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THE MARINE OBSERVER



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JANUARY

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THE MARINE OBSERVER

VOL. XVI.
No. 133



JANUARY
1939

The Review of the Marine Division in co-operation with Voluntary Marine Observers

TABLE OF PRINCIPAL CONTENTS

| | PAGE | | PAGE |
|--|------|---|------|
| Foreword | 2 | Wireless Weather Signals :— | |
| Marine Meteorology, 1919 to 1938 | 2 | Ships, Wireless Weather Signals | 28 |
| Marine Observers' Log : | | Wireless Stations Detailed to receive Routine Coded Weather Reports from " A " Selected Ships | 33 |
| January, February and March | 4 | Wireless Stations Detailed to receive Routine Coded Weather Reports from " B " Selected Ships | 35 |
| Aurora and Allied Phenomena, by E. W. BARLOW, B.Sc. | 12 | International Ships' Wireless Weather Telegraphy Code | 38 |
| Exceptional Tidal Streams in the Southern North Sea and Eastern English Channel, by J. M. CARRUTHERS, D.Sc., F.Inst.P. | 18 | Code Tables | 39 |
| Winter Gales in the North Atlantic, by Commr. J. HENNESSY, R.D., R.N.R. | 20 | Personnel :— | |
| Southern Ice Reports :— | | Captain J. H. LAWSON } Retirements | 42 |
| January, February and March, 1938 | 22 | Captain A. PURVIS } | |
| | | Mr. E. ALLEN, Obituary | 42 |
| | | Lithographic illustrations after page 42 :— | |
| | | Ships' Wireless Weather Signals, Chart of the World. | |
| | | Currents in the North Atlantic, South-Eastern portion :— | |
| | | November, December and January. | |
| | | Currents in the Mediterranean :— | |
| | | November, December and January. | |
| | | Ice Chart of the Southern Hemisphere :— | |
| | | January, February and March. | |

FOREWORD.

THE MARINE OBSERVER was brought into being fifteen years ago by Dr. (now Sir GEORGE) SIMPSON, F.R.S., and Captain L. A. BROOKE SMITH, R.D., R.N.R., who were the Director and the Marine Superintendent of the Meteorological Office at that time. During the last few months we have lost, through retirement, the services of those two founders of this journal. It has fallen to my lot to take over the duties of Sir GEORGE SIMPSON, and I would like to make the appearance of this new Volume an occasion for paying a brief tribute to the work of those who have gone before me and for saying a few words about the future.

The Marine Division of the Meteorological Office, together with the corps of voluntary marine observers, constitute today an organization of which we may all be proud. Not only is it an extremely efficient organization, but it is imbued with a fine spirit of friendly co-operation. The credit for this happy state of affairs must be given primarily to Captain BROOKE SMITH. His energy and knowledge of the ways of those that go down to the sea in ships have

been responsible for building up this magnificent service. I thank him for everything that he has done, and we will all wish him many years of happiness in his well-earned retirement.

I also desire to take this opportunity to express my appreciation to the very large number of Officers of the Merchant Navy for the valuable part which they have played in bringing our Marine Service to its present state of perfection. I look forward confidently to the continuation of the efficiency and the cordial relations which characterize our present co-operation, and I shall always do everything in my power to further this aim.

In conclusion, I would like to say that I shall always be pleased to see personally every Captain or other Officer of the corps of observers who is able to pay a visit to the Meteorological Office in London.

Meteorological Office.

N. K. JOHNSON,
Director.

MARINE METEOROLOGY, 1919-1938.

When this number of THE MARINE OBSERVER is published Captain BROOKE SMITH will have retired from the position of Marine Superintendent of the Meteorological Office, and it is appropriate that we should briefly review the great progress made by the Marine Division in co-operation with the Voluntary Corps of Marine Observers in the past nineteen years during which he has organized and superintended the work carried out on behalf of the Meteorological Office in the British Merchant Navy.

Owing to the Great War, co-operation of the Merchant Navy with the Meteorological Office had by 1919 practically ceased, so it became necessary that an entirely new Observing Fleet should be recruited and a Voluntary Corps of Marine Observers built up. To make the necessary personal contact with the Merchant Navy, Port Meteorological offices were opened at Liverpool and London in the charge of Master Mariners. At other ports, both at home and in the Dominions, retired master mariners were appointed as agents to assist in the work.

With a view to interesting and training future officers of the Merchant Navy in Marine Meteorological observation a cadets' meteorological log was introduced for use in the Officers' Training Ships and College.

The rapid growth of the use of Wireless Telegraphy at sea immediately following the war gave rise to the desirability of introducing new methods of observational work, whereby an effective weather intelligence service at sea would be built up and in addition meteorological centres on shore would receive additional data to aid forecasting. This period therefore was one of transition, in which new methods had to be devised and established, while retaining the older form of observation for climatological purposes.

Working on these lines it was then possible to introduce the practice of synoptic meteorology in the Merchant Navy and with a view to encouraging this method a Wireless Shipping Bulletin broadcast from British coast stations was adopted. Lectures to the Commanders and

Officers of British ships were given at all the larger ports to illustrate how these Bulletins, when used in conjunction with all available synchronized ships observations exchanged by Wireless Telegraphy, would enable the mariner to construct a simple weather chart which would be of practical assistance to him in the navigation of his ship.

By this time the Voluntary Observing Fleet had reached the total of 500 ships and in order to provide the Marine Division with a means of acknowledging the labours of observers and of making some return to them for their work, THE MARINE OBSERVER was established in 1924. The functions of this journal included the provision of information useful to navigation concerning weather, currents and ice, articles of interest to seamen, the stimulation of interest in Marine Meteorology and its practical application at sea, and the provision of means whereby mariners might give their experience to others.

At the same time as THE MARINE OBSERVER was founded an improved Shipping Weather Bulletin was introduced. These two aids so helped towards the improvement of meteorological observation at sea and the growth of the practical application of wireless and weather as an aid to navigation, that in 1928 the Marine Division was enabled to formulate a scheme whereby a limited number of ships termed Selected Ships would carry out the service of routine wireless weather reporting, at scheduled times, in all parts of the world.

