             | Elder Dempster         | Form 911 27.10.26 to 3.12.26  | 7.12.26.       |
| 50 <i>Adriatic</i> ...    | Beadnell, F. E., Capt., R.N.R.                            |  | W.T.                               | White Star             | W.T. Reg. 15.11.26 to 4.12.26                                       | 8.12.26.       |
| <i>Aeneas</i> ...         | Wallace, W. K.  | J. M. Anderson, J. Weir                                | No. A.                             | A. Holt                | Form 911 18.10.26 to 6.11.26  | 9.11.26.       |
| <i>Agapenor</i> ...       | Ramsay, J.  | J. J. West   | " A.                               | "                      | 7.11.26 to 17.11.26   | 24.11.26.      |
| <i>Aidan</i> ...          | Harris, F. C. P.  | R. Parry   | " A.                               | Booth                  | 6.11.26 to 18.11.26   | 29.11.26.      |
| <i>Alban</i> ...          | Whayman, W.   | L. Harper  | " A.                               | "                      | 7.9.26 to 5.10.26   | 11.11.26.      |
| <i>Albania</i> ...        | Gronow, S.  | D. A. C. Butler  | " A.                               | Cunard                 | 18.10.26 to 29.11.26  | 8.12.26.       |
| <i>Alipore</i> ...        | Harrison, R., D.S.C., R.D., Captain, R.N.R.               |  | " M.                               | P. and O.              | 29.8.25 to 22.9.25  | 24.9.26.       |
| <i>Almanzora</i> ...      | Mackenzie, G. A.  | A. H. Phillipson                                       | " A.                               | R.M.S.P.               | 12.9.26 to 24.11.26   | 13.12.26.      |
| <i>Alondra</i> ...        | Prendergast, J. J.  | H. Peters  | " A.                               | Yeoward                | " 25.9.26 to 7.11.26  | 9.11.26.       |
| <i>Ampelo</i> ...         | Vandenkerckhove, A.                                       | A. Vandenbulck   | " A.                               | American Petroleum     | " 6.11.26 to 28.11.26   | 1.12.26.       |
| <i>Antiochus</i> ...      | Dunlop, S. K.   | E. T. Bayes  | " A.                               | A. Holt                | " 11.10.26 to 30.10.26  | 13.11.26.      |
| <i>Aorangi</i> ...        | Crawford, R.  | J. W. Bray, G. H. Kime, H. A. Titchfield, E. Anderson. | M.L.                               | Canadian-Australasian  | " 4.9.26 to 19.10.26  | 27.10.26.      |
| 30 <i>Aquitania</i> ...   | Charles, Sir J. T. W., K.B.E., C.B., R.D., Commr., R.N.R. | J. L. Crossdale, J. Locke, D. MacLean.                 | W.T.                               | Cunard                 | Met. Log. 7.5.26 to 19.8.26   | 10.9.26.       |
| 62 <i>Arabic</i> ...      | Bulman, J. B.   | S. B. Morfee, M. Bennett, A. F. Butcher.               | "                                  | White Star             | W.T. Reg. 17.10.26 to 1.11.26                                       | 3.11.26.       |
| <i>Arafura</i> ...        | Gordon, A. S.   | J. T. Heddle, G. C. Smith, O. B. Godfrey.              | M.L.                               | Eastern and Australian | " 15.10.26 to 6.11.26   | 9.11.26.       |
| <i>Archimedes</i> ...     | Downs, E. B.  | J. M. Edgar  | No. A.                             | Lamport & Holt         | Form 911 20.4.26 to 14.5.26   | 17.5.26.       |
| <i>Ariguaní</i> ...       | Sudamore, J. H. H., D.S.C., R.D., Commr., R.N.R.          | G. Dobson, S. A. Sapworth, G. McKee, W. E. Butcher.    | M.L.                               | Elders & Fyffes        | Met. Log. 7.4.26 to 28.6.26   | 1.9.26.        |
| <i>Armada Castle</i> ...  | Millard, A.   | A. B. Connor, G. D. Pinnick, L. May.                   | "                                  | Union Castle           | Form 911 22.3.26 to 9.6.26  | 16.7.26.       |
| <i>Arracan</i> ...        | Willis, M.  | R. McInnes, M. S. Stuart, C. C. Weir.                  | "                                  | P. Henderson           | " 10.4.26 to 8.8.26   | 18.8.26.       |
| <i>Arundel</i> ...        | Short, H.   | Mr. Hill   | C.C.                               | Southern Rly.          | Met. Log. 17.4.26 to 10.10.26                                       | 30.10.26.      |
| <i>Arundel Castle</i> ... | George, J., O.B.E.  | C. S. Keen   | No. A.                             | Union Castle           | " 4.1.26 to 11.4.26   | 26.4.26.       |
| <i>Astronomer</i> ...     | Richards, J.  | H. Thomas, J. Glen, — Winstanley.                      | M.L.                               | Harrison               | Telegraphic Report 1.12.26  | 1.12.26.       |
| <i>Athenic</i> ...        | Davies, E.  | W. Hill  | No. A.                             | White Star             | Met. Log. 8.9.26 to 24.10.26  | 26.10.26.      |
| <i>Atreus</i> ...         | Salter, G. H.   | J. C. Podmore  | " A.                               | A. Holt                | " 18.2.26 to 16.6.26  | 24.6.26.       |
| <i>Atsuta Maru</i> ...    | Arakida, R.   | K. Murazumi  | " A.                               | Nippon Yusen Kaisha    | Form 911 21.9.26 to 5.10.26   | 8.10.26.       |
| <i>Auditor</i> ...        | Owen, W. T.   | T. E. Steel  | " M.                               | Harrison               | " 1.10.26 to 5.12.26  | 13.12.26.      |
| <i>Ausonia</i> ...        | Stafford, W., D.S.C., R.D., Lt.-Commr., R.N.R.            | E. R. B. Freeman                                       | " A.                               | Cunard                 | " 29.7.26 to 10.8.26  | 16.8.26.       |
| <i>Avon</i> ...           | Adam, C., R.D., Commr., R.N.R.                            | E. S. Dunch  | " M.                               | R.M.S.P.               | " 28.10.26 to 16.11.26  | 7.12.26.       |
| <i>Balfour</i> ...        | Dott, J.  | S. W. Keay   | No. A.                             | Canadian Pacific       | " 19.11.26 to 13.12.26  | 14.12.26.      |
| <i>Balranald</i> ...      | Townshend, W. P., Commr., R.N.R.                          | F. Ward, E. Cowell, J. Davis, E. Alexander.            | M.L.                               | P. & O. Branch         | " 24.3.26 to 2.7.26   | 17.7.26.       |
| 51 <i>Baltic</i> ...      | White, E. R., Commr. R.N.R.                               | H. R. Wilkinson, H. C. Gray, D. K. Crawford.           | W.T.                               | White Star             | Met. Log. 3.9.26 to 1.10.26   | 6.10.26.       |
|                           |   |  |                                    |                        | Met. Log. 2.7.26 to 7.11.26   | 20.11.26.      |
|                           |   |  |                                    |                        | W.T. Reg. 1.11.26 to 20.11.26                                       | 23.11.26.      |
|                           |   |  |                                    |                        | Form 911 1.11.26 to 21.11.26  | 23.11.26.      |



| Name of Vessel.                | Captain.   | Observing Officers.                                       | Official Meteorological Equipment. | Line.                             | Last Log, Register, or Report Contributed. Received up to 15.12.26. | Date Received.         |
|--------------------------------|--|---|------------------------------------|-----------------------------------|---|------------------------|
| <i>Bambra</i> ...              | Turner, J. E. ...                                | H. W. Norris, J. E. Turner, F. Humble.                    | M.L.                               | State Service, Australia          | Met. Log. 25.11.25 to 3.5.26 ...                                    | 27.10.26.              |
| <i>Rampton Castle</i> ...      | Hutchings, A. H. ...                             | J. W. S. Brooks ...                                       | No.                                | Union Castle                      | " 12.3.26 to 3.7.26 ...   | 16.7.26.               |
| <i>Banbury Castle</i> ...      | Singelsen, E. A., D.S.C., R.D., Capt., R.N.R.    | C. G. Cuthbertson ...                                     | No. A.                             | "                                 | Form 911 14.10.26 to 16.11.26                                       | 14.12.26.              |
| <i>Banffshire</i> ...          | Wynne, R. H. ...                                 | W. F. Lockhead ...  | " A.                               | Turnbull Martin                   | " 14.10.26 to 26.11.26  | 2.12.26.               |
| <i>Baron Murray</i> ...        | Edgar, J. E. ...                                 | W. P. G. Arthur, H. Thompson                              | " A.                               | Hogarth & Sons                    | " 8.5.26 to 10.6.26 ...   | 21.9.26.               |
| <i>Barpeta</i> ...             | Miller, A. C. ...                                | W. P. Page  | " M.                               | British India                     | " 20.10.26 to 19.11.26  | 13.12.26.              |
| <i>Baychimo</i> ...            | Cornwall, S. A. ...                              | E. J. Hankin ...  | " A.                               | Hudson's Bay Co.                  | " 17.10.26 to 1.12.26   | 8.12.26.               |
| <i>Baymaud</i> ...             | Foellmer, G. ...                                 | "   | " M.                               | "                                 | "   | "                      |
| <i>Beaufort</i> ...            | Rice, W. V., D.S.O., D.S.C., Commr., R.N.        | "   | M.L.                               | His Majesty's Ship                | Met. Log. 30.8.26 to 12.11.26...                                    | 17.11.26.              |
| 59 <i>Belgenland</i> ...       | Howell, T. ...                                   | C. Murray, J. Cross                                       | W.T.                               | Red Star                          | W.T. Reg. 4.10.26 to 23.10.26...<br>Form 911 4.10.26 to 23.10.26... | 26.10.26.<br>26.10.26. |
| <i>Benalder</i> ...            | Cole J. H., D.S.C.                               | T. S. Rawlingson  | No. A.                             | Ben Line                          | " 17.9.26 to 27.10.26...  | 1.11.26.               |
| <i>Bendigo</i> ...             | Nicholl, R. N. C.                                | H. J. Cholerton   | " M.                               | P. & O. Branch                    | " 4.9.26 to 8.10.26   | 21.10.26.              |
| 31 <i>Berengaria</i> ...       | Rostron, Sir A. H., K.B.E., R.D., Capt., R.N.R.  | J. A. Myles, W. C. A. Robson, E. W. Connell               | W.T.                               | Cunard                            | W.T. Reg. 15.11.26 to 29.11.26                                      | 1.12.26.               |
| <i>Berrima</i> ...             | Short, C. E.                                     | T. Ferguson   | No. M.                             | P. & O. Branch                    | Form 911 4.8.26 to 5.12.26  | 7.12.26.               |
| <i>Berwyn</i> ...              | McCombie, G.                                     | "   | " A.                               | Canadian Pacific                  | " 19.10.26 to 16.11.26  | 20.11.26.              |
| <i>Bintang</i> ...             | Morzer Bruyns, M. F.                             | M. C. Altins  | " M.                               | Nederland                         | " 22.10.26 to 15.11.26  | 29.11.26.              |
| <i>Bogota</i> ...              | Good, W. J.                                      | W. Billington   | " A.                               | R.M.S.P. Co.                      | " 21.5.26 to 19.9.26  | 21.9.26.               |
| <i>Bolingbroke</i> ...         | Dott, J. F., McQueen, D., Murray, M. F.          | C. A. Mott  | M.L.                               | Canadian Pacific                  | Met. Log. 23.1.26 to 31.8.26  | 8.9.26.                |
| <i>Borda</i> ...               | Holland, R.                                      | "   | No. M.                             | P. & O. Branch                    | Form 911 3.9.26 to 12.10.26   | 7.12.26.               |
| <i>Bothwell</i> ...            | Rothwell, A. J.                                  | G. Mowatt   | " A.                               | Canadian Pacific                  | " 6.10.26 to 5.11.26  | 8.11.26.               |
| <i>Brandon</i> ...             | Sargent, A. H., R.D., Lt.-Commr., R.N.R.         | T. Beck   | " A.                               | "                                 | " 25.7.26 to 25.8.26  | 27.8.26.               |
| <i>Brecon</i> ...              | McCombie, G.                                     | F. E. Bevis   | " A.                               | "                                 | " 29.6.26 to 27.7.26  | 3.8.26.                |
| <i>Brenda</i> ...              | Lamont, A.                                       | F. R. Ness  | " A.                               | Scottish Fishery Board            | " 1.6.26 to 30.6.26   | 3.7.26.                |
| <i>Brighton</i> ...            | Hill, A.   | Mr. Munton  | C.O.                               | Southern Railway                  | Telegraphic Report 15.12.26   | 15.12.26.              |
| <i>British Advocate</i> ...    | Taylor, R. J.                                    | M. Kennedy  | No. M.                             | British Tankers                   | Form 911 28.8.26 to 10.10.26...                                     | 22.10.26.              |
| <i>British Engineer</i> ...    | Joures, T. W.                                    | E. L. W. Evans  | " M.                               | "                                 | " 26.1.26 to 9.3.26   | 12.4.26.               |
| <i>British Soldier</i> ...     | Putt, R. O.                                      | H. J. Crangle   | " A.                               | "                                 | " 7.10.26 to 12.11.26...  | 7.12.26.               |
| <i>Bronte</i> ...              | Crappier, J. S.                                  | W. Jones, H. L. Rudd                                      | " A.                               | Lampart & Holt                    | " 3.10.26 to 14.10.26   | 18.10.26.              |
| <i>Browning</i> ...            | Connorton, W. A.                                 | A. B. Murray  | " A.                               | "                                 | " 29.3.26 to 1.7.26   | 5.7.26.                |
| <i>Bruiere</i> ...             | Denson, W.                                       | R. Mowbray  | " A.                               | "                                 | " 20.1.26 to 12.2.26  | 22.3.26.               |
| <i>Burma</i> ...               | Reid, R. B.                                      | J. Henderson  | " A.                               | Henderson                         | " 24.7.26 to 10.10.26   | 29.10.26.              |
| <i>Cambria U.S.</i> ...        | Sherwood, C. A., D.S.C.                          | A. J. English, B. C. Farrow, C. F. St. John.              | M.L.                               | Eastern Tel. Co.                  | Met. Log. 20.6.26 to 24.8.26  | 29.9.26.               |
| <i>Cambria</i> ...             | Telfer, J. E., O.B.E.                            | V. S. Phillips  | C.C.                               | L.M. & S. Rly.                    | Telegraphic Report 13.12.26   | 13.12.26.              |
| <i>Cameronia</i> ...           | Smart, R. W.                                     | "   | No. A.                             | Anchor                            | Form 911 24.10.26 to 13.11.26                                       | 20.11.26.              |
| <i>Camito</i> ...              | Forrester, W. T., O.B.E.                         | W. T. Broome, P. C. Congdon, F. Dudgeon, C. N. Schofield. | M.L.                               | Elders & Fyfes                    | Met. Log. 21.6.26 to 16.10.26...                                    | 30.10.26.              |
| <i>Canadian Importer</i> ...   | Forson, A.                                       | C. R. Randle  | No. A.                             | Canadian Govt. Mercantile Marine. | Form 911 1.9.26 to 1.10.26  | 26.10.26.              |
| <i>Canadian Inventor</i> ...   | Boulton, F. W.                                   | D. Grey   | " A.                               | "                                 | " 25.8.26 to 4.9.26   | 22.9.26.               |
| <i>Canadian Miller</i> ...     | McConehy, W. T.                                  | C. E. Moore, H. Ruegg                                     | " A.                               | "                                 | " 14.3.26 to 23.6.26  | 15.7.26.               |
| <i>Canadian Scottish</i> ...   | Wallace, C.                                      | A. E. Webster   | " A.                               | "                                 | " 17.7.26 to 4.9.26   | 18.10.26.              |
| <i>Canadian Skirmisher</i> ... | Millar, W. H.                                    | R. J. Watson  | " A.                               | "                                 | " 25.9.26 to 2.11.26  | 7.12.26.               |
| <i>Canadian Winner</i> ...     | Bisset, C. R.                                    | R. Girling, J. Cochrane                                   | " M.                               | "                                 | " 29.8.26 to 9.10.26  | 2.11.26.               |
| 35 <i>Carmania</i> ...         | Brown, F. G., R.D., Capt., R.N.R.                | L. R. Simpson, W. M. Stewart, P. L. Williams.             | W.T.                               | Cunard                            | W.T. Reg. 17.10.26 to 6.11.26...<br>Form 911 25.7.26 to 13.8.26     | 8.11.26.<br>20.8.26.   |
| <i>Carnarvon Castle</i> ...    | Hague, J. W., Commr., R.N.R.                     | "   | M.L.                               | Union Castle                      | "   | "                      |
| 34 <i>Caronia</i> ...          | Hossack, W. H., R.D., Capt., R.N.R.              | R. F. Bovey, T. Ashcroft, D. Butler, S. V. Williams.      | W.T.                               | Cunard                            | W.T. Reg. 1.11.26 to 20.11.26...<br>Form 911 1.11.26 to 20.11.26... | 24.11.26.<br>24.11.26. |
| <i>Casanare</i> ...            | "  | "   | No.                                | Elders & Fyfes                    | "   | "                      |
| 52 <i>Cedric</i> ...           | Hickson, V. W., Lt.-Commr., R.N.R.               | B. A. A. Crowley, J. Farrell.                             | W.T.                               | White Star                        | W.T. Reg. 24.10.26 to 13.11.26...<br>Form 911 24.10.26 to 14.11.26  | 16.11.26.<br>16.11.26. |
| 53 <i>Celtic</i> ...           | Berry, G.  | A. Thompson, J. Peters                                    | "                                  | "                                 | W.T. Reg. 8.11.26 to 23.11.26...<br>Form 911 7.11.26 to 23.11.26... | 1.12.26.<br>1.12.26.   |
| <i>Centaur</i> ...             | Rose, A. F.                                      | L. Johnstone  | No. M.                             | A. Holt & Co.                     | " 30.8.26 to 17.10.26   | 22.11.26.              |
| <i>Ceramic</i> ...             | Roberts, J., C.B.E., D.S.O., R.D., Capt., R.N.R. | D. W. Chamberlain   | " A.                               | White Star                        | " 29.8.26 to 13.12.26...  | 15.12.26.              |
| <i>Change</i> ...              | Gambrill, F. C.                                  | J. Thomas, D. D. Tyer, J. A. Allan.                       | M.L.                               | Yuill & Co.                       | Met. Log. 23.4.26 to 11.8.26  | 22.9.26.               |
| <i>China</i> ...               | Furlong, G. H. S., R.D., Capt., R.N.R.           | M. K. Stone   | No. M.                             | P. & O.                           | Form 911 8.10.26 to 27.10.26...                                     | 15.11.26.              |
| <i>Chindwara</i> ...           | Brooks, E. G.                                    | "   | " M.                               | British India                     | " 12.10.26 to 25.10.26  | 22.11.26.              |
| <i>Chindwin</i> ...            | Esslemont, C.                                    | "   | " A.                               | Henderson                         | "   | "                      |
| <i>City of Baroda</i> ...      | Houghton, W.                                     | A. Beaton, J. Cook, W. H. Dalton.                         | M.L.                               | Ellerman                          | Met. Log. 19.9.25 to 31.5.26  | 4.6.26.                |
| <i>City of Benares</i> ...     | Anderson, W. W.                                  | C. G. Inglis  | No. A.                             | "                                 | Form 911 1.10.26 to 19.10.26...                                     | 8.11.26.               |
| <i>City of Brisbane</i> ...    | Seaborne, F. O., D.S.C.                          | R. W. May   | " A.                               | "                                 | " 24.7.26 to 22.8.26  | 22.11.26.              |
| <i>City of Canterbury</i> ...  | Bremner, D. M.                                   | "   | " A.                               | "                                 | " 21.10.26 to 12.11.26  | 17.11.26.              |
| <i>City of Chester</i> ...     | Letton, F. W.                                    | H. Asher, W. Speakman, H. A. Hazell.                      | M.L.                               | "                                 | Met. Log. 11.4.26 to 18.8.26  | 20.9.26.               |
| <i>City of Edinburgh</i> ...   | Wyper, J.  | N. G. Fraser  | No. M.                             | "                                 | Form 911 13.9.26 to 12.10.26...                                     | 2.11.26.               |
| <i>City of Hong Kong</i> ...   | Walton, H. L., O.B.E., R.D., Commr., R.N.R.      | A. M. Westlake  | " A.                               | "                                 | " 1.9.26 to 11.9.26   | 25.9.26.               |
| <i>City of London</i> ...      | Martin, D.                                       | J. J. McTigue   | " A.                               | "                                 | " 8.3.26 to 2.4.26  | 12.4.26.               |
| <i>City of Marseilles</i> ...  | Brown, G.  | W. A. MacAdams, G. F. L. Coates.                          | " A.                               | "                                 | " 25.2.26 to 18.3.26  | 22.3.26.               |
| <i>City of Rangoon</i> ...     | Dunning, T. W. J.                                | A. Gibb, V. S. Turner, A. H. Cosker, G. Lawrey.           | M.L.                               | "                                 | Met. Log. 14.12.25 to 4.6.26  | 28.6.26.               |
| <i>City of Yokohama</i> ...    | McDonald, W. D.                                  | R. A. Fulton  | No. A.                             | "                                 | Form 911 4.9.26 to 30.9.26  | 25.10.26.              |
| <i>Clan Alpine</i> ...         | Lennox, W. J.                                    | G. Short  | " A.                               | Clan                              | " 27.8.26 to 2.10.26  | 8.11.26.               |
| <i>Clan Lamont</i> ...         | Urquhart, P., D.S.C.                             | P. de Gruchy  | " A.                               | "                                 | " 3.10.26 to 29.10.26...  | 22.11.26.              |
| <i>Clan Lindsay</i> ...        | Worthington, J. H.                               | "   | " A.                               | "                                 | " 14.10.26 to 12.11.26  | 13.12.26.              |
| <i>Clan Macbeth</i> ...        | Young, A. H., R.D., Lieut.-Commr., R.N.R.        | W. Hurst  | " A.                               | "                                 | " 28.10.26 to 6.11.26...  | 7.12.26.               |
| <i>Clan Macfadyen</i> ...      | Stenson, F. J., R.D., Capt., R.N.R.              | H. M. Wavell  | " A.                               | "                                 | " 19.9.26 to 13.10.26...  | 8.11.26.               |
| <i>Clan McGillivray</i> ...    | West W. F.                                       | J. H. Johnson   | " A.                               | "                                 | " 23.10.26 to 20.11.26  | 14.12.26.              |