In 1929 the International Conference of Safety of Life at Sea embodied in their Convention, Article 35, whereby the contracting Governments undertook:—

“To encourage the collection of meteorological data by ships at sea and to arrange for their examination, dissemination and exchange in the manner most suitable for the purpose of aiding navigation. In particular the contracting Governments undertake to co-operate in carrying out as far as practicable the following meteorological arrangements:—

(a) To warn ships of gales, storms, and tropical storms, both by

the issue of Wireless messages and by the display of appropriate signals at coastal points.

- (b) To issue daily by radio, Weather Bulletins suitable for shipping containing data of existing weather conditions and forecasts.
- (c) To arrange for certain Selected Ships to take meteorological observations at specified hours, and to transmit such observations by Wireless Telegraphy for the benefit of other ships and of the various official meteorological services, and to provide coast stations for the reception of the messages transmitted."

Immediately following the Convention of Safety of Life at Sea (which was later ratified by the British and many other Governments, party to the Convention) the International Meteorological Committee adopted the British Selected ship scheme and drew up an International ships meteorological code to be used with it. The scheme provided for 1,000 Selected Ships of all nations; each nation maintaining a proportionate number of such ships in accordance with her proportion of the world's tonnage and was brought into operation in British ships on 1st May, 1930.

In order to carry out more fully the obligations contained in paragraph (c) of Article 35 of the Convention of Safety of Life at Sea and to firmly establish this practice throughout the British Merchant Navy, the recruitment of British Supplementary Weather Reporting Ships was commenced in October, 1936, their commanders undertaking to carry out the work in all parts of the world where and when necessary.

To assist seamen in a better understanding of the work of observation, the MARINE OBSERVERS' HANDBOOK was entirely re-written, and as a companion volume to this, a HANDBOOK OF WEATHER, CURRENTS AND ICE, FOR SEAMEN was published dealing with the practical application of the work.

Coincident with the introduction and growth of W/T weather reporting at sea, the Marine Division undertook the re-charting of the surface currents of the oceans. The existing charts were not sufficiently accurate for the needs of modern navigation and a new method was adopted, whereby modern observations of set and drift were combined and the mean strength and direction of current calculated for small areas, together with roses showing the frequency of the various directions and strengths of currents for larger areas. The oceans were dealt with section by section and published in THE MARINE OBSERVER. On completion of each ocean these sections were assembled and published in Atlas form. In this way Atlases of the North Atlantic, Indian and South Pacific Oceans have been produced and published.

In the course of this work a great deal of investigation has been made which has brought to light much new information concerning the characteristics and seasonal variations of ocean currents, which is of material benefit to navigation.

The extraction of data from Ships' Meteorological Logs had, prior to 1921, been done by hand into data books. In that year the Hollerith electric sorting and tabulating machines were introduced into the Marine Division in order that the climatological data could be more readily and rapidly handled. From that year the data in all ships' meteorological logs received in the Marine Division were extracted on to Hollerith cards immediately after receipt.

Much of the data contained in logs which had been returned to the Marine Division from 1855 to 1920 had not been dealt with, and a scheme was drawn up for this information also to be extracted on to Hollerith cards, combined with the post-war data and computed into averages, for the publication of meteorological atlases of all oceans. The extraction of these data, comprising some two-and-a-half million sets of observations, is now nearing completion, after which the preparation of meteorological atlases can be proceeded with. When this is done the voluntary work of generations of seamen dating back to 1855, which has extended our knowledge of winds, weather and currents over all oceans will be handed back to the Merchant Navy in a form suitable for general use at sea.

In addition their data will not only assist in dealing with practical problems connected with the shipping industry such as the sea-kindliness of ships, carriage of cargoes, etc., but will provide a wealth of information for the furtherance of meteorological and allied research.

During the post-war years the standard of meteorological observation at sea has shown remarkable improvement and at no other time than at present have seamen taken a greater interest in Marine Meteorology, and in its practical application to safe and economical navigation.

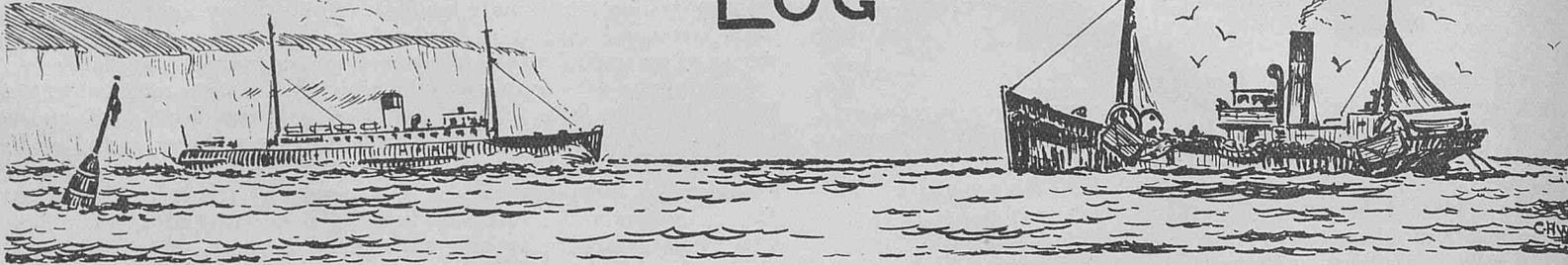
THE MARINE OBSERVER will continue as in the past to encourage, advise and guide the work of our Voluntary Corps, and it is with confidence that we look forward to the future maintenance and development of this work for the mutual benefit of shipping, aviation and meteorology.

We wish all members of the Voluntary Corps both present and past a happy and successful New Year.

Marine Division,
Meteorological Office,
London.
October, 1938.

J. H.

The Marine Observers' Log



January, February and March

It is hoped that these pages will be filled each quarter with a selection of the contributions of Mariners in manuscript, or remarks from the Logs and Records of regular Marine Observers.

Responsibility for statements rests with the Contributor.

CURRENT.

Gulf of Aden.

THE following is an extract from the Meteorological Record of S.S. *Clan Macindoe*. Captain H. ANDREWS. Suez to Aden and Bombay. Observer, Mr. E. H. PYETT, 3rd Officer.

2nd February, 1938. Experienced a strong easterly set reaching a velocity of two to three knots across the Gulf of Suez between Zafarana Light and Jubal Island. With the ship steaming at 13 knots it was found necessary to steer as much as 7° to the westward in order to counteract the effects of the current.

Wind S.W., force 2 to 3. Barometer 1019 mb.

WESTERLY SET.

Manipa Strait.