## LIST OF VOLUNTARY OBSERVING SHIPS

iii

| Name of Vessel.                | Captain.   | Observing Officers.  | Official Meteorological Equipment. | Line.                                   | Last Log, Register, or Report Contributed. Received up to 15.12.26. | Date Received. |
|--------------------------------|--|--|------------------------------------|---|---|----------------|
| <i>Clan Macindoe</i> ...       | Low, A. ...  | J. G. Baillie ...  | No. A.                             | Clan ...                                | Form 911 1.10.26 to 3.12.26 ...                                     | 7.12.26.       |
| <i>Clan Mackellar</i> ...      | Scotland, A. ...   | D. McAllister ...  | " A.                               | " ...                                   | 27.8.26 to 30.9.26 ...  | 8.11.26.       |
| <i>Clan Mackinnon</i> ...      | McComish, A. B. ...  | W. F. Isaac, S. Y. Strange, J. W. Innes.                                       | M.L.                               | " ...                                   | Met. Log. 21.8.26 to 27.11.26...                                    | 2.12.26.       |
| <i>Clan Macphee</i> ...        | Gourlay, J. B. ...   | D. S. Rae, J. O. Woodall, J. J. Millar.  | "                                  | " ...                                   | " 6.9.25 to 14.5.26 ...   | 24.6.26.       |
| <i>Clan Macnaughton</i> ...    | Thomson, W. ...  | A. J. Storkey, D. MacDiarmid   | No. M.                             | " ...                                   | Form 911 19.6.26 to 29.6.26 ...                                     | 14.8.26.       |
| <i>Clan Macnaghtart</i> ...    | Mee, F. T. ...   | F. B. Fairweather ...  | " A.                               | " ...                                   | " 24.10.26 to 25.11.26 ...  | 3.12.26.       |
| <i>Clan MacTavish</i> ...      | Higgins, C. J. ...   | " A. ...   | " A.                               | " ...                                   | " ...   | " ...          |
| <i>Clan Macwhirter</i> ...     | Waterhouse, J. ...   | R. W. Roberts ...  | " A.                               | " ...                                   | Form 911 11.8.26 to 24.11.26...                                     | 9.12.26.       |
| <i>Clan Macwilliam</i> ...     | Williamson, A. ...   | T. B. Cranwill ...   | " A.                               | " ...                                   | " 28.8.26 to 9.10.26 ...  | 30.10.26.      |
| <i>Clan Malcolm</i> ...        | Neill, G. A. ...   | S. M. Werrey Easterbrook, H. V. Wightman, H. M. Macrone                        | M.L.                               | " ...                                   | Met. Log. 5.5.26 to 5.9.26 ...                                      | 25.9.26.       |
| <i>Clan Morrison</i> ...       | Porterfield, W. M. ...   | L. C. Higgins ...  | No. A.                             | " ...                                   | Form 911 13.9.26 to 2.10.26 ...                                     | 25.10.26.      |
| <i>Clan Murdoch</i> ...        | Miller, W. ...   | P. McMillan ...  | " A.                               | " ...                                   | " 27.6.26 to 25.7.26 ...  | 26.10.26.      |
| <i>Clan Ranald</i> ...         | Laird, C. ...  | T. O. Marr ...   | " A.                               | " ...                                   | " 27.9.26 to 20.10.26...  | 6.12.26.       |
| <i>Clan Ross</i> ...           | Smith, W. P. ...   | D. B. Edgar ...  | " A.                               | " ...                                   | " 3.10.26 to 30.11.26 ...   | 13.12.26.      |
| <i>Clan Sinclair</i> ...       | George, L. S. ...  | N. Macleod ...   | " A.                               | " ...                                   | " 24.10.26 to 11.11.26 ...  | 17.11.26.      |
| <i>Clan Urquhart</i> ...       | Gibb, A. F. W. ...   | T. G. Mitchell ...   | " A.                               | " ...                                   | " 31.10.26 to 1.12.26 ...   | 7.12.26.       |
| <i>Colonia, C.S.</i> ...       | Carlton, G. F. ...   | W. E. Allen, R. E. Coad, O.B.E., Commr., F. B. Bolingbroke.                    | M.L.                               | Telegraph Construction & Maintenance.   | Met. Log. 13.6.26 to 24.9.26 ...                                    | 30.9.26.       |
| <i>Colonian</i> ...            | Gittins, R. P. ...   | " ...  | No. A.                             | Leyland ...                             | Form 911 13.11.26 to 24.11.26                                       | 7.12.26.       |
| <i>Comerin</i> ...             | Borland, J. Mc. I., C.B., D.S.O., R.D., Capt., R.N.R.          | E. A. O. Chambers ...  | " M.                               | P. & O. ...                             | " 24.8.26 to 23.9.26 ...  | 28.9.26.       |
| <i>Concordia</i> ...           | Telfer, J. H. ...  | T. Philip, J. McIntosh, J. Mackay.   | M.L.                               | Anchor Donaldson ...                    | Met. Log. 3.4.26 to 20.8.26 ...                                     | 27.8.26.       |
| <i>Corinthic</i> ...           | Hart, F. ...   | E. Burt, J. Warltire, V. Evans.  | "                                  | White Star ...                          | " 17.7.26 to 30.10.26...  | 8.11.26.       |
| <i>Cornish City</i> ...        | James, D. P. ...   | " ...  | No. A.                             | Reardon Smith ...                       | " ...   | " ...          |
| <i>Cornwall</i> ...            | Haines, F. P. ...  | R. Gowthorpe, W. Thompson  | " A.                               | Federal ...                             | Form 911 26.9.26 to 8.11.26 ...                                     | 11.11.26.      |
| <i>Craftsman</i> ...           | Gibbings, W. ...   | D. G. Russell ...  | " A.                               | Harrison ...                            | " 11.10.26 to 26.11.26  | 2.12.26.       |
| <i>Crawford Castle</i> ...     | Morgan, A. O., R.D., Commr., R.N.R.                            | J. E. R. Wilford ...   | " A.                               | Union Castle ...                        | " 13.9.26 to 19.10.26...  | 16.11.26.      |
| <i>Cristales</i> ...           | Isaacson, J. M. ...  | S. Browne, R. Southerland, D. M. Baker, J. M. Hampshire.                       | M.L.                               | Elders & Fyffes ...                     | Met. Log. 25.7.26 to 4.12.26 ...                                    | 14.12.26.      |
| <i>Culebra</i> ...             | Mackay, A. S., R.D., Commr., R.N.R.                            | P. Cooper, H. V. Todd, J. W. Smith, F. G. Dawson.                              | "                                  | R.M.S.P. Co. ...                        | " 16.7.26 to 4.12.26 ...  | 13.12.26.      |
| <i>Cumberland</i> ...          | Deith, G. T. ...   | E. F. Hopkins ...  | No. A.                             | Federal ...                             | Form 911 18.2.26 to 19.6.26 ...                                     | 22.6.26.       |
| <i>Cuthbert</i> ...            | Lee, O. J. P. ...  | C. C. Beal ...   | " A.                               | Booth ...                               | " 20.10.26 to 3.11.26...  | 10.11.26.      |
| <i>Cyclops</i> ...             | Cosker, W. ...   | H. L. Cole ...   | " A.                               | A. Holt ...                             | " 1.8.26 to 1.10.26 ...   | 8.10.26.       |
| <i>Dardanus</i> ...            | Williams, D. T. ...  | C. F. Morgan ...   | " M.                               | " ...                                   | " 10.10.26 to 22.10.26 ...  | 29.11.26.      |
| <i>Darian</i> ...              | Masters, W. ...  | " ...  | " A.                               | Leyland ...                             | " 21.10.26 to 23.11.26 ...  | 9.12.26.       |
| <i>Darro</i> ...               | Matthews, G. P. ...  | W. Halder Campe... ..  | " M.                               | R.M.S.P. Co. ...                        | " 30.10.26 to 23.11.26 ...  | 15.12.26.      |
| <i>Demerara</i> ...            | Willan, F. C. L. ...   | J. J. C. Blake ...   | " M.                               | " ...                                   | " 17.10.26 to 11.12.26 ...  | 14.12.26.      |
| <i>Demosthenes</i> ...         | Orriss, F. A. ...  | J. F. Cruickshank ...  | " M.                               | Aberdeen ...                            | " 8.7.26 to 27.8.26 ...   | 1.9.26.        |
| <i>Deseado</i> ...             | Hannam, F. S. ...  | C. C. Dingle, L. D. Jennings   | " M.                               | " ...                                   | " 4.9.26 to 31.10.26 ...  | 5.11.26.       |
| <i>Desna</i> ...               | Huff, G. ...   | A. F. Walker ...   | " M.                               | " ...                                   | " 20.9.26 to 12.11.26...  | 19.11.26.      |
| <i>Deucalion</i> ...           | Findlay, J. ...  | W. L. Michie, R. Wilson ...  | " A.                               | A. Holt ...                             | " 8.10.26 to 31.10.26...  | 13.11.26.      |
| <i>Dieppe</i> ...              | Marmery, S. ...  | Mr. Parsons ...  | C.C.                               | Southern Railway ...                    | Telegraphic Report 14.12.26   | 14.12.26.      |
| <i>Dimboola</i> ...            | Roy, C. M. ...   | S. J. Griffith ...   | No. A.                             | Melbourne S.S. Co. ...                  | Form 911 1.10.26 to 27.10.26...                                     | 29.11.26.      |
| <i>Discoverer</i> ...          | Ling, J. T. ...  | C. C. Heaton ...   | " M.                               | Harrison ...                            | " 26.6.26 to 19.8.26 ...  | 21.9.26.       |
| <i>Discovery, R.R.S.</i> ...   | Stenhouse, J. R., D.S.O., D.S.C., O.B.E., R.D., Commr., R.N.R. | T. W. Goodchild ...  | M.L.                               | Discovery Expedition                    | Met. Log. 8.5.23 to 11.7.26 ...                                     | 30.9.26.       |
| <i>Domala, M.V.</i> ...        | Kitson, A. G. ...  | R. W. Smith ...  | No. M.                             | British India ...                       | Form 911 9.9.26 to 11.10.26 ...                                     | 30.10.26.      |
| <i>Dominia, C.S.</i> ...       | Campos, V., O.B.E., Lt.-Commr., R.N.R.                         | " ...  | M.L.                               | Telegraph Construction and Maintenance. | " ...   | " ...          |
| <i>61 Doric</i> ...            | Bolton, S., D.S.C., R.D., R.N.R.                               | T. Pratt, F. W. Laws, E. N. Lloyd.   | W.T.                               | White Star ...                          | Form 911 1.10.26 to 24.10.26  | 27.10.26.      |
| <i>Doric Star</i> ...          | Thomas, R. T. ...  | L. McDermott ...   | No. M.                             | Blue Star ...                           | Form 911 25.9.26 to 22.10.26...                                     | 12.11.26.      |
| <i>Dorington Court</i> ...     | Clarke, E. J. ...  | E. W. Blomberg ...   | " A.                               | Haldin & Co. ...                        | " 20.8.26 to 27.9.26 ...  | 4.10.26.       |
| <i>Dromore Castle</i> ...      | Vincent, E. S., R.D., Commr., R.N.R.                           | D. H. McDougall ...  | " A.                               | Union Castle ...                        | " 18.6.26 to 6.11.26 ...  | 10.11.26.      |
| <i>Dryden</i> ...              | Major, T. W. ...   | G. W. Major ...  | " M.                               | Lampert & Holt ...                      | " 25.9.26 to 16.10.26...  | 1.11.26.       |
| <i>Duendes</i> ...             | Pape, E. R. ...  | W. Billington ...  | " M.                               | P.S.N. Co. ...                          | " 20.10.26 to 13.11.26  | 6.12.26.       |
| <i>Dunaff Head</i> ...         | Butt, H. L., R.D., Commr., R.N.R.                              | P. S. Fullerton, J. P. Napier  | " A.                               | Ulster S.S. Co. ...                     | " ...   | " ...          |
| <i>Dundrum Castle</i> ...      | Weller, H. E. ...  | W. S. Byles ...  | " A.                               | Union Castle ...                        | " 4.8.26 to 30.8.26 ...   | 14.9.26.       |
| <i>Dunrobin</i> ...            | Ramsay, J. D. ...  | C. H. Kendall ...  | " A.                               | Glen & Co. ...                          | " 5.10.26 to 9.11.26 ...  | 7.12.26.       |
| <i>Duquesa</i> ...             | Ellis, F., D.S.C. ...  | E. W. Denman ...   | " M.                               | Furness Withy ...                       | " 12.8.26 to 7.10.26 ...  | 12.10.26.      |
| <i>Durenda</i> ...             | Wilson, W. ...   | K. G. Pullman ...  | " M.                               | British India ...                       | " 1.1.26 to 9.1.26 ...  | 1.2.26.        |
| <i>Edinburgh Castle</i> ...    | Wilford, T. H. ...   | " ...  | No.                                | Union Castle ...                        | Met. Log. 8.1.26 to 24.1.26 ...                                     | 29.5.26.       |
| <i>Egyptian Prince</i> ...     | Ord, T. ...  | W. R. Holt ...   | No. A.                             | Prince ...                              | Form 911 10.8.26 to 18.10.26  | 22.10.26.      |
| <i>Elmina</i> ...              | Williams, T. E. ...  | J. A. McGough, G. Shorter, Allen, E. E.  | M.L.                               | Elder Dempster ...                      | Met. Log. 2.6.26 to 5.10.26 ...                                     | 11.10.26.      |
| <i>El Paraguay</i> ...         | Smith, F. C. ...   | J. Allerton ...  | No. M.                             | Houlder Bros. ...                       | Form 911 29.7.26 to 21.9.26 ...                                     | 25.9.26.       |
| <i>Elpenor</i> ...             | Leslie, G., D.S.C., R.D., Lt.-Commr., R.N.R.                   | M. Robertson ...   | M.L.                               | A. Holt ...                             | Met. Log. 28.3.26 to 28.8.26 ...                                    | 8.9.26.        |
| <i>Elysia</i> ...              | Duncan, A. R. ...  | A. Laidlaw, C. Jenkins, J. A. C. A. Leitch                                     | "                                  | Anchor ...                              | " 10.7.26 to 16.9.26 ...  | 3.10.26.       |
| <i>Empress of Asia</i> ...     | Holland, A. T. ...   | R. H. Foley, L. Johnston, L. C. Hogg, T. M. W. Golby, W. T. Miller             | "                                  | Canadian Pacific ...                    | " 27.5.26 to 6.9.26 ...   | 8.10.26.       |
| <i>Empress of Canada</i> ...   | Lovegrove, A. V. R., D.S.O., R.D., Capt., R.N.R.               | H. C. Halliday ...   | "                                  | " ...                                   | " 10.6.26 to 20.9.26 ...  | 20.10.26.      |
| <i>Empress of France</i> ...   | Robinson, S., C.B.E., R.D., Commr., R.N.R.                     | " ...  | "                                  | " ...                                   | " 1.5.26 to 3.11.26 ...   | 8.11.26.       |
| <i>Empress of Russia</i> ...   | Griffiths, E. ...  | E. Roberts, W. Ewens, O. F. Pennington, W. Pickersgill.                        | "                                  | " ...                                   | " 7.3.26 to 14.6.26 ...   | 6.9.26.        |
| <i>Empress of Scotland</i> ... | Hosken, A. J. ...  | J. H. Reid ...   | "                                  | " ...                                   | " 15.5.26 to 13.10.26...  | 28.10.26.      |
| <i>Endeavour</i> ...           | Latta, R. G. ...   | M. McLellan, W. Bacon, F. G. Hutchings.  | "                                  | " ...                                   | " ...   | " ...          |
|                                | Stuart, R.N., V.C., D.S.O.                                     | " ...  | "                                  | " ...                                   | " ...   | " ...          |
|                                | Commr. S. A. Geary-Hill, D.S.O., R.N.                          | R. M. Southern, G. S. Norrington, E. V. B. Baker, E. H. B. Baker, J. Torlesse. | "                                  | His Majesty's Ship ...                  | " 3.3.26 to 30.6.26 ...   | 17.7.26.       |