THE following is an extract from the Meteorological Record of M.S. *Levernbank*. Captain H. A. JONES. Rabaul to Colombo. Observer, Mr. A. E. NEWTON, 3rd Officer.

16th March, 1938. A southerly course was set from a position in the Manipa Strait to pass 6½ miles off Tanjong Bartutui, the south-eastern point of Ambelau Island. A good course was maintained until almost abeam of Tanjong Saroma (Buru Island) at 9.20 p.m., after which cross bearings indicated that the vessel was setting to the westward. Tanjong Bartutui was brought abeam only 2½ miles off at 10.45 p.m. from which a westerly set of about 2 knots was apparent. Weather at the time: Wind S.W., force 2 to 3, sea smooth, no swell; a strong southerly rain squall lasting about 20 minutes was experienced during the above period. No tide rips were observed at the time. Moonlight permitted reliable bearings, full moon occurring on 14th March.

RIPS.

Bay of Bengal.

THE following is an extract from the Meteorological Record of S.S. *Tinhow*. Captain D. I. C. ROBERTSON. Durban to Hong Kong. Observer, Mr. J. K. MALLORY, 2nd Officer.

4th February, 1938, at 14.40 A.T.S. (0800 G.M.T.). Very marked rips were observed in a belt a quarter of a mile wide, extending in a west

and east direction as far as the eye could see, with calm water elsewhere. The rips were breaking fiercely, the waves being about 3 feet high and 4 feet long in the centre of the patch. They came from a N.'ly direction. Weather at the time of observation, calm. Barometer 29.71 in. (corrected). Air and sea temperatures 86°F.; Low S.W.'ly, swell, partly cloudy. The current experienced between noon and evening stellar observations was 090°, 4 miles, in 6 hours.

Position of Ship: Latitude 5° 10' N., Longitude 93° 20' E.

ISOLATED SWELLS.

South Indian Ocean.

THE following is an extract from the Meteorological Record of S.S. *Port Auckland*. Captain C. A. ROBINSON. London to Melbourne via Cape of Good Hope. Observer, Mr. T. A. SUTTON, 4th Officer.

3rd February, 1938, at 0040 G.M.T. Three isolated and very heavy swells overtook the ship from the west, the actual swell at the time being confused, moderate N.N.W.'ly. At 0115 a westerly swell was seen to be developing and although moderate at first it slowly increased to amount 8 by Douglas scale.

Weather at time: Wind S.S.W., force 3; Overcast and rain.

Position of Ship: Latitude 45° 00' S., Longitude 79° 55' E. (D.R.).

DISCOLOURED WATER.

South Pacific Ocean.

THE following is an extract from the Meteorological Record of M.S. *Clydebank*. Captain W. BROOME. Balboa to Brisbane. Observer, Mr. C. W. HAYCRAFT, 2nd Officer.

On 1st January, 1938, during the afternoon watch while on a passage from Balboa to Brisbane, the vessel passed through streaks of discoloured water. These streaks which were of a light brown shade in the centre merging to a light green at the edges, appeared to be about ten yards wide and about half a mile long.

Weather at the time of observation: Light breezes, slight sea and long low swell, temperature 83° F. Current experienced from morning stars to noon, 035°, 0.6 knots. Latitude 22° 50' S., Longitude 169° 54' W.

The vessel passed through varying amounts of this discoloration for some days, and on January 6th when the matter appeared to be thickest a sample was obtained and examined.

The discoloration was found to be due to a very small seed-like matter of a dirty yellowish colour *en masse* with a definite smell of linseed. When a quantity was squeezed between the fingers a sort of mud was obtained. Upon examination through a magnifying glass a species of marine life was seen; this resembled a spider, blue in colour, the head the size of a pin head with a body about the size of a grain of rice, with eight legs which were continually grasping at seed-like matter until it had covered itself.

Position of Ship: Latitude 25° 04' S., Longitude 172° 00' E. Sea temperature 79° F., air temperature 84° F.
Smooth sea and slight swell.

North Pacific Ocean.

THE following is an extract from the Meteorological Record of S.S. *Westmoreland*. Captain J. S. OXNARD. United Kingdom to New Zealand, via Panama. Observer, Mr. J. M. TAYLOR, 3rd Officer. 25th March, 1938. From 12.25 to 12.40 p.m. A.T.S. (1755 to 1810 G.M.T.), the vessel passed through a sharply-defined patch of discoloured water extending over several square miles. On examination, the sea which appeared to be of a dark red colour, was found to contain numerous minute particles held in suspension and an unpleasant odour was noticeable.

The discoloration appeared to be near the surface only, as the water churned up by the propeller was of normal colour. A sample of this water was bottled for analysis and after about one hour a bright red sediment was deposited on the bottom of the bottle. During the following hour this turned yellow and finally green. By the 12th April, the sediment had developed into a green moss-like weed.

Air temperature 84° F., sea temperatures, at 12.00 p.m. 73° F.; at 12.25 p.m. 76° F.; at 12.40 p.m. 78° F.; cloudless sky, sea slight, slight confused swell, density 1025. Sounding per chart 1700 fathoms.

Position of ship at noon: Latitude 6° 30' N., Longitude 80° 54' W. Course 227°, Speed 12.0 knots.

NOTE.—This discoloration appears to be caused by the plant *trichodesmium*, a blue-green alga, with a red pigment, described by Mr. Russell in a note appended to an observation made by S.S. *Largs Bay*, published in MARINE OBSERVER, Vol. X, 1933, page 7.

KELP.

South Pacific Ocean.

THE following is an extract from the Meteorological Record of M.S. *Durham*. Captain C. R. PILCHER. Wellington, New Zealand to London via Cape Horn. Observer, Mr. J. A. C. KNOTT, 3rd Officer.

22nd March, 1938, at 09.30 A.T.S. A large piece of kelp was observed to pass close to the vessel. This was considered to be an unusual sight in such a desolate part of the Southern Ocean, and accordingly worthy of remark. A number of patches of kelp were sighted later in the passage between Cape Horn and the Strait of Le Maire.

Approximate distance from nearest land, 960 miles. (Dougherty Island in Latitude 59° 40' S., Longitude 120° 00' W.)

Position of ship: Latitude 54° 04' S., Longitude 148° 03' W. (D.R.).

GIANT RAYFISH.

North Pacific Ocean.