| Name of Vessel.                      | Captain.  | Observing Officers.                                     | Official Meteorological Equipment. | Line.                        | Last Log, Register, or Report Contributed. Received up to 15.12.26. | Date Received. |
|--------------------------------------|---|---|------------------------------------|------------------------------|---|----------------|
| <i>Essequibo</i> ...                 | Kite, E. ...  | J. L. Forster ...                                       | No. M.                             | R.M.S.P. Co. ...             | Form 911 9.9.26 to 25.10.26 ...                                     | 12.11.26.      |
| <i>Eumæus</i> ...                    | Elford, W. J. ...   | ... ..  | " A.                               | A. Holt ...                  | 28.9.26 to 17.10.26 ...   | 22.11.26.      |
| <i>Euripides</i> ...                 | Collins, P. J., O.B.E.  | H. S. Cox, K. D. Fisher, P. Long Ion.                   | M.L.                               | Aberdeen ...                 | Met. Log. 18.7.26 to 22.11.26 ...                                   | 29.11.26.      |
| <i>Euryades</i> ...                  | Stewart, J. ...   | ... ..  | No. A.                             | A. Holt ...                  | ... ..  | ...            |
| <i>Eurybates</i> ...                 | Cannon, C. G. ...   | F. A. Brown ...   | No. A.                             | A. Holt ...                  | Form 911 18.10.26 to 24.11.26 ...                                   | 29.11.26.      |
| <i>Explorer</i> ...                  | Lamont, A., Allan, J. ...   | ... ..  | M.L.                               | Scottish Fishery Board       | Met. Log. 1.3.26 to 27.9.26 ...                                     | 9.11.26.       |
| <i>Ferdale</i> ...                   | Daniel, F. ...  | D. Jones, E. F. Pemble ...                              | No. M.                             | Commonwealth Govt.           | Form 911 23.10.26 to 20.11.26 ...                                   | 24.11.26.      |
| <i>Fitzroy</i> ...                   | Harvey J.R., O.B.E., Lt.-Commr., R.N. Lockhart C. S. Lt.-Commr., R.N. | K. Collins ...  | M.L.                               | His Majesty's Ship ...       | Met. Log. 1.8.26 to 15.11.26 ...                                    | 18.11.26.      |
| <i>Flandria</i> ...                  | Maars, L. ...   | T. Doornbosch ...                                       | No. M.                             | Holland Lloyd ...            | Form 911 1.10.26 to 21.10.26 ...                                    | 22.11.26.      |
| <i>Flinders</i> ...                  | Law, E. F. B., Lt.-Commr., R.N.                                       | D. W. Deane ...   | M.L.                               | His Majesty's Ship ...       | Met. Log. 25.7.26 to 5.11.26 ...                                    | 18.11.26.      |
| <i>Francisco</i> ...                 | Scales, H. ...  | J. C. Nettleship ...                                    | No. A.                             | Ellerman Wilson ...          | Form 911 2.10.26 to 4.11.26 ...                                     | 9.11.26.       |
| <i>Freya</i> ...                     | Angus, W. ...   | T. R. Ness ...  | " A.                               | Scottish Fishery Board       | " 1.11.26 to 3.11.26 ...  | 3.12.26.       |
| <i>Gaika</i> ...                     | Whitfield, G. J. ...  | ... ..  | " A.                               | Union Castle                 | " 11.10.26 to 30.10.26 ...  | 14.12.26.      |
| <i>Galtymore</i> ...                 | Southerland, —  | ... ..  | No. M.                             | Furness Withy                | ... ..  | ...            |
| <i>Garret</i> ...                    | Visser, C. W. ...   | C. J. Vandenboom ...                                    | " M.                               | R. Otterdam Lloyd            | Form 911 22.5.26 to 11.8.26 ...                                     | 9.9.26.        |
| <i>Garth Castle</i> ...              | Jackson, C. R. ...  | ... ..  | No.                                | Union Castle                 | ... ..  | ...            |
| <i>Gascoyne</i> ...                  | Rutt, W. N. ...   | R. Simpson ...  | No. A.                             | Dalgely & Co. ...            | Form 911 19.1.26 to 24.2.26 ...                                     | 30.3.26.       |
| <i>Gelria</i> ...                    | Veldkamp, G. J. ...   | T. van der Mast ...                                     | " M.                               | Holland Lloyd                | " 17.9.26 to 6.10.26 ...  | 8.11.26.       |
| <i>Glenamoy, M.V.</i> ...            | Homan, C. E. ...  | R. H. Bishop ...  | " A.                               | Glen Line ...                | " 4.11.26 to 17.11.26 ...   | 20.11.26.      |
| <i>Glenapp, M.V.</i> ...             | Roberts, W. E. ...  | S. W. Bell ...  | " A.                               | " ...                        | " 14.11.25 to 27.12.25 ...  | 4.1.26.        |
| <i>Glenshane</i> ...                 | Beer, E. ...  | R. A. Dale ...  | " A.                               | " ...                        | " 22.8.26 to 25.9.26 ...  | 25.10.26.      |
| <i>Gloucestershire</i> ...           | Robin, E. ...   | H. J. Janett ...  | " A.                               | Bibby ...                    | " 28.8.26 to 5.11.26 ...  | 9.11.26.       |
| <i>Gorgon</i> ...                    | Hughes, J. W. ...   | A. E. Bowlt ...   | M.L.                               | A. Holt & Co. ...            | " 30.9.26 to 17.10.26 ...   | 22.11.26.      |
| <i>Halesius</i> ...                  | ... ..  | ... ..  | No.                                | R. P. Houston                | ... ..  | ...            |
| <i>Haliartius</i> ...                | Marsh, L. V. ...  | W. H. Upton ...   | No. A.                             | R. P. Houston                | Form 911 11.4.26 to 8.5.26 ...                                      | 7.6.26.        |
| <i>Harmonides</i> ...                | Hughes, W. F. ...   | S. S. Davidson ...                                      | " A.                               | " ...                        | " 5.9.26 to 27.9.26 ...   | 18.10.26.      |
| <i>Harmony, Auxy.</i> ...            | Jackson, J. C. ...  | A. W. Bush ...  | " A.                               | Moravian Mission             | " 4.8.26 to 27.9.26 ...   | 14.10.26.      |
| <i>Hatarana</i> ...                  | Denne, G. H. A. ...   | F. Wells, C. Parkes, W. T. Barnes.                      | M.L.                               | British India                | " 12.6.25 to 27.2.26 ...  | 29.3.26.       |
| <i>Hauraki, M.V.</i> ...             | Frew, J. D. ...   | ... ..  | M. L.                              | Union S.S. Co. N.Z. ...      | " 22.6.26 to 11.7.26 ...  | 20.9.26.       |
| <i>Henry Holmes, C.S.</i> ...        | Bicker Caarten, A. ...  | M. A. Green ...   | No. M.                             | W. I. & Panama Telegraph Co. | " 15.10.26 to 3.11.26 ...   | 22.11.26.      |
| <i>Herald</i> ...                    | Silk, H. V., Lieut.-Commr., R.N.                                      | W. C. Jenks ...   | M.L.                               | His Majesty's Ship ...       | Met. Log. 22.3.26 to 5.9.26 ...                                     | 20.10.26.      |
| <i>Herefordshire</i> ...             | Mann, R. P. ...   | H. R. Mackay ...  | No. A.                             | Bibby ...                    | Form 911 25.4.26 to 3.7.26 ...                                      | 12.7.26.       |
| <i>Herminius</i> ...                 | Roberts, T. V. ...  | G. P. McCraith ...                                      | " A.                               | Shaw, Savill & Albion        | " 25.9.26 to 11.10.26 ...   | 22.11.26.      |
| <i>Herschel</i> ...                  | Davies, G. W. ...   | J. M. Edgar ...   | " A.                               | Lampart & Holt               | " 14.10.25 to 15.12.25 ...  | 29.12.25.      |
| <i>Hertford</i> ...                  | Urquhart, D. ...  | A. Robertson ...  | " A.                               | Federal ...                  | " 18.8.26 to 7.9.26 ...   | 4.10.26.       |
| <i>Hibernia</i> ...                  | Tanner, E. B., O.B.E.   | R. Woodall ...  | C.C.                               | L.M. & S. Rly.               | Telegraphic Report, 11.12.26 ...                                    | 11.12.26.      |
| <i>Highland Enterprise</i> ...       | Pond, R. H. ...   | J. H. Tilton ...  | No. A.                             | Nelson ...                   | Form 911 12.12.25 to 11.2.26 ...                                    | 10.3.26.       |
| " <i>Glen</i> ...                    | Jones, T. J. ...  | W. Jealous ...  | " A.                               | " ...                        | " 23.3.26 to 26.5.26 ...  | 31.5.26.       |
| " <i>Heather</i> ...                 | Powell, G. A. ...   | J. H. Fitton, J. Hardy ...                              | " A.                               | " ...                        | " 13.12.25 to 24.6.26 ...   | 14.7.26.       |
| " <i>Laddie</i> ...                  | Alford, C. ...  | E. F. Smart ...   | " A.                               | " ...                        | " 31.8.26 to 24.10.26 ...   | 5.10.26.       |
| " <i>Piper</i> ...                   | Collings, D. ...  | J. S. Collins, S. E. Jackson W. T. Breen.               | M.L.                               | " ...                        | Met. Log. 25.4.26 to 16.9.26 ...                                    | 23.9.26.       |
| " <i>Pride</i> ...                   | Robinson, R. H. ...   | W. Williams ...   | No.                                | " ...                        | Form 911 30.7.26 to 2.10.26 ...                                     | 7.10.26.       |
| " <i>Prince</i> ...                  | Brown, J. B. ...  | S. A. Wheaton ...                                       | No. A.                             | Prince ...                   | " 23.9.26 to 17.10.26 ...   | 22.11.26.      |
| " <i>Rorer</i> ...                   | Ashby Graves, F. ...  | C. C. Legg ...  | " A.                               | Nelson ...                   | " 17.8.26 to 11.10.26 ...   | 21.10.26.      |
| " <i>Warrior</i> ...                 | Robinson, R. H. ...   | J. O. Simons ...  | " M.                               | " ...                        | " 25.3.26 to 19.5.26 ...  | 26.5.26.       |
| <i>Hildebrand</i> ...                | Maddrell, J. ...  | A. Allan ...  | " A.                               | Booth ...                    | " 22.9.26 to 8.11.26 ...  | 11.11.26.      |
| <i>Hobsons Bay</i> ...               | Kydd, O. J. ...   | R. Pearce, A. Badman, T. Morrison, H. Heady.            | M.L.                               | Commonwealth Govt.           | Met. Log. 30.3.26 to 11.7.26 ...                                    | 17.7.26.       |
| 54 <i>Homerie</i> ...                | Holme, A. ...   | A. S. Dyer, H. G. Morgan, J. W. Best.                   | W.T.                               | White Star ...               | W.T. Reg. 23.10.26 to 12.11.26 ...                                  | 15.11.26.      |
| <i>Hororata</i> ...                  | Holland, E. ...   | E. R. Kemp ...  | No. A.                             | New Zealand S.S. Co.         | Form 911 18.11.26 to 3.12.26 ...                                    | 6.12.26.       |
| <i>Hubert</i> ...                    | Pym, J. H. ...  | S. G. Edwards ...                                       | " A.                               | Booth ...                    | " 10.4.26 to 15.8.26 ...  | 17.8.26.       |
| <i>Huntingdon</i> ...                | Ashworth, W. ...  | R. Cox ...  | " A.                               | Federal ...                  | " 21.9.26 to 29.11.26 ...   | 14.12.26.      |
| <i>Hurunu</i> ...                    | Burton Davies, J. ...   | J. Oxnard, L. C. Hill, L. Cann, K. Goldsworthy.         | M.L.                               | New Zealand S.S. Co.         | Met. Log. 14.9.26 to 6.10.26 ...                                    | 11.10.26.      |
| <i>Ingoma</i> ...                    | Barrow, R. K. ...   | A. M. Hughes ...  | No. M.                             | Harrison ...                 | Form 911 15.10.26 to 2.12.26 ...                                    | 7.12.26.       |
| <i>Iris, C.S.</i> ...                | Hughes, H. R. ...   | W. Oliver, D. Bruce, D. MacDonald, T. Vickers.          | M.L.                               | Pacific Cable Board ...      | Met. Log. 23.1.26 to 25.4.26 ...                                    | 5.10.26.       |
| <i>Iroquois</i> ...                  | Jackson, A. L., Commr., R.N.  | H. L. Jenkins ...                                       | "                                  | His Majesty's Ship ...       | " 26.4.26 to 23.8.26 ...  | 29.9.26.       |
| <i>Ixion</i> ...                     | Williams, R. J. ...   | W. Angus ...  | No. A.                             | A. Holt ...                  | Form 911 29.7.26 to 18.10.26 ...                                    | 1.11.26.       |
| <i>Javanese Prince</i> ...           | Naylor, E. ...  | W. Venn ...   | " A.                               | Prince ...                   | " 19.9.26 to 1.11.26 ...  | 6.12.26.       |
| <i>Jervis Bay</i> ...                | Chaplin, W. R. ...  | R. W. Laycock ...                                       | " M.                               | Commonwealth Govt.           | " 3.8.26 to 19.10.26 ...  | 27.10.26.      |
| <i>John Pender, C.S.</i> ...         | Smythe, T. W. ...   | H. W. Milne ...   | " A.                               | Eastern Tel. Co. ...         | " 8.9.26 to 25.9.26 ...   | 25.10.26.      |
| <i>Justin</i> ...                    | Evans, L. ...   | R. C. Holmes ...  | " A.                               | Booth ...                    | " 11.8.26 to 1.10.26 ...  | 14.10.26.      |
| <i>Kaisar-i-Hind</i> ...             | Headlam, P. C. ...  | A. H. Cole ...  | " M.                               | P. & O. ...                  | " 3.10.26 to 24.11.26 ...   | 30.11.26.      |
| <i>Kamo Maru</i> ...                 | Shiratori, S. ...   | H. Yesaki ...   | " A.                               | Nippon Yusen Kaisha          | " 14.8.26 to 14.9.26 ...  | 12.10.26.      |
| <i>Kangaroo</i> ...                  | Norris, H. C. ...   | R. J. Sinclair, V. L. Gilbert, E. Hutchinson.           | M.L.                               | State Service Australia      | Met. Log. 8.3.26 to 21.7.26 ...                                     | 20.9.26.       |
| <i>Karapara</i> ...                  | Baird, S. K. ...  | ... ..  | No. M.                             | British India                | ... ..  | ...            |
| <i>Kashmir</i> ...                   | Stringer, R.H., O.B.E., R.D., Commr., R.N.R.                          | T. C. Fairburn ...                                      | " M.                               | P. & O. ...                  | Form 911 12.9.26 to 1.10.26 ...                                     | 5.10.26.       |
| <i>Kathamba</i> ...                  | Mordue, J. A. ...   | ... ..  | " A.                               | Ellerman Bucknall ...        | " 21.8.26 to 27.9.26 ...  | 11.10.26.      |
| <i>Kellett</i> ...                   | Maxwell, P. S. E., Commr., R.N.                                       | ... ..  | M.L.                               | His Majesty's Ship ...       | Met. Log. 12.8.26 to 15.11.26 ...                                   | 6.12.26.       |
| <i>Kenilworth Castle</i> ...         | Chave, Sir B., K.B.E., Attwood, J. Owen, S.                           | H. L. Iddes, T. M. Gordon ...                           | "                                  | Union Castle                 | " 17.1.26 to 11.7.26 ...  | 15.7.26.       |
| <i>Kent</i> ...                      | Downton, M. M. ...  | F. M. Knight ...  | No. A.                             | New Zealand S.S. Co.         | Form 911 28.7.26 to 31.8.26 ...                                     | 8.9.26.        |
| <i>Khiva</i> ...                     | Cooper, —   | ... ..  | M.L.                               | P. & O. ...                  | " ... ..  | ...            |
| <i>Khyber</i> ...                    | Hester, C. W., R.D., Commr., R.N.R.                                   | C. B. Roche, E. J. Parry, H. D. Case, G. S. B. Collard. | "                                  | P. & O. ...                  | Form 119 27.8.26 to 8.12.26 ...                                     | 13.12.26.      |
| <i>Kin Ora</i> ...                   | McIntosh, A. ...  | E. A. Hickling ...                                      | "                                  | Shaw Savill & Albion         | " 27.2.26 to 9.4.26 ...   | 13.4.26.       |
| <i>Kildonan Castle</i> ...           | Imah, C. B. ...   | G. H. Pickering ...                                     | No. A.                             | Union Castle                 | " 2.1.26 to 21.2.26 ...   | 1.3.26.        |
| <i>Knight Companion</i> ...          | Reed, G. C. ...   | J. J. Daniel ...  | " M.                               | A. Holt ...                  | " 26.9.26 to 9.11.26 ...  | 13.11.26.      |
| <i>Kovno</i> ...                     | Dossor, W. A. ...   | H. Redfern, A. Snowdon, A. Hebblewhite.                 | M.L.                               | Ellerman Wilson              | Met. Log. 12.6.26 to 26.11.26 ...                                   | 27.11.26.      |
| <i>Kweiyang</i> ...                  | Byers, G. ...   | W. McDonald, T. Hackett ...                             | "                                  | China Nav. Co. ...           | " 25.3.26 to 4.8.26 ...   | 27.9.26.       |
| 37 <i>Laconia</i> ...                | West, C. W. ...   | ... ..  | W.T.                               | Cunard                       | ... ..  | ...            |
| <i>Lady Denison Pender, C.S.</i> ... | Pattison, G. H. ...   | F. Lawrence ...   | No. A.                             | Eastern Tel. Co. ...         | " 9.5.26 to 7.7.26 ...  | 7.8.26.        |
| <i>Laguna</i> ...                    | Kirkwood, J. H. ...   | ... ..  | " A.                               | Pacific S.N. Co. ...         | " 7.11.26 to 24.11.26 ...   | 14.12.26.      |
| <i>Lahore</i> ...                    | Dawson, E. N. ...   | W. G. Stevenson ...                                     | " M.                               | P. & O. ...                  | " 8.11.26 to 17.11.26 ...   | 13.12.26.      |