THE following is an extract from the Meteorological Record of M.S. *Rangitiki*. Captain H. BARNETT. Plymouth to New Zealand via Panama. Observers, Lieut.-Commr. H. S. CASHMORE, R.N.R., Chief Officer, and Mr. I. B. ROSE, 4th Officer.

On 28th March, 1938, at sunset, observed a huge diamond-shaped fish leap clear of the surface about 300 yards away on starboard quarter; it landed flat in the sea sending up a large cloud of spray.

The diagonals of the diamond-shaped body were estimated as over 30 feet long, and it had a long whip-like tail. It appeared to be coloured black.

Sea smooth and weather fine.

Position of ship: Latitude 4° 22' N., Longitude 83° 14' W.

PUMICE.

Rabaul (New Britain).

THE following is an extract from the Meteorological Record of M.S. *Leverbank*. Captain H. A. JONES. Rabaul to Colombo. Observer, Mr. A. E. NEWTON, 3rd Officer.

Simpson Harbour, Rabaul, 28th February, 1938. At 6.00 a.m. a layer of pumice, about 4 inches deep, was observed drifting slowly across the harbour from the direction of the new crater formed by the earthquake of last year. The pumice, which was of a rather soft nature, followed the line of the beach but extended well out into the harbour. The layer consisted mainly of small broken particles, but the average size of the pieces was about 3 or 4 inches diameter. There was a constant hissing noise as the particles rubbed against one another due to the slight breeze. Heavy rain had fallen almost continuously the previous night and residents informed us that, invariably after heavy rains, pumice is washed away from the steep slopes of the new crater and drifts across the harbour, which has at times been completely covered. Patches of this pumice occasionally drift out of the harbour many miles to sea and might easily be mistaken by anyone not familiar with the vicinity, as a reef, or patch over a reef. The resemblance is striking, especially at a distance.

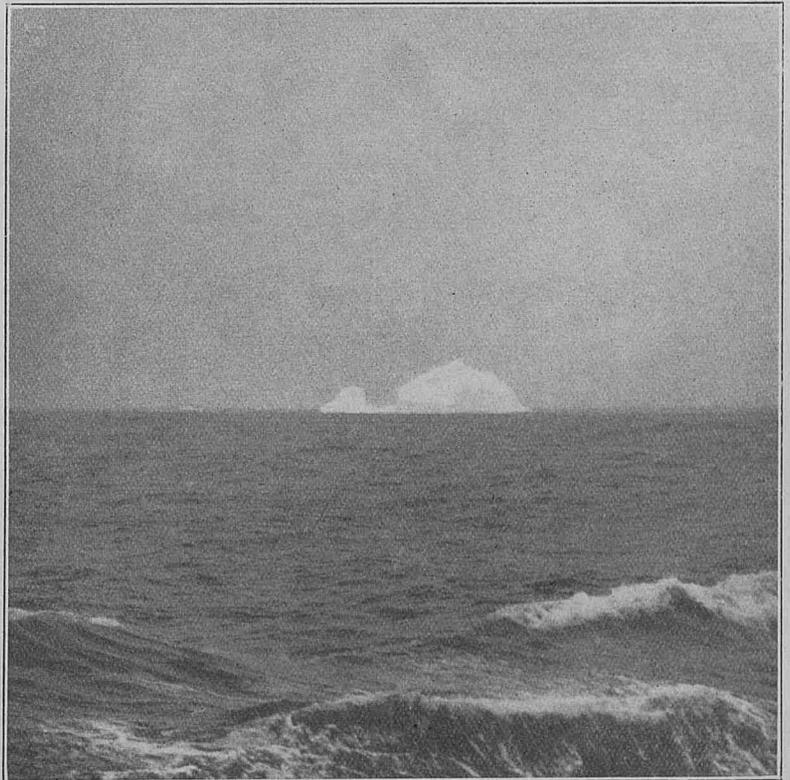
During our stay in Blanche Bay, Mount Tavurvur was observed to be steaming continually. This volcano was also in eruption last year and there are a number of hot springs at its base. Occasional rumblings and tremors are still observed in Rabaul, and caution in navigating this vicinity is necessary in view of the fact that the contour of the bottom might be considerably altered during these tremors without any visual warning or indication.

NOTE.—In Volume XV of THE MARINE OBSERVER, page 45, an account of the state of Rabaul Harbour, as seen by T.S.S. *Tanda* on June 15th, 1937, was published.

ICEBERGS.

Southern Ocean.

THE accompanying photograph has been received with the Meteorological Record of M.S. *Durham*. Captain C. R. PILCHER. Wellington, New Zealand to London, via Cape Horn.

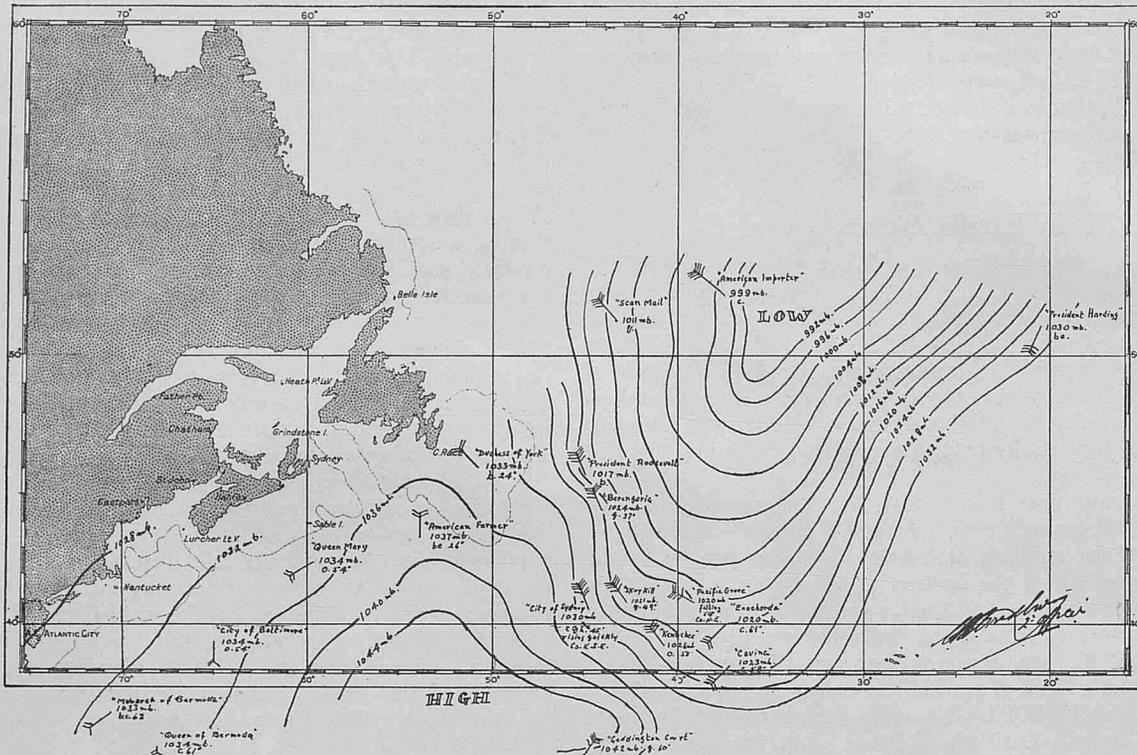


The photograph was taken by Mr. G. O. BALDWIN, Supernumerary Second Officer, on 24th March, 1938, in Latitude 55° 40' S., Longitude 127° 18' W.

WEATHER FORECASTING AT SEA.

North Atlantic.

S.S. *City of Sydney*. Captain E. MYLES. Observing Officer, Mr. C. E. P. BRADBURY, 2nd Officer.



S.S. *City of Sydney*, 12.00 G.M.T., 6th February, 1938.

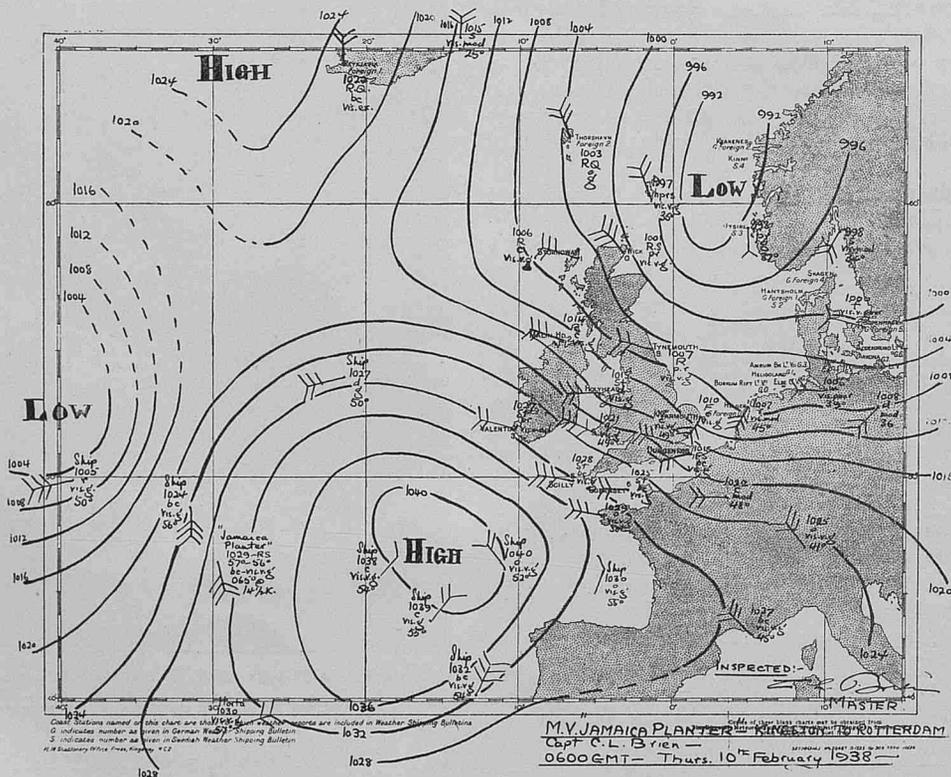
GENERAL INFERENCE.—A depression centred Lat. 53° N., Long. 35° W., extends S.S.W., to Lat. 40° N., and is moving rapidly E.N.E. An anticyclone centred in Lat. 37° N. Long. 51° W. is moving eastward.

FORECAST.—Fresh N.N.W. gale, moderating and backing to W.N.W., rough sea, heavy swell, cloudy and clear.

WEATHER EXPERIENCED.—Fresh N.N.W. gale veered to N. by E., and moderated rough to moderate sea, heavy swell, cloudy and clear.

Eastern North Atlantic.