## LIST OF VOLUNTARY OBSERVING SHIPS

V

| Name of Vessel.                   | Captain.                                     | Observing Officers.                               | Official Meteorological Equipment. | Line.                   | Last Log, Register, or Report Contributed. Received up to 15.12.26. | Date Received |
|-----------------------------------|--|---|------------------------------------|-------------------------|---|---------------|
| <i>Lalande</i> ...                | Hamill, H. ...                               | A. E. Warburton ...                               | No. A.                             | Lampport & Holt         | Form 911 25.9.26 to 23.10.26...                                     | 16.11.26.     |
| <i>Lancashire</i> ...             | de Legh, P. ...                              | W. H. Muirhead ...                                | " A.                               | Bibby                   | 25.9.26 to 2.12.26 ...  | 9.12.26.      |
| <i>36 Lancastria</i> ...          | Malin, R. G., Lt.-Commr., R.N.R.             | R. P. Campbell, L. R. Sharp, F. G. Russell        | " W.T.                             | Cunard                  | W.T. Reg. 7.11.26 to 27.11.26...                                    | 1.12.26.      |
| <i>Laomedon</i> ...               | Beswick, W., D.S.C., Lt.-Commr., R.N.R.      | A. Yarwood  | No. A.                             | A. Holt                 | Form 911 7.11.26 to 28.11.26...                                     | 1.12.26.      |
| <i>La Paz, M.V.</i> ...           | Dunn, R. E.                                  | W. L. Jones                                       | " M.                               | Pacific S.N. Co.        | " 23.7.26 to 8.8.26 ...   | 30.8.26.      |
| <i>Laplace</i> ...                | Shaw, W.                                     | A. L. Murray, R. D. Cottam                        | " A.                               | Lampport & Holt         | " 7.8.26 to 13.10.26 ...  | 18.10.26.     |
| <i>35 Lapland</i> ...             | Thomas, A. J.                                | E. Cornellie, J. C. Flett                         | W.T.                               | Red Star                | Met. Log. 1.1.26 to 8.5.26 ...                                      | 17.5.26.      |
| <i>Lassell, M.V.</i> ...          | Hickman, V. T.                               | F. J. Durrant                                     | No. A.                             | Lampport & Holt         | W.T. Reg. 8.11.26 to 27.11.26...                                    | 29.11.26.     |
| <i>Leicestershire</i> ...         | English, G. L.                               | J. Cullen, W. A. Kent, D. Y. Sharrock, J. Logan.  | M.L.                               | Bibby                   | Form 911 7.11.26 to 27.11.26...                                     | 29.11.26.     |
| <i>Leighton, M.V.</i> ...         | Lindesay, J. M.                              | J. T. A. Thomson                                  | No. A.                             | Lampport & Holt         | Met. Log. 20.2.26 to 9.3.26 ...                                     | 29.3.26.      |
| <i>Leitrim</i> ...                | Robertson, A.                                | H. G. Letts                                       | " A.                               | Dowie, J., & Co.        | " 31.7.26 to 9.10.26 ...  | 21.10.26.     |
| <i>Loch Katrine</i> ...           | Shillito, B.                                 | K. Whitaker                                       | " M.                               | R.M.S.P. Co.            | Form 911 17.8.26 to 20.11.26...                                     | 13.12.26.     |
| <i>London Commerce</i> ...        | Young, H. J., D.S.C.                         | H. P. Longland                                    | " A.                               | Furness Withy           | " 10.7.26 to 7.9.26 ...   | 10.9.26.      |
| <i>London Importer</i> ...        | Williamson, J. M.                            | J. S. Williams, W. Stanley                        | M.L.                               | "                       | " 24.6.26 to 21.9.26 ...  | 28.9.26.      |
| <i>Lord Antrim</i> ...            | Jarvis                                       | C. J. Rea   | No. A.                             | Ulster S.S. Co.         | " 23.10.26 to 23.11.26 ...  | 29.11.26.     |
| <i>Loriga, M.V.</i> ...           | Makin, F. W.                                 | E. C. Hicks                                       | " A.                               | Pacific S.N. Co.        | Met. Log. 12.6.26 to 2.9.26 ...                                     | 17.9.26.      |
| <i>Losada, M.V.</i> ...           | Ross, J.                                     | E. Baxter   | " M.                               | "                       | Form 911 20.8.26 to 6.12.26 ...                                     | 10.12.26.     |
| <i>Macedonia</i> ...              | Potter, H. W., R.D., Commr., R.N.R.          | E. R. Bodley                                      | " M.                               | P. & O.                 | " 21.9.26 to 8.10.26 ...  | 26.10.26.     |
| <i>Macharda</i> ...               | Tyers, W. O.                                 | D. M. Fulton                                      | " M.                               | Brocklebank             | " 29.10.26 to 14.11.26 ...  | 7.12.26.      |
| <i>Mahana</i> ...                 | Kershaw, W. A. R.                            | F. M. Smith, H. C. Smith, J. C. K. Rogers.        | " A.                               | Shaw, Savill & Albion   | Met. Log. 23.11.26 to 6.12.26...                                    | 8.12.26.      |
| <i>Maharaja</i> ...               | Hinton, J. C.                                | H. A. Hartley                                     | " M.                               | Asiatic S.N. Co.        | " 15.4.26 to 10.8.26 ...  | 30.8.26.      |
| <i>Mahia</i> ...                  | Williams, G.                                 | R. Naef   | No.                                | Shaw, Savill & Albion   | Form 911 4.10.26 to 15.10.26...                                     | 29.11.26.     |
| <i>Maihar</i> ...                 | Rowe, J. P.                                  | C. Shaw, H. T. Scoins, G. Henshaw.                | M.L.                               | Brocklebank             | Met. Log. 20.3.26 to 23.6.26 ...                                    | 15.7.26.      |
| <i>Maimyo</i> ...                 | Scurr, T. W.                                 | H. M. Drummond                                    | No. A.                             | Burns Philp             | Form 911 9.7.26 to 1.12.26 ...                                      | 6.12.26.      |
| <i>Maiwara</i> ...                | Brown, T. M.                                 | "   | M.L.                               | White Star              | W.T. Reg. 12.11.26 to 25.11.26                                      | 29.11.26.     |
| <i>58 Majestic</i> ...            | Metcalfe, G. R.                              | W. Pearson, J. Paine, A. Young, W. T. Fitzgerald. | W.T.                               | "                       | Met. Log. 3.3.26 to 15.6.26 ...                                     | 10.8.26.      |
| <i>Makambo</i> ...                | McLean, J.                                   | F. C. Vogelmann, T. R. Lang, W. O. L. Wilding.    | M.L.                               | Burns Philp             | " 11.3.25 to 19.2.26 ...  | 4.5.26.       |
| <i>Makura</i> ...                 | Worrall, L. C. H.                            | O. C. Bray, J. M. Hood, A. Foster.                | "                                  | Canadian-Australasian   | "   | "             |
| <i>Malabar</i> ...                | "  | "   | "                                  | Burns, Philp & Co.      | "   | "             |
| <i>Malakuta</i> ...               | Adamson, F. L.                               | J. H. Round                                       | No. M.                             | Brocklebank             | Form 911 8.9.26 to 22.9.26 ...                                      | 25.9.26.      |
| <i>Malancha</i> ...               | Sharpe, G.                                   | R. Humble   | " M.                               | "                       | " 29.7.26 to 12.8.26 ...  | 28.9.26.      |
| <i>Malda</i> ...                  | Gray, T. N.                                  | W. S. Donald                                      | " M.                               | British India           | " 21.9.26 to 27.10.26 ...   | 3.11.26.      |
| <i>Mumari</i> ...                 | Falconer, H.                                 | P. Campbell                                       | " A.                               | Shaw, Savill & Albion   | " 6.8.26 to 11.9.26 ...   | 1.11.26.      |
| <i>Manchester Brigade</i> ...     | Stott, C. H.                                 | E. Hale   | " A.                               | Manchester Liners       | " 16.10.26 to 18.11.26 ...  | 22.11.26.     |
| <i>Manchester Corporation</i> ... | Everest, J. E.                               | W. L. Lavers                                      | " A.                               | "                       | " 30.10.26 to 2.12.26 ...   | 9.12.26.      |
| <i>Manchester Hero</i> ...        | Riley, J. E.                                 | J. H. Emmitt, H. Anderton, B. M. Brown.           | M.L.                               | "                       | Met. Log. 3.10.25 to 20.7.26 ...                                    | 27.7.26.      |
| <i>Manchester Merchant</i> ...    | Struss, F. D.                                | E. W. Jeffries                                    | No. A.                             | "                       | Form 911 26.6.26 to 11.8.26 ...                                     | 20.8.26.      |
| <i>Manchester Regiment</i> ...    | Foale, J. R.                                 | H. Dobson   | " A.                               | "                       | "   | "             |
| <i>Manchester Shipper</i> ...     | Dormer, A. E.                                | H. Swindells                                      | M.L.                               | "                       | Met. Log. 24.7.26 to 16.11.26...                                    | 29.11.26.     |
| <i>Manipur</i> ...                | Cochran, G. N.                               | R. Penston, K. Leadbetter                         | No. M.                             | Brocklebank             | Form 911 5.9.26 to 2.10.26 ...                                      | 14.10.26.     |
| <i>Mantua</i> ...                 | Randell, G. G.                               | D. B. Leader                                      | " M.                               | P. & O.                 | " 10.10.26 to 21.10.26 ...  | 3.12.26.      |
| <i>Manzanara</i> ...              | Maxwell Brown, W. E.                         | G. S. Gracie                                      | " A.                               | Elders & Fyfes          | " 10.11.25 to 25.11.25 ...  | 4.1.26.       |
| <i>Marburn</i> ...                | Stewart, A.                                  | R. H. W. Jackson                                  | " M.                               | Canadian Pacific        | " 24.4.26 to 17.5.26 ...  | 20.5.26.      |
| <i>Marella</i> ...                | Mortimer, S.                                 | J. A. Street                                      | M.L.                               | Burns Philp             | Met. Log. 2.4.25 to 25.8.25 ...                                     | 1.12.25.      |
| <i>Marengo</i> ...                | Brown, A. M.                                 | "   | "                                  | "                       | "   | "             |
| <i>Margha</i> ...                 | Williams, J. C., R.D., Commr., R.N.R.        | F. Eglin, H. Brown, J. Ford                       | "                                  | Ellerman Wilson         | " 20.3.26 to 30.8.26 ...  | 2.9.26.       |
| <i>Marsina</i> ...                | Milne, R. A., R.D., Commr., R.N.R.           | J. Strachan, P. Wright, H. E. Evans.              | "                                  | British India           | " 20.6.26 to 14.9.26 ...  | 20.9.26.      |
| <i>Masirah</i> ...                | Rothery, S.                                  | H. C. Tarrington                                  | No. A.                             | Burns, Philp & Co.      | Form 911 15.9.26 to 6.10.26 ...                                     | 15.11.26.     |
| <i>Matakana</i> ...               | Mallett, R.                                  | A. E. Evans                                       | " M.                               | Brocklebank             | " 12.9.26 to 13.10.26 ...   | 16.11.26.     |
| <i>Matarara</i> ...               | Thurston, H. P.                              | J. Hart, J. Dickson, G. E. Lindsay.               | M.L.                               | Shaw, Savill & Albion   | Met. Log. 15.8.26 to 23.9.26 ...                                    | 29.11.26.     |
| <i>Mathura</i> ...                | Voy, W.                                      | V. V. Edmonds                                     | No. A.                             | Burns Philp & Co.       | Form 911 8.10.26 to 2.11.26 ...                                     | 13.12.26.     |
| <i>Mataroa</i> ...                | Kershaw, W. A. R.                            | "   | M.L.                               | Shaw, Savill & Albion   | Met. Log. 28.3.26 to 1.8.26 ...                                     | 13.9.26.      |
| <i>Matheran</i> ...               | Sandeman, W.                                 | H. H. Armstrong, H. Willington, J. Richardson.    | "                                  | Brocklebank             | "   | "             |
| <i>Mathura</i> ...                | Hanna, R. G.                                 | "   | "                                  | "                       | Form 911 1.2.26 to 3.3.26 ...                                       | 8.3.26.       |
| <i>Matiana</i> ...                | Bacon, A. E.                                 | H. H. Armstrong                                   | No. M.                             | British India           | " 29.4.26 to 27.5.26 ...  | 31.5.26.      |
| <i>Maunganui</i> ...              | Langlands, D. H.                             | G. Earl   | " M.                               | Union S.S. Co. of N.Z.  | " 4.6.26 to 9.7.26 ...  | 23.8.26.      |
| <i>32 Mauretania</i> ...          | Davey, A. H.                                 | C. G. Eustace                                     | " M.                               | Cunard                  | W.T. Reg. 10.10.26 to 24.10.26                                      | 15.11.26.     |
| <i>Media</i> ...                  | Diggle, E. G., R.D., Capt., R.N.R.           | E. R. Taylor, J. A. Quarrie, G. Duguid.           | W.T.                               | "                       | " 31.10.26 to 15.11.26  | 17.11.26.     |
| <i>Medic</i> ...                  | Mallett, R.                                  | S. C. Cram  | No. A.                             | T. & J. Brocklebank     | Form 911 21.11.26 to 5.12.26 ...                                    | 10.12.26.     |
| <i>56 Megantic</i> ...            | Jones, W. H.                                 | "   | " A.                               | White Star              | " 2.5.26 to 28.6.26 ...   | 7.7.26.       |
| <i>22 Melita</i> ...              | Trant, E. L., R.D., Commr., R.N.R.           | H. A. Billiald, R. Conway, J. C. Boyce.           | W.T.                               | "                       | W.T. Reg. 24.10.26 to 13.11.26...                                   | 16.11.26.     |
| <i>Mennon</i> ...                 | Notley, A. H.                                | J. Shearer, N. J. P. Roberts                      | No. A.                             | Canadian Pacific        | " 23.10.26 to 10.11.26  | 15.11.26.     |
| <i>21 Metagama</i> ...            | Evans, D. L.                                 | L. S. Evans                                       | " A.                               | A. Holt                 | Form 911 16.11.25 to 3.3.26 ...                                     | 13.3.26.      |
| <i>Minderoo</i> ...               | Freer, A. Commr., R.N.R.                     | R. Walker, A. Mansey                              | W.T.                               | Canadian Pacific        | W.T. Reg. 31.10.26 to 20.11.26                                      | 22.11.26.     |
| <i>Miona</i> ...                  | Richardson, E.                               | B. J. Bennie, W. J. McPhedran, J. H. Oxtan.       | No. A.                             | West Australia Nav. Co. | Met. Log. 2.5.26 to 4.10.26 ...                                     | 1.12.26.      |
| <i>23 Minnedosa</i> ...           | Mackenzie, G. G.                             | J. H. Hennessey                                   | " A.                               | Scottish Fishery Board  | Form 911 1.9.26 to 10.10.26 ...                                     | 14.10.26.     |
| <i>Minnetonka</i> ...             | Griffiths, J. F.                             | L. Hammersley, F. W. Roberts                      | W.T.                               | Canadian Pacific        | W.T. Reg. 6.11.26 to 24.11.26...                                    | 29.11.26.     |
| <i>Minnewaska</i> ...             | Gates, T. F., C.B.E.                         | H. E. McCartney                                   | No. M.                             | Atlantic Transport      | Form 911 7.11.26 to 27.11.26...                                     | 30.11.26.     |
| <i>Mirror, C.S.</i> ...           | Claret, F. H., C.B.E., Commr., R.N.R.        | J. W. Grier                                       | " M.                               | "                       | " 26.9.26 to 16.10.26 ...   | 25.10.26.     |
| <i>Mississippi</i> ...            | Gibson, L.                                   | A. G. Watts                                       | " M.                               | Eastern Tel. Co.        | " 8.10.26 to 14.10.26 ...   | 4.11.26.      |
| <i>Moldavia</i> ...               | Wylie, J. T. J.                              | A. T. Perrin                                      | " A.                               | Atlantic Transport      | " 29.10.26 to 23.11.26  | 8.12.26.      |
| <i>Mongolian Prince</i> ...       | Burleigh, C. W., D.S.C., R.D., Capt., R.N.R. | R. H. Maskell                                     | " M.                               | P. & O.                 | " 17.7.26 to 9.10.26 ...  | 16.11.26.     |
| <i>24 Montcalm</i> ...            | Edwards, W.                                  | F. Mugford  | " A.                               | Prince                  | " 16.10.26 to 29.10.26  | 11.11.26.     |
| <i>25 Montclare</i> ...           | Hamilton, G.                                 | H. McFadyen                                       | W.T.                               | Canadian Pacific        | W.T. Reg. 6.11.26 to 25.11.26...                                    | 29.11.26.     |
|                                   | Webster, G. S., R.D., Lt.-Commr., R.N.R.     | R. Fegan, H. S. Knight, A. Harrison, E. Shergold. | "                                  | "                       | " 17.10.26 to 4.11.26...  | 8.11.26.      |
|                                   |  |   |                                    |                         | Form 911 16.10.26 to 4.11.26...                                     | 9.11.26.      |