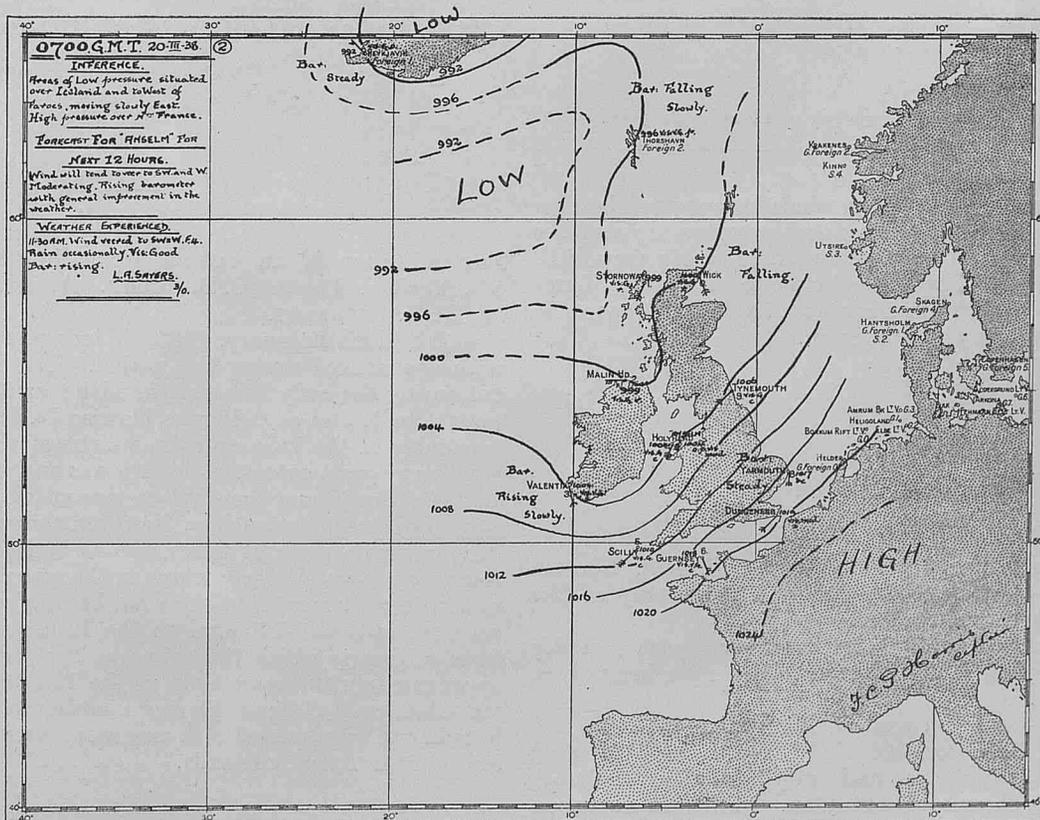
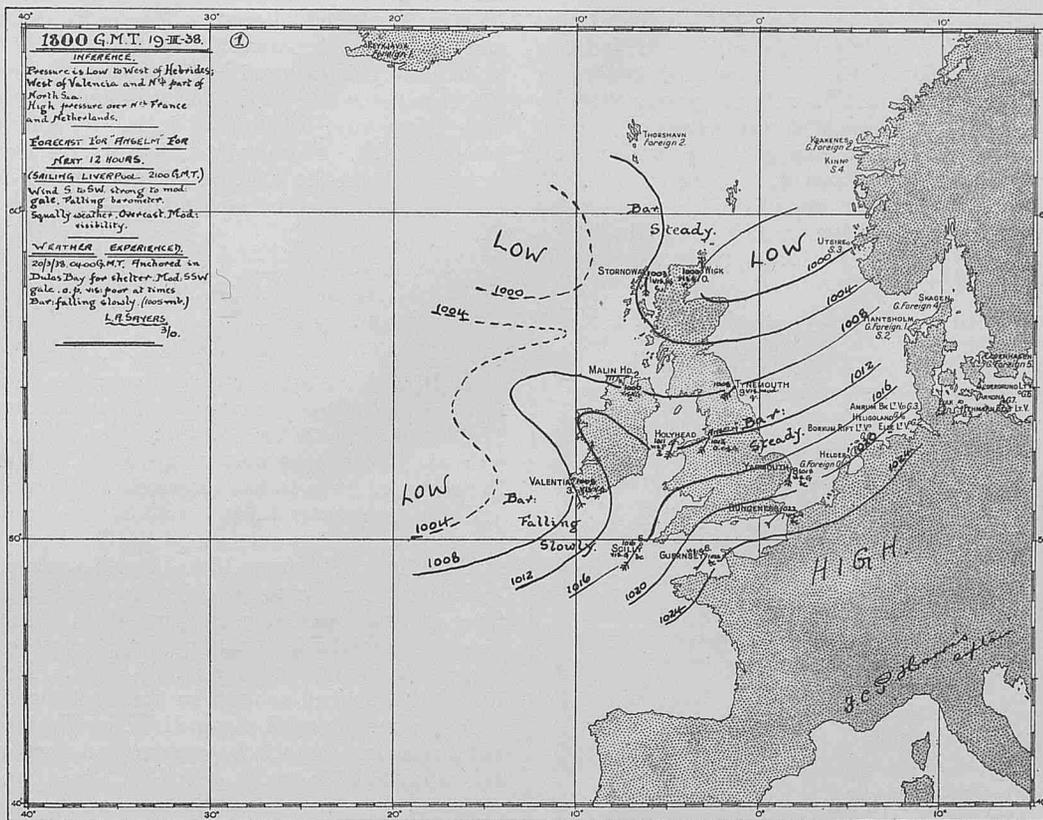
M.S. *Jamaica Planter*. Captain C. L. BRIAN. Observing Officer, Mr. E. ALLEN, Chief Officer.



M.V. JAMAICA PLANTER - KINGSTON - ROTTERDAM
 Capt C. L. Brian -
 0600 GMT - Thurs. 10th February 1938

Eastern North Atlantic.

S.S. *Anselm*. Captain F. C. P. HARRIS. Observing Officer, Lieut. L. A. SAYERS, R.N.R., 3rd Officer.



CYCLONIC DISTURBANCE.

Mauritius.

S.S. *Tinhow*. Captain D. I. C. ROBERTSON. Observing Officer Mr. J. K. MALLORY, 2nd Officer.

Whilst in Port Louis harbour on 25th January, 1938, a report was received of a disturbance north of Rodriguez Island which had the characteristics of a developing cyclone. On the morning after leaving Port Louis, 26th January, when we should have been approaching the disturbed area, the only indication we had of it was a heavy E. by S. swell, but that may have been caused by strong trades further east, the wind at the time being S.E. by S. force 4. At 10 a.m. A.T.S. (0600 G.M.T.) sufficient coded weather reports were received to draw up a weather map of the situation, which showed that a depression existed, with its centre in Latitude 17° S., Longitude 61° 30' E. and moving slowly W.S.W.



The gradient being very slight, no strong winds were expected unless the depression suddenly deepened. As the accompanying weather chart shows, the wind remained light and veered quickly from S.E. to N.W., proving that we must have passed close to the centre. Later reports from Mauritius on 27th January at 0700 G.M.T. gave the position as north of Mauritius and still weak.

STORM.

South Pacific Ocean.

THE following remarks have been received from S.S. *Karetu*. Captain R. L. DAVIES. Hobart to Bluff, N.Z., through the courtesy of The Commonwealth Meteorologist, Melbourne.

The following is a report on an exceptionally severe storm that was experienced by this vessel on 5th February, 1938, during her voyage from Hobart to Bluff, N.Z.

We left Hobart at 7.30 a.m. on the 4th February, 1938, with the barometer standing at 29.50 in. and the wind S. force 3 to 4. Cleared Tasman Island at 11.30 a.m., the sea and swell both being moderate and the sky overcast, with barometer at 29.46 in. During the afternoon

both wind and sea steadily increased, and at 4 p.m. the wind was S. force 6, barometer 29.38 in., with a rough sea and confused swell, misty rain having set in. At 8 p.m. the wind had decreased to force 5, and the barometer fallen to 29.31 in., there being a considerable swell from the N.E. Lightning was observed without thunder. At 10 p.m. the wind altered suddenly to the northward, force 2 to 3, and the barometer was 29.26 in.

At midn'ght the wind had increased to force 4 from the N.N.E., and the barometer had fallen to 29.14 in. The sky was heavily overcast with misty rain varying in intensity, and there was a heavy swell from the N.E. From midnight to 9 a.m. the wind gradually increased to force 8 from the N.E. and the barometer fell rapidly—the following being the readings for each hour:—

| | | | | | |
|-----------|-----|-----------|------------|-----|-----------|
| 1.00 a.m. | ... | 29.05 in. | 6.00 a.m. | ... | 28.85 in. |
| 2.00 a.m. | ... | 28.98 " | 7.00 a.m. | ... | 28.80 " |
| 3.00 a.m. | ... | 28.94 " | 8.00 a.m. | ... | 28.73 " |
| 4.00 a.m. | ... | 28.91 " | 9.00 a.m. | ... | 28.60 " |
| 5.00 a.m. | ... | 28.88 " | 10.00 a.m. | ... | 28.50 " |

At 10.00 a.m. the wind had veered to N.E. by N. and increased to force 9 with fierce driving rain squalls between bright patches. By 11.00 a.m., barometer 28.41 in., the wind had backed to northward and was blowing a whole gale. At 11.25 a.m. speed was reduced and the ship was hove-to heading north. The wind had backed to the N.W. and the barometer fallen to 28.39 in.—the lowest reading recorded. At noon the barometer stood at 28.41 in., the wind being between N.W. and W.N.W. force 10 to 11 with a very high sea and swell running.

During the afternoon the wind reached its greatest velocity, hurricane force at times, and blowing from W.N.W. to W. by N. The barometer rose steadily, the following readings being recorded: 1 p.m. 28.44 in., 2 p.m. 28.46 in., and 4 p.m. 28.59 in. The sea and swell gradually followed the wind around to the westward.

At 8 p.m. the wind was still W. by N., force 11, with a high sea and swell running, but the barometer had risen to 28.86 in. By midnight the wind had backed to W.S.W., force 10, and the barometer was 29.02 in.

From midnight to 4 a.m., the wind gradually backed to S.W. force 9, and a definite decrease in the length and intensity of the squalls was noted; it remained overcast with misty rain at times.

The barometer at 4 a.m. was 29.11 in. and at 5.52 a.m. conditions were sufficiently improved to put the ship about on her course for Bluff and increase the speed.

At 8 a.m. the wind was S.W. force 8, barometer reading 29.27 in., with a marked improvement in the weather, although a high sea and swell were still running.

Position of ship: Latitude 44° 07' S., Longitude 152° 35' E.

MISTRAL.

Marseilles.

THE following is an extract from the Meteorological Record of S.S. *Mooltan*. Captain C. B. ROCHE. Australia to London. Observer, Mr. T. A. SERGEANT.

11th to 14th February, 1938. Winds of storm and hurricane force were experienced during this period. The barometer commenced to fall during the early hours of the 11th; at 0250 the wind was N.W. force 4 to 5, and at 0310 was blowing N.W. force 12. Owing to the proximity of the land and the weight of the wind, the sea did not rise to any great extent. The ship was anchored in a force 11 wind off Estaque Roads and for obvious reasons no note is made of sea or swell for the time at anchor; however, the sea surface was lashed into driving spray which at times rose as high as the bridge (65 ft.) and there were frequent fierce whirls in the water. During the night there was little abatement, but the wind became more squally; a slight lull occurred at about 6.00 a.m. on the 12th, when the wind dropped to force 8, during which the ship was berthed. Another slight lull at approximately the same time on the 13th enabled the ship to put to sea when once clear of Planier Lighthouse. Tremendous seas, very irregular in size, period and steepness, were carried down until well south of the Balearic Islands.

HEAVY WEATHER IN ARCTIC WATERS AND THE LOSS OF THE STEAM TRAWLER "LADY LAVINIA" WITH ALL HANDS.

THE following are notes transcribed by Mr. W. H. CARR, Merchant Navy Agent for the Humber, from the notes and remarks of Skipper J. H. ELLIS of the Steam Trawler *St. Cathan*.

On 5th March, 1938, at 0900, *St. Cathan* in Latitude 65° 00' N., Longitude 5° 22' E., the barometer read 993 mb. (corrected). The vessel was on a 45° (mag.) course with strong south-westerly wind and rain. Ship's speed 11 knots. The wind had increased to strong since 0700.

By 1200 the barometer had fallen to 983 mb. (corrected) and the wind had increased to strong gale with continuous rain and high sea.

Just before 1200 I was forced to get the ship round and face the weather, the wind by then being W.S.W. Then by 1400 the rain had stopped and the wind further increased from W.S.W., from which direction it continued steady all afternoon with barometer falling 3 millibars slowly in the 5 hours, from 1200 to 1700. The sky was covered with cumulonimbus cloud (very dark, almost black) except through an opening overhead through which we could see the clear sky nearly the whole afternoon.

As darkness came towards 1700 the wind increased still further, and from that time until 2200 reached hurricane force, with the barometer remaining steady. After 2200 the wind showed inclination to veer and became squally and the barometer started to rise. By daylight on 6th March the wind had moderated to N.W'ly gale with squalls and we were able to continue our passage.

Several ships in the vicinity reported winds of hurricane force and some were damaged. The *Lady Lavinia* disappeared but others 50 miles away had only strong gales but were able to keep their course although on reduced speed.

During the height of the storm the high crested seas were very dangerous, driving with great speed and requiring the vessel to be tended continuously with helm and engines. This state of things lasted for about 6 hours.

In 30 years' experience of Arctic fishing I have never seen such wind and sea.