| Name of Vessel.                | Captain.  | Observing Officers.  | Official Meteorological Equipment. | Line.                                     | Last Log, Register, or Report Contributed. Received up to 15.12.26. | Date Received. |
|--------------------------------|---|--|------------------------------------|---|---|----------------|
| <i>Montferland</i> ...         | Van Noppen, C. D.   | W. Slooten ...   | No. M.                             | Holland Lloyd ...                         | Form 911 5.8.26 to 6.11.26 ...                                      | 17.11.26.      |
| 27 <i>Montnairn</i> ...        | Turnbull, J., C.B.E., R.D., Capt., R.N.R.                 | F. E. Williams, F. Chodzko, F. Hindle.                                       | W.T.                               | Canadian Pacific ...                      | W.T. Reg. 7.11.26 to 25.11.26...                                    | 29.11.26.      |
| 26 <i>Montrose</i> ...         | Landy, E.   | A. Watt, R. Woods, A. W. Patrick.  | "                                  | " " " ...                                 | " 2.10.26 to 21.10.26   | 27.10.26.      |
| 20 <i>Montroyal</i> ...        | Stewart, A.   | R. Antrobus ...  | "                                  | " " " ...                                 | " 24.10.26 to 11.11.26  | 15.11.26.      |
| <i>Moresby</i> ...             | Edgell, J. A., O.B.E., Capt., R.N.                        | W. H. Martin ...   | M.L.                               | His Majesty's Australian Ship.            | Form 911 17.7.26 to 22.7.26 ...                                     | 26.7.26.       |
| <i>Morvada</i> ...             | Mills, T. L., O.B.E., R.D., Commr., R.N.R.                | A. J. Norris ...   | No. M.                             | British India ...                         | Met. Log. 15.4.26 to 12.8.26 ...                                    | 30.9.26.       |
| <i>Mulbera</i> ...             | Steadman, W. R.   | F. Broomhead, E. H. Spriggs  | " M.                               | " ...                                     | Form 911 11.7.26 to 1.10.26 ...                                     | 5.10.26.       |
| <i>Nagara</i> ...              | Foster, E.  | E. Hewitt ...  | " M.                               | " ...                                     | " 6.10.26 to 25.11.26   | 30.11.26.      |
| <i>Nagoya</i> ...              | Davis, H. C., D.S.C., R.D., Commr., R.N.R.                | L. Porter ...  | " M.                               | R.M.S.P. Co. ...                          | " 9.10.26 to 20.11.26...  | 15.12.26.      |
| <i>Nellore...</i> ...          | Hignett, A. H., R.D., Lt. - Commr., R.N.R.                | S. H. Baldwin ...  | " M.                               | " ...                                     | " 30.5.26 to 27.8.26 ...  | 2.9.26.        |
| <i>Nestor</i> ...              | Owen, R. D., O.B.E.                                       | D. Rees, F. J. Silva, D. W. Stroud.  | M.L.                               | A. Holt ...                               | " 20.3.26 to 12.6.26 ...  | 14.7.26.       |
| <i>Newby Hall</i> ...          | Butler, J.  | D. F. Galloway, A. W. Wise, D. T. Smith.                                     | "                                  | Ellerman ...                              | Met. Log. 24.1.26 to 30.5.26 ...                                    | 4.6.26.        |
| <i>Newfoundland</i> ...        | Westgarth, W. A., D.S.C.                                  | R. F. Handley, E. Sainty, S. Moore.  | "                                  | Furness Withy ...                         | " 22.6.26 to 15.10.26...  | 27.10.26.      |
| <i>Niagara</i> ...             | Showman, A. C. ...  | A. P. Cousin, D. McKenzie, T. Haulton.                                       | "                                  | Canadian-Australian...                    | " 19.8.26 to 3.12.26 ...  | 14.12.26.      |
| <i>Ningchow</i> ...            | Mawson, J.  | G. H. Oldridge ...   | No. A.                             | A. Holt ...                               | Met. Log. 2.6.26 to 16.9.26 ...                                     | 8.10.26.       |
| <i>Norfolk</i> ...             | Christie, W. J.   | " ...  | " A.                               | Federal ...                               | Form 911 21.9.26 to 10.10.26...                                     | 8.11.26.       |
| <i>Norna</i> ...               | Wilde, H. J.  | " ...  | " A.                               | Scottish Fishery Board                    | Form 911 18.9.26 to 7.11.26 ...                                     | 12.11.26.      |
| <i>Norseman, C.S.</i> ...      | Wright, J. W.   | A. Landles ...   | " M.                               | Western Tel. Co. ...                      | Form 911 20.11.26 to 30.11.26                                       | 13.12.26.      |
| <i>Northwestern Miller</i> ... | Barter, H. O., R.N., Commr., R.N.R.                       | E. Pearce ...  | " A.                               | Furness Withy ...                         | " 13.10.26 to 11.11.26  | 16.11.26.      |
| <i>Nova Scotia</i> ...         | Nuttall, E. L.  | " ...  | " A.                               | " ...                                     | " 8.9.26 to 4.10.26 ...   | 18.10.26.      |
| <i>Nubian</i> ...              | Furneaux, S.  | W. P. Paterson ...   | " A.                               | Leyland ...                               | " 23.12.25 to 24.1.26   | 28.1.26.       |
| <i>Oaklands Grange...</i> ...  | Watmough, T. M.   | H. R. Gaskill ...  | " A.                               | " ...                                     | " 22.10.26 to 7.11.26...  | 22.11.26.      |
| 42 <i>Ohio</i> ...             | St. Clair, C., D.S.C.                                     | E. J. Longheed ...   | " A.                               | Houlder Bros. ...                         | W.T. Reg. 17.10.26 to 7.11.26                                       | 12.11.26.      |
| <i>Olympic</i> ...             | Clarke, E., R.D., Commr., R.N.R.                          | E. A. E. Littlewood, D. P. Larnham, G. N. Elliott.                           | W.T.                               | R.M.S.P. Co. ...                          | Form 911 18.9.26 to 7.11.26 ...                                     | 12.11.26.      |
| <i>Orama</i> ...               | Marshall, W., C.B., D.S.O., A.-d.-C., R.D., Capt., R.N.R. | A. Fisher, A. W. Robinson, J. Clarke, S. A. Jones, H. J. C. Day, R. Crangle. | "                                  | White Star ...                            | W.T. Reg. 4.11.26 to 9.12.26 ...                                    | 13.12.26.      |
| <i>Oranian</i> ...             | Shelford, W. S., Lieut. - Commr., R.N.R.                  | T. Fox Russell, C. K. Blake, H. Tanner.                                      | M.L.                               | Orient ...                                | Form 911 4.11.26 to 10.12.26...                                     | 13.12.26.      |
| <i>Orbita</i> ...              | Hoskins, W.   | W. Lawton ...  | No. A.                             | Leyland ...                               | Met. Log. 25.7.26 to 26.10.26...                                    | 2.11.26.       |
| 43 <i>Orca</i> ...             | Warner, G. E., R.D., R.N.R.                               | C. V. Fletcher, H. H. Tre-weeks, A. Chamberlin.                              | No.                                | R.M.S.P. Co. ...                          | Form 911 11.9.26 to 13.11.26...                                     | 26.11.26.      |
| <i>Orcoma</i> ...              | Le Brecht, H. A.  | " ...  | W.T.                               | " ...                                     | W.T. Reg. 12.9.26 to 3.10.26 ...                                    | 7.10.26.       |
| <i>Orduna</i> ...              | Dominy, R. H., C.B.E., Commr., R.N.R.                     | R. Griffiths, R. Gill, T. Naylor.  | M.L.                               | Pacific S.N. Co. ...                      | Form 911 11.9.26 to 3.10.26 ...                                     | 7.10.26.       |
| <i>Orestes</i> ...             | Smith, W. E., D.S.O., R.D., Capt., R.N.R.                 | H. G. Whittle, S. Robbins, J. E. P. Matthews, D. P. Larham.                  | No.                                | R.M.S.P. Co. ...                          | Met. Log. 19.8.26 to 5.11.26 ...                                    | 11.11.26.      |
| <i>Orita</i> ...               | Hanney, T. W.   | " ...  | No. A.                             | A. Holt ...                               | W.T. Reg. 5.9.26 to 26.9.26 ...                                     | 4.10.26.       |
| <i>Ormonde</i> ...             | Splatt, W. A.   | T. R. Scott, D. W. Hutchinson, R. W. Hanson, G. R. Bubb.                     | M.L.                               | Pacific S.N. Co. ...                      | Form 911 4.9.26 to 27.9.26 ...                                      | 4.10.26.       |
| <i>Ormuz</i> ...               | Wyatt, A. G. N., Lieut. Commr., R.N.                      | A. M. Hughes ...   | "                                  | His Majesty's Ship ...                    | Met. Log. 1.11.26 to 11.11.26...                                    | 17.11.26.      |
| <i>Oronsay</i> ...             | O'Sullivan, F. R.   | F. J. L. Butler, W. Wickham, A. A. Addison, H. A. Whittle.                   | "                                  | Orient ...                                | Met. Log. 17.2.26 to 29.5.26 ...                                    | 9.6.26.        |
| <i>Oroya</i> ...               | Owens, A. L., R.D., Lt.-Commr., R.N.R.                    | — Hatch, — Rice, W. Elliot   | "                                  | " ...                                     | " 7.9.26 to 17.11.26 ...  | 1.12.26.       |
| <i>Orsova</i> ...              | Pearce, A.  | G. Lewis ...   | No. M.                             | Pacific S.N. Co. ...                      | " 8.8.26 to 11.11.26 ...  | 17.11.26.      |
| <i>Ortega</i> ...              | Cameron, E. P., R.D., Commr., R.N.R.                      | L. J. Vesty, W. Elliott, J. F. Castle-Bartley.                               | M.L.                               | Orient ...                                | " 21.2.26 to 25.5.26 ...  | 31.5.26.       |
| <i>Orvieto</i> ...             | Barkley, E.   | G. M. Rice ...   | No. M.                             | Pacific S.N. Co. ...                      | Form 911 27.4.26 to 5.7.26 ...                                      | 12.7.26.       |
| <i>Osterley</i> ...            | Matheson, C. G., D.S.O., R.D., Capt., R.N.R.              | A. Hawker, G. L. Carter, J. L. Skilling, T. L. Shurrock.                     | M.L.                               | Orient ...                                | Met. Log. 22.8.26 to 24.11.26...                                    | 4.12.26.       |
| <i>Otaki</i> ...               | Sarson, M. J.   | H. Tanner, N. A. Whinfield, S. Burnnand.                                     | No.                                | " ...                                     | Form 911 29.9.26 to 15.11.26...                                     | 24.11.26.      |
| <i>Otranto</i> ...             | McNish, R.  | " ...  | No. A.                             | New Zealand S.S. Co.                      | Met. Log. 5.9.26 to 9.12.26 ...                                     | 14.12.26.      |
| <i>Oxfordshire</i> ...         | Wood, C.  | D. N. MacGregor ...  | " M.                               | Shaw, Savill & Albion                     | " 24.1.26 to 27.4.26 ...  | 20.5.26.       |
| <i>Pacific Shipper,</i> ...    | Staunton, H. G., C.B.E., R.D.                             | S. Myers ...   | " M.                               | Orient ...                                | " 8.8.26 to 11.11.26 ...  | 17.11.26.      |
| <i>Pacuar</i> ...              | Crumplin, W. E.   | D. T. Nicholas ...   | " A.                               | Bibby Bros. ...                           | " 21.2.26 to 25.5.26 ...  | 31.5.26.       |
| <i>Pakeha</i> ...              | Newman, G. W. A.  | G. Davis ...   | " A.                               | Furness Withy ...                         | " 21.2.26 to 25.5.26 ...  | 31.5.26.       |
| <i>Pareora</i> ...             | Harvey, A. E.   | M. C. Cruickshank ...  | " A.                               | Elders & Fyffes ...                       | " 21.2.26 to 25.5.26 ...  | 31.5.26.       |
| <i>Paris</i> ...               | W. P. Clifton Mogg  | E. T. Baker, R. E. Nicholson, A. J. Tillot.                                  | M.L.                               | Shaw, Savill & Albion                     | Met. Log. 3.8.26 to 16.8.26 ...                                     | 8.9.26.        |
| <i>Patia</i> ...               | Evans, J. O.  | N. Turner ...  | No. A.                             | Hain S.S. Co. ...                         | Met. Log. 27.5.26 to 12.10.26...                                    | 18.10.26.      |
| <i>Patrician</i> ...           | Cook, C. L.   | Mr. Biles... ..  | C.C.                               | Southern Rly. ...                         | Form 911 25.10.26 to 7.11.26  | 9.11.26.       |
| <i>Peshawur</i> ...            | Maxwell Brown, W. E.                                      | J. Kinsley ...   | No. A.                             | Elders & Fyffes ...                       | Telegraphic Report. 15.10.26 ...                                    | 15.10.26.      |
| <i>Persic</i> ...              | Pugh, R. H.   | H. W. Stanley ...  | " M.                               | Harrison ...                              | Form 911 19.9.26 to 24.10.26...                                     | 4.11.26.       |
| <i>Pialo</i> ...               | Welsh, T. K.  | H. F. P. Albrecht, T. A. Flett, E. J. Evans, G. Brown.                       | M.L.                               | Eastern Extension (A. & C.) Telegraph Co. | Met. Log. 11.6.26 to 28.9.26 ...                                    | 23.11.26.      |
| <i>Polycarp</i> ...            | Bulman, J. B.   | R. Conway ...  | No. A.                             | White Star ...                            | Met. Log. 7.7.26 to 4.9.26 ...                                      | 13.11.26.      |
| <i>Polyarc</i> ...             | Hester, C. W., R.D., Commr., R.N.R.                       | D. G. Baillie, J. K. Crone, R. D. Whyte-Mackay.                              | M.L.                               | P. & O. ...                               | Form 911 27.9.25 to 4.11.25 ...                                     | 17.3.26.       |
| <i>Polyarc</i> ...             | Kettlewell, C. R.   | " ...  | " A.                               | New Zealand S.S. Co.                      | Met. Log. 16.1.26 to 2.7.26 ...                                     | 9.7.26.        |
| <i>Polyarc</i> ...             | Evans, T. G.  | C. W. Smethurst ...  | No. A.                             | Booth ...                                 | Form 911 26.8.26 to 20.10.26...                                     | 12.11.26.      |

## LIST OF VOLUNTARY OBSERVING SHIPS

vii

| Name of Vessel.                  | Captain.                                | Observing Officers.   | Official Meteorological Equipment. | Line.                                | Last Log, Register, or Report Contributed. Received up to 15.12.26. | Date Received. |
|----------------------------------|---|---|------------------------------------|--------------------------------------|---|----------------|
| <i>Port Adelaide</i> ...         | Hayter, S. W. ...                       | R. W. Linklater, G. Lovegrove, J. L. Porter.                  | M.L.                               | Commonwealth & Dominion.             | Met. Log. 6.2.26 to 11.6.26 ...                                     | 21.6.26.       |
| " <i>Albany</i> ...              | Robinson, C. A. ...                     | E. A. Leavett, W. Eastoe, J. Thom.                            | "                                  | " " "                                | " 1.5.26 to 9.11.26 ...   | 17.11.26.      |
| " <i>Auckland</i> ...            | Durham, R. S. ...                       | R. B. Stannard ...  | "                                  | " " "                                | Form 911 4.3.26 to 20.7.26 ...                                      | 26.7.26.       |
| " <i>Bowen</i> ...               | Gilling, W. ...                         | W. R. Johnston ...  | No. A.                             | " " "                                | " 21.7.26 to 27.8.26 ...  | 20.9.26.       |
| " <i>Caroline</i> ...            | Renaut, F. A. ...                       | H. H. Smith, E. Fenton, C. Chamberlin, A. T. C. Cooper.       | M.L.                               | " " "                                | Met. Log. 3.10.25 to 11.4.26 ...                                    | 19.4.26.       |
| " <i>Darwin</i> ...              | Sawbridge, I. R. ...                    | E. T. N. Lawrey ...   | No. A.                             | " " "                                | Form 911 23.10.26 to 4.12.26...                                     | 13.12.26.      |
| " <i>Dunedin</i> ...             | Lea, W. H. ...                          | E. G. Jones, R. Needham, H. M. Post, E. Wheeler.              | M.L.                               | " " "                                | Met. Log. 17.7.26 to 29.10.26                                       | 4.11.26.       |
| " <i>Hacking</i> ...             | Hoad, A. C. ...                         | F. W. Elgar ...   | "                                  | " " "                                | Form 911 1.8.26 to 14.8.26 ...                                      | 30.8.26.       |
| " <i>Hobart</i> ...              | Craven, R. ...                          | G. Langford ...   | "                                  | " " "                                | " 6.3.26 to 25.6.26 ...   | 8.7.26.        |
| " <i>Hunter</i> ...              | Cottell, S. C. ...                      | A. Cooper, R. Forrest, J. T. Weldie.                          | "                                  | " " "                                | Met. Log. 1.6.26 to 2.11.26 ...                                     | 23.11.26.      |
| " <i>Melbourne</i> ...           | Kearney, F. J. ...                      | D. G. H. Bradley, J. A. Fairbairn, A. G. Starkey.             | M.L.                               | " " "                                | " 4.5.26 to 5.9.26 ...  | 8.9.26.        |
| " <i>Napier</i> ...              | Jones, C. N. ...                        | J. L. Lewis, A. McDonald, P. A. Munday, C. Jolly.             | No. A.                             | " " "                                | Form 911 2.10.26 to 20.11.26...                                     | 9.12.26.       |
| " <i>Nicholson</i> ...           | Jack, J. ...                            | H. C. Jeffery, W. G. Jones, N. M. Muzzill, S. Hearn.          | M.L.                               | " " "                                | Met. Log. 20.2.26 to 18.7.26 ...                                    | 24.7.26.       |
| " <i>Pirie</i> ...               | Kippons, T. ...                         | G. L. H. Dean, K. D. Morgan, H. G. Boys Smith.                | "                                  | " " "                                | " 6.4.26 to 6.9.26 ...  | 13.9.26.       |
| " <i>Sydney</i> ...              | Higgs, W. G. ...                        | L. M. R. Bayly, W. J. Watson, A. Brown.                       | "                                  | " " "                                | " 26.6.26 to 29.7.26 ...  | 5.8.26.        |
| " <i>Victor</i> ...              | Swan, L. H. ...                         | P. H. Pedrick ...   | "                                  | " " "                                | " 16.7.26 to 20.11.26...  | 1.12.26.       |
| " <i>Wellington</i> ...          | Farmer, F. ...                          | B. Christensen, A. L. Herre...                                | No. A.                             | " " "                                | Form 911 22.3.26 to 24.7.26 ...                                     | 6.8.26.        |
| <i>President Jackson</i> ...     | Griffith, J. ...                        | B. Christensen ...  | " A.                               | Pacific Mail S.S. Co....             | " 19.4.26 to 21.5.26 ...  | 22.7.26.       |
| <i>President Jefferson</i> ...   | Nichols, F. R. ...                      | A. M. Quinlan ...   | " A.                               | Admiral Oriental Line                | " 1.9.26 to 19.9.26 ...   | 18.10.26.      |
| <i>President Wilson</i> ...      | Nelson, H. ...                          | R. J. Whitley ...   | " A.                               | Dollar ...                           | " 5.9.26 to 2.11.26 ...   | 22.11.26.      |
| <i>Protea</i> , H.M.S.A.S. ...   | Woodhouse, A. F. B., Lt.-Commr., R.N.R. | W. J. Ryan ...  | No. M.                             | South African Naval Service.         | " 1.8.26 to 14.9.26 ...   | 12.10.26.      |
| <i>Pyrrhus</i> ...               | Read, J. W. ...                         | G. Randall ...  | " A.                               | A. Holt ...                          | " 5.10.26 to 15.10.26   | 22.11.26.      |
| <i>Rangpura</i> ...              | King, A. M., D.S.C.                     | R. H. Shaw, C. Cochrane, H. J. Yates.                         | " M.                               | P. & O. ...                          | " 23.10.26 to 10.11.26  | 15.11.26.      |
| <i>60 Regina</i> ...             | Smith, R. G. ...                        | P. McCullum, P. Shakespeare                                   | " W.T.                             | White Star-Dominion                  | W. T. Reg. 14.11.26 to 4.12.26                                      | 8.12.26.       |
| " <i>Reindeer</i> ...            | Langdon, C. ...                         | L. C. Bach ...  | C.C.                               | G.W. Railway ...                     | Form 911 14.11.26 to 4.12.26  | 8.12.26.       |
| " <i>Remuera</i> ...             | Cameron, J. J. ...                      | F. F. Feint ...   | No. A.                             | New Zealand S.S. Co.                 | Telegraphic Report 11.12.26   | 11.12.26.      |
| " <i>Reventazon</i> ...          | Jack, D. A. ...                         | F. Bishop ...   | No. A.                             | Elders & Fyffes ...                  | Form 911 13.3.26 to 19.4.26 ...                                     | 27.7.26.       |
| " <i>Rhodesian Transport</i> ... | Fowler, W. H. ...                       | T. E. Hart, C. B. Miller, W. H. J. Llewellyn.                 | No. A.                             | Houlder Bros. ...                    | Form 911 22.4.26 to 19.8.26 ...                                     | 25.8.26.       |
| " <i>Rimutaka</i> ...            | Hemming, F. A. ...                      | J. W. McMullan ...  | M.L.                               | New Zealand S.S. Co.                 | Met. Log. 31.5.25 to 29.3.26 ...                                    | 1.4.26.        |
| " <i>Risaldar</i> ...            | Park, G. ...                            | E. Lawrence, R. G. Rees, H. Cockerill.                        | "                                  | Asiatic S.N. Co. ...                 | " 10.4.26 to 16.9.26 ...  | 19.10.26.      |
| " <i>Romney</i> ...              | Syms, G. ...                            | ... ..  | No. A.                             | Lampport & Holt ...                  | Form 911 27.4.26 to 7.7.26 ...                                      | 13.8.26.       |
| " <i>Rotorua</i> ...             | Hunter, J. B. ...                       | ... ..  | M.L.                               | N.Z.S. Co. ...                       | Met. Log. 3.7.26 to 15.10.26...                                     | 26.10.26.      |
| " <i>Royal Fusilier</i> ...      | Dawson, J. ...                          | ... ..  | No. A.                             | London & Edinburgh S.S. Co.          | Form 911 10.11.26 to 5.12.26  | 8.12.26.       |
| " <i>Royal Transport</i> ...     | Dove, J. ...                            | R. W. Wass ...  | " A.                               | Houlder Bros. ...                    | " 24.1.26 to 24.7.26 ...  | 6.8.26.        |
| " <i>Ruapehu</i> ...             | McKellar, A. W., R.D., Capt., R.N.R.    | - F. Russel, O. M. Watts, W. J. Glassborow.                   | M.L.                               | New Zealand S.S. Co.                 | Met. Log. 16.4.26 to 10.8.26 ...                                    | 16.8.26.       |
| " <i>Sachem</i> ...              | ... ..                                  | ... ..  | No.                                | Furness Withy Eastern and Australian | "   | "              |
| " <i>St. Albans</i> ...          | Smith, G. L. ...                        | J. W. Kavanagh, W. McIntyre                                   | M.L.                               | "                                    | Met. Log. 9.4.26 to 5.9.26 ...                                      | 26.10.26.      |
| " <i>St. Helier</i> ...          | Diamond, S. L. ...                      | C. Shalford ...   | "                                  | "                                    | "   | "              |
| " <i>St. Julien</i> ...          | Mulhall, W. ...                         | C. Bell ...   | C.C.                               | G.W. Railway ...                     | Telegraphic Report 4.11.26 ...                                      | 4.11.26.       |
| " <i>St. Patrick</i> ...         | Langdon, C. H. ...                      | C. Joy ...  | "                                  | "                                    | " 29.9.26 ...   | 29.9.26.       |
| " <i>Salaga</i> ...              | Bearpark, E. W. ...                     | F. C. Smith ...   | No. A.                             | Rankin Gilmour ...                   | Form 911 27.4.26 to 5.8.26 ...                                      | 17.8.26.       |
| " <i>38 Samaria</i> ...          | Sola, P., D.S.O. ...                    | C. V. Evans ...   | " A.                               | Elder Dempster ...                   | " 18.9.26 to 4.12.26 ...  | 14.12.26.      |
| " <i>Saxoleine</i> ...           | McNeil, S. G. S., R.D., Capt., R.N.R.   | A. F. Porter, J. E. Tagg, S. C. F. Belcher, A. B. Fastang.    | W.T.                               | Cunard ...                           | W.T. Reg. 14.11.26 to 5.12.26...                                    | 10.12.26.      |
| " <i>Saxon</i> ...               | Rodgers, C. S. ...                      | B. Johnsen ...  | No. A.                             | Hunting & Son ...                    | Form 911 18.2.26 to 9.3.26 ...                                      | 29.3.26.       |
| " <i>Scindia</i> ...             | Owen, S. H. ...                         | E. G. Broodbank ...   | " A.                               | Union Castle ...                     | " 27.8.26 to 18.10.26...  | 22.10.26.      |
| " <i>Scholar</i> ...             | Matthews, W. ...                        | R. S. Paton ...   | " A.                               | Anchor ...                           | " 18.8.26 to 17.11.26   | 1.12.26.       |
| " <i>Scotia</i> ...              | Egerton, J. J. ...                      | ... ..  | " M.                               | Harrison ...                         | "   | "              |
| " <i>Scottish Bard</i> ...       | Prichard, S.D., M.B.E. ...              | O. W. L. Jones ...  | C.C.                               | L.M. & S. Rly ...                    | Telegraphic Report 4.12.26  | 4.12.26.       |
| " <i>33 Seythia</i> ...          | McDonnell, S. ...                       | J. W. Lilley ...  | No. A.                             | Tankers Ltd. ...                     | Form 911 13.10.26 to 28.10.26                                       | 25.11.26.      |
| " <i>Sheaf Lance</i> ...         | Prothero, W. ...                        | G. Overton, J. C. Munro, P. G. Britten.                       | W.T.                               | Cunard ...                           | W.T. Reg. 25.10.26 to 14.11.26                                      | 22.11.26.      |
| " <i>Sheaf Mount</i> ...         | Earl, C. ...                            | ... ..  | No. A.                             | W. A. Souter ...                     | Form 911 10.6.26 to 8.7.26 ...                                      | 22.7.26.       |
| " <i>Sheaf Spear</i> ...         | Groves, C. V. ...                       | C. A. Goold ...   | No. A.                             | "                                    | Met. Log. 25.6.26 to 3.10.26 ...                                    | 18.10.26.      |
| " <i>Shropshire</i> ...          | Whitfield, G. A., O.B.E.                | ... ..  | M.L.                               | "                                    | "   | "              |
| " <i>Socrates</i> ...            | Grisewood, W. H., Dring, S. J.          | ... ..  | "                                  | "                                    | "   | "              |
| " <i>Soekaboemi</i> ...          | Adamson, B. W. ...                      | ... ..  | "                                  | "                                    | "   | "              |
| " <i>Somersel</i> ...            | Taylor, F. C. ...                       | W. E. Jordan ...  | No. A.                             | Bibby ...                            | Form 911 19.9.26 to 16.11.26...                                     | 22.11.26.      |
| " <i>Somerselshire</i> ...       | Z. W. Flach ...                         | C. van Reenen ...   | " M.                               | Lampport & Holt ...                  | " 2.5.26 to 30.7.26 ...   | 12.8.26.       |
| " <i>Somme</i> ...               | Barnett, H. ...                         | J. J. Youngs ...  | " M.                               | Rotterdam Lloyd ...                  | " 15.12.25 to 21.1.26...  | 26.1.26.       |
| " <i>Spectator</i> ...           | Foster, W. L. ...                       | R. C. Leitch, H. G. Walton, P. H. Potter.                     | M.L.                               | N.Z.S. Co. ...                       | Met. Log. 2.5.26 to 25.8.26 ...                                     | 3.9.26.        |
| " <i>Spero</i> ...               | Miles, F. R., Commr. R.D., R.N.R.       | J. Watson ...   | No. A.                             | Bibby ...                            | Form 911 1.5.26 to 23.7.26 ...                                      | 13.8.26.       |
| " <i>Stockwell</i> ...           | Harding, C. H. J. ...                   | D. Fraser, J. G. F. Betson ...                                | " A.                               | R.M.S.P. Co. ...                     | "   | "              |
| " <i>Stuart Prince</i> ...       | Norton, W. J. ...                       | T. E. Fea ...   | M.L.                               | Harrison ...                         | " 20.11.25 to 20.2.26...  | 26.2.26.       |
| " <i>Suva Maru</i> ...           | Montgomery, H. ...                      | ... ..  | "                                  | Ellerman Wilson ...                  | Met. Log. 12.12.25 to 14.6.26...                                    | 1.7.26.        |
| " <i>Sylviafield</i> ...         | Thowless, E. ...                        | W. Gibson ...   | No. A.                             | Brocklebank ...                      | Form 911 11.8.26 to 23.8.26 ...                                     | 27.8.26.       |
| " <i>Tainui</i> ...              | Kemp, E. J. ...                         | W. Venn ...   | " A.                               | Prince ...                           | " 18.2.26 to 6.3.26 ...   | 26.4.26.       |
| " <i>Tairoa</i> ...              | Okuno, Y. ...                           | ... ..  | " A.                               | Nippon Yusen Kaisha                  | " 23.8.26 to 20.9.26 ...  | 11.10.26.      |
| " <i>Tahiti</i> ...              | Biddick, E. ...                         | ... ..  | " A.                               | Hunting & Son ...                    | " 25.9.26 to 15.10.26   | 21.10.26.      |
| " <i>Taiping</i> ...             | Elford, H. C. ...                       | P. S. Horwood ...   | " A.                               | Shaw, Savill & Albion                | " 16.8.26 to 21.9.26 ...  | 25.9.26.       |
| " <i>Tanda</i> ...               | Summers, W. G. ...                      | S. A. Bannister ...   | " A.                               | "                                    | " 30.3.26 to 12.5.26 ...  | 17.5.26.       |
| " <i>Taipei</i> ...              | Hill, T. V. ...                         | D. A. Monlove ...   | " A.                               | Union S.S. Co. of N.Z.               | " 8.9.26 to 28.10.26 ...  | 16.11.26.      |
| " <i>Taipei</i> ...              | Hamilton, H. E. ...                     | A. M. Frame, T. G. Stratford, W. Bailey L. A. Baile.          | M.L.                               | Yuill & Co. ...                      | Met. Log. 22.1.26 to 17.5.26 ...                                    | 19.7.26.       |
| " <i>Tanda</i> ...               | Pilcher, E. ...                         | R. Lloyd Harry, B. Dun, F. Colvin, T. Cavanagh, C. Stratford. | "                                  | E. & A. S.S. Co. ...                 | " 1.6.26 to 25.8.26 ...   | 26.10.26.      |



| Name of Vessel.                      | Captain.                                       | Observing Officers.   | Official Meteorological Equipment. | Line.                        | Last Log, Register, or Report Contributed. Received up to 15.12.26. | Date Received. |
|--------------------------------------|--|---|------------------------------------|------------------------------|---|----------------|
| <i>Tambora</i> ...                   | Huisman, N. ...                                | H. Van Manen ...  | No. M.                             | Rotterdam Lloyd ...          | Form 911 29.8.26 to 14.10.26...                                     | 30.10.26.      |
| <i>Teiresias</i> ...                 | Wilkinson, W. H. ...                           | W. Stanger ...  | " A.                               | A. Holt & Co. ...            | " 25.6.26 to 7.10.26 ...  | 12.10.26.      |
| <i>Tekoa</i> ...                     | Barnett, H. ...                                | P. H. Chalwin ...   | " M.                               | New Zealand S.S. Co. ...     | " 25.10.26 to 9.11.26...  | 30.11.26.      |
| <i>Telamon</i> ...                   | Duggan, C. ...                                 | G. Bevan ...  | " A.                               | A. Holt ...                  | " 20.4.26 to 21.6.26 ...  | 3.7.26.        |
| <i>Teucer</i> ...                    | Hodgson, R. N. ...                             | P. Cross ...  | " A.                               | " ...                        | " 5.10.26 to 2.12.26 ...  | 13.12.26.      |
| <i>Themistocles</i> ...              | Jernyn, W. M. ...                              | R. J. Buckland ...  | " M.                               | Aberdeen ...                 | " 3.6.26 to 22.7.26 ...   | 3.8.26.        |
| <i>Theseus</i> ...                   | Jones, E. ...                                  | W. A. Fyffe ...   | " A.                               | A. Holt ...                  | " 23.10.26 to 3.11.26...  | 29.11.26.      |
| <i>Titan</i> ...                     | Wilkinson, T. G. ...                           | D. MacLavith, D. T. Williams, G. W. Best, C. G. Bailey.           | M.L.                               | " ...                        | Met. Log. 20.10.25 to 11.3.26...                                    | 18.3.26.       |
| <i>Tongariro</i> ...                 | White Parsons, V.C.                            | J. J. Youngs, E. Quick ...  | No. M.                             | New Zealand S.S. Co.         | Form 911 24.10.26 to 7.11.26...                                     | 29.11.26.      |
| <i>Transylvania</i> ...              | Bone, D. W. ...                                | P. Middleton ...  | " A.                               | Anchor ...                   | " 31.10.26 to 21.11.26  | 24.11.26.      |
| <i>Traveller</i> ...                 | Worthington, B. ...                            | R. H. Rowe ...  | " M.                               | T. & J. Harrison ...         | " 24.9.26 to 13.10.26...  | 19.10.26.      |
| <i>Trematon</i> ...                  | Evans, B. ...                                  | R. Gregory, J. Toms, J. Bell.                                     | M.L.                               | Hain S.S. Co. ...            | Met. Log. 2.9.25 to 8.2.26 ...                                      | 2.3.26.        |
| <i>Turakina</i> ...                  | Hamilton, E. S. ...                            | A. N. Marshall, G. S. Shepherd                                    | No. M.                             | New Zealand S.S. Co.         | Form 911 9.2.26 to 4.5.26 ...                                       | 26.5.26.       |
| <i>Tuscuna</i> ...                   | Gemmell, W. J. ...                             | J. Hamilton ...   | " A.                               | Anchor ...                   | " 25.9.26 to 17.10.26...  | 21.10.26.      |
| <i>Tyndareus</i> ...                 | Scott, J. R. ...                               | A. G. Phillips, C. E. Mook, A. R. McDavid.                        | M.L.                               | A. Holt ...                  | Met. Log. 7.1.26 to 9.6.26 ...                                      | 6.8.26.        |
| <i>Ulimaroa</i> ...                  | Wylie, W. J. ...                               | J. Gilbertson ...   | No. M.                             | Huddart Parker, Ltd.         | Form 911 27.8.26 to 18.10.26...                                     | 7.12.26.       |
| <i>Ulysses</i> ...                   | McHutchon, W. ...                              | E. C. Radford ...   | " A.                               | A. Holt ...                  | " 17.10.26 to 4.11.26...  | 13.12.26.      |
| <i>Urvolosi</i> ...                  | Barnes, E. W. ...                              | " ...   | " A.                               | Bullard King ...             | " 10.11.26 to 24.11.26  | 13.12.26.      |
| <i>Valacia</i> ...                   | Inch, F. ...                                   | G. Meggitt ...  | " M.                               | Cunard ...                   | " 28.9.26 to 7.11.26 ...  | 22.11.26.      |
| <i>Vardulia</i> ...                  | Fear, E. T. C. ...                             | L. D. W. Rand ...   | " A.                               | " ...                        | " 9.9.26 to 21.9.26 ...   | 4.10.26.       |
| <i>Verbania</i> ...                  | Poolley, T. S. M. ...                          | A. F. Watts ...   | " A.                               | " ...                        | " 23.5.26 to 3.8.26 ...   | 13.12.26.      |
| <i>Vigilant</i> ...                  | Simpson, E. S. S. ...                          | J. Hunter ...   | " A.                               | Scottish Fishery Board       | " 1.11.26 to 30.11.26...  | 6.12.26.       |
| <i>Voitapu</i> ...                   | Norton, A. ...                                 | W. Johnson ...  | " A.                               | Canadian-Australasian        | " 6.9.26 to 30.9.26 ...   | 29.11.26.      |
| <i>Wairuna</i> ...                   | " ...  | " ...   | M.L.                               | Union S.S. Co. of N.Z.       | " ...   | " ...          |
| <i>Walmer Castle</i> ...             | Chave, Sir B., K.B.E.                          | H. A. Deller ...  | No. A.                             | Union Castle ...             | Form 911 7.5.26 to 23.5.26 ...                                      | 7.6.26.        |
| <i>Wangaratta</i> ...                | Scutt, W. ...                                  | T. W. Wordingham, G. R. Millard, K. M. Morrison, N. A. Pope.      | M.L.                               | British India ...            | Met. Log. 6.3.26 to 30.7.26 ...                                     | 3.8.26.        |
| <i>Warfeld</i> ...                   | Steel, R. ...                                  | C. M. Quick ...   | No. A.                             | " ...                        | Form 911 18.10.26 to 4.11.26...                                     | 7.12.26.       |
| <i>War Nizam</i> ...                 | Moncrieff, T. ...                              | J. Row ...  | " A.                               | British Tankers ...          | " 17.8.26 to 28.9.26 ...  | 6.10.26.       |
| <i>Welshman</i> ...                  | Rollerson, W. ...                              | J. Mendus ...   | " M.                               | White Star-Dominion          | " 22.10.26 to 14.11.26  | 26.11.26.      |
| <i>Westmoreland</i> ...              | Upton, H. C., D.S.C., R.D., Lt.-Commr., R.N.R. | A. J. Angell, G. B. Herbert-Jones, N. L. H. Fane, C. O. Luxmoore. | M.L.                               | Federal ...                  | " 31.5.26 to 17.11.26...  | 22.11.26.      |
| <i>William Scoresby</i> , R.S.S.     | Mercer, G. M., D.S.C., Lt.-Commr., R.N.R.      | " ...   | "                                  | Falkland Islands Government. | " ...   | " ...          |
| <i>Windsor Castle</i> ...            | Strong, H., R.D., Commr., R.N.R.               | F. Wilbraham, C. L. Lovegrove, J. Montgomery, F. Norfolk.         | No.                                | Union Castle ...             | Met. Log. 1.6.26 to 20.9.26 ...                                     | 2.10.26.       |
| <i>Winifredian</i> ...               | Harrocks, W. ...                               | A. Crone ...  | No. M.                             | Leyland ...                  | Form 911 22.5.26 to 21.6.26 ...                                     | 29.6.26.       |
| <i>Woodarra</i> ...                  | Hudson, H. T. ...                              | L. D. Graham, G. Hyland, H. Goater, J. Wallace.                   | M.L.                               | British India ...            | Met. Log. 20.3.26 to 8.9.26 ...                                     | 15.9.26.       |
| <i>Yorkshire</i> ...                 | Adamson, B. W. ...                             | R. S. Evans, W. T. Walmsley                                       | No.                                | Bibby ...                    | Form 911 3.7.26 to 14.9.26 ...                                      | 17.9.26.       |
| <i>Zealand</i> ...                   | Harvey, H. ...                                 | S. Hay, J. C. Goldsworthy   | No. M.                             | Red Star ...                 | " 10.10.26 to 30.10.26  | 12.11.26.      |
| <i>Conway</i> H.M.S.                 | Broadbent, H. W., R.D. Capt., R.N.R.           | The Senior Cadets...  | Cadets' M.L.                       | " ...                        | Cadets' Met. Log. 10.5.26 to 24.7.26                                | 29.7.26.       |
| <i>Pangbourne</i> Nautical College.  | Tracy, A. F. G., Commr., R.N.                  | " ...   | "                                  | " ...                        | Cadets' Met. Log. 2.5.26 to 24.7.26...                              | 6.8.26.        |
| <i>Worcester</i> , H.M.S.            | Sayer, M. B., O.R.E., R.D., Capt., R.N.R.      | " ...   | "                                  | " ...                        | Cadets' Met. Log. 7.5.26 to 23.7.26...                              | 31.7.26.       |
| <i>Abaco</i> ...                     | " ...  | The Keepers ...   | Lighthouse Register.               | " ...                        | Lighthouse Register 1.1.26 to 30.6.26                               | 26.10.26.      |
| <i>Cay Lobos</i> ...                 | " ...  | " ...   | "                                  | " ...                        | Lighthouse Register 1.1.26 to 30.6.26                               | 26.10.26.      |
| <i>Double Headed Shot</i> ...        | " ...  | " ...   | "                                  | " ...                        | Lighthouse Register 1.1.26 to 30.6.26                               | 26.10.26.      |
| <i>Inagua</i> ...                    | " ...  | " ...   | "                                  | " ...                        | Lighthouse Register 1.1.26 to 30.6.26                               | 26.10.26.      |
| <i>Sombrero</i> ...                  | " ...  | " ...   | "                                  | " ...                        | Lighthouse Register 1.1.26 to 30.6.26                               | 5.8.26.        |
| <i>Watling Island</i> ...            | " ...  | " ...   | "                                  | " ...                        | Lighthouse Register 1.1.26 to 30.6.26                               | 19.11.26.      |
| <i>Cape Pembroke</i> (Falkland Is.). | " ...  | " ...   | "                                  | " ...                        | Lighthouse Register 17.1.26 to 20.7.26                              | 18.8.26.       |

LIST OF SHIPS CO-OPERATING THROUGH THE METEOROLOGICAL OFFICE WITH THE MINISTRY OF AGRICULTURE AND FISHERIES (FISHERIES LABORATORY, LOWESTOFT) IN THE COLLECTION OF WATER SAMPLES, ETC.

| Name of Vessel.       | Captain.            | Observing Officer.    | Line.               | Last Case of Water Samples, Reports, etc., Received up to 30.11.26. | Date Received. |
|-----------------------|---------------------|-----------------------|---------------------|---|----------------|
| <i>Cristales</i> ...  | Isaacson, J. M. ... | J. A. Hampshire ...   | Elders & Fyffes ... | Water Samples ...   | 23.10.26.      |
| <i>Darro</i> ...      | Matthews, G. P. ... | W. Halder-Campe ...   | R.M.S.P. Co. ...    | " ...   | 8.11.26.       |
| <i>Deseado</i> ...    | Hannam, F. S. ...   | C. O. Dingle ...      | " ...               | " ...   | 12.11.26.      |
| <i>Hildebrand</i> ... | Maddrell, J. ...    | A. Allan ...          | Booth ...           | " ...   | 15.9.26.       |
| <i>Pacuare</i> ...    | Harvey A. E. ...    | H. G. Cruickshank ... | Elders & Fyffes ... | " ...   | " ...          |

February M.O., 1927.