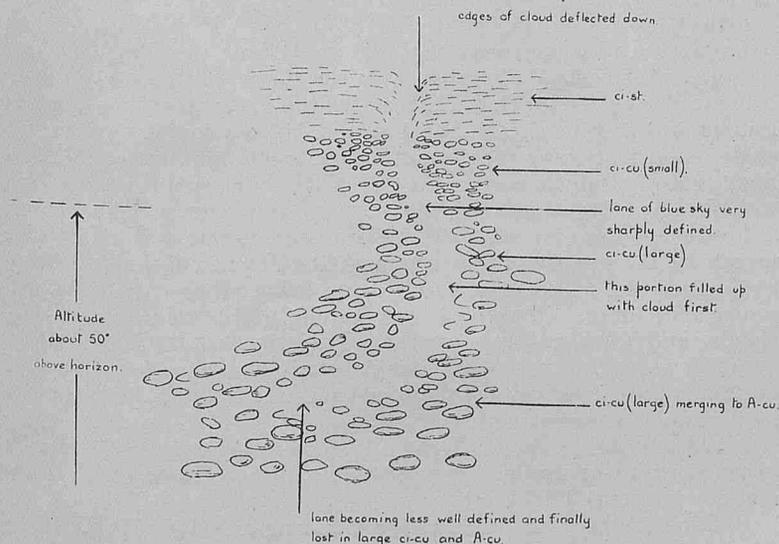
Observing vessels *Cape Barfleur* and *Arctic Ranger* were also in the vicinity. The former homeward bound was hove down and had to shift coal during the storm. The latter was about 50 miles north of *St. Cathan* and reported nothing above a whole gale.

UNUSUAL CLOUD FORMATION.

South Indian Ocean.

THE following is an extract from the Meteorological Record of S.S. *Otranto*. Captain L. V. JAMES, D.S.C. Australia to London. Observer, Lieut. J. O. H. KIRKWOOD, R.N.R., 4th Officer.

On 30th January, 1938, at 0555 G.M.T., 11.35 a.m. A.T.S., a perfectly clear lane of blue sky was observed to the S.S.E. passing through a layer of Cist. and Cicu. cloud.



The fibres of the Cist. cloud where they were pierced by this clear lane were observed to be turned downwards. The general appearance was as depicted in the diagram, and the impression given was that of the passage of a projectile through the cloud.

The actual formation of the lane was not observed, but little time probably elapsed, as the formation was striking, and was again obliterated within a few minutes by the cloud forming over it.

Barometer, corrected, 29.82 in., air temperature 83.5° F., wind N.N.W., force 2.

Position of Ship : Latitude 5° 17' S., Longitude 89° 20' E.

SOLAR HALOS.

South Pacific Ocean.

THE following is an extract from the Meteorological Record of S.S. *City of Dieppe*. Captain W. J. MERCHANT. Panama to Brisbane. Observer, Mr. E. A. CHAPMAN, 2nd Officer.

On 22nd January, 1938, at 1.05 p.m. A.T.S. (2255 G.M.T.) observed a small arc (7° to 8° approximately) of a solar halo. The angular distance of the spectrum from the sun (altitude 70° 50') measured 45° 40'.

The breadth of the spectrum subtended an angle of 1° 50'. (Note.— This angle was difficult to measure exactly, owing to diffusion.) The colours of the spectrum ranged through red, orange, yellow, light green, green and greeny-blue, red being nearest the sun.

The greatest brilliancy was attained at 1.12 p.m., when all the above colours were very distinct and presented a most unusual sight. The length of arc of spectrum and the brilliancy varied from then until 1.35 p.m. when it had completely disappeared.

An arc of a second halo 21° 40', angular distance from the sun, was also observed at the same time, but the colours of the spectrum (red and orange) were only faintly discernible. The breadth of the spectrum was approximately 1°. This halo also disappeared at the same time as the former.

The weather at the time of observation was sultry with occasional passing showers. Patches of Cirrus cloud of varying density were moving slowly across at the time of observation.

Barometer 1016.6 mb., air temperature 84° F., wind E.S.E., force 4, clouds Cumulonimbus 3/10ths, Cirrus 3/10ths.

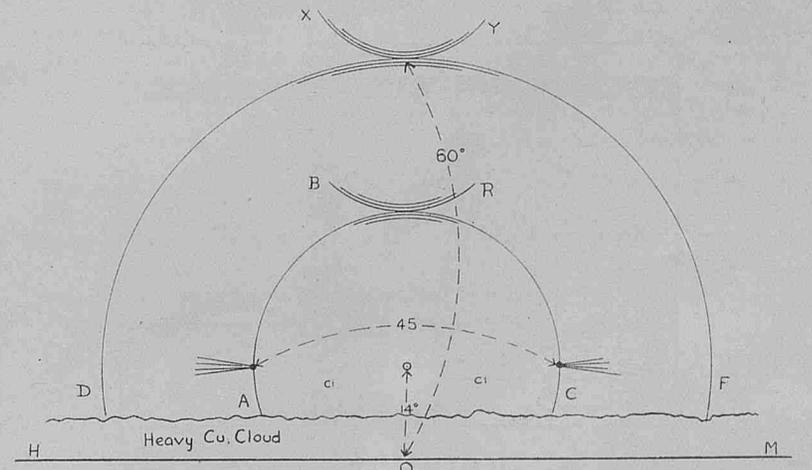
Position of Ship : Latitude 10° 18' S., Longitude 144° 04' W.

HALO PHENOMENON.

North Sea.

THE following is an extract from the Meteorological Log of S.S. *Torcello*. Captain A. HINCHCLIFF. Christiansands to Liverpool. Observer, Mr. H. GRUNNILL, 2nd Officer.

On 25th March, 1938, at 0733, when the first sight of the sun was seen, the lower Cu. clouds were moving from the W., leaving very high, fine Ci. cloud. The accompanying sketch shows the solar halos observed.



The sun was shining brightly through the fine Ci. clouds at an altitude of 14° , with an inner halo of $22\frac{1}{2}^\circ$ radius (AC) the spectrum colours only showing faintly at the part adjacent to the "reverse" halo (BR), on which the spectrum colours were distinct; then appeared the halo (DF) similar to AC, the altitude of the point of intersection with XY "reverse" halo being 60° , the spectrum colours being also distinct in XY.

Then, each side of the sun and parallel to it on the halo AC, were two brilliant points with the sun's rays radiating from them parallel to the horizon HM: forming a very peculiar, unusual and interesting sight which lasted for 14 minutes.

Position of Ship: (DR) Latitude $58^\circ 16' N.$, Longitude $3^\circ 32' E.$

NOTE.—In this observation BR is the upper arc of contact to the halo of $22\frac{1}{2}^\circ$ radius; while the brilliant spots on this halo, at the same altitude as the sun, are mock suns. The extensions or tails of these are portions of the mock sun ring, which, if completely visible, would pass through the sun and both mock suns, forming a horizontal ring round the sky. Even where this ring is partly or wholly visible, the parts adjacent to the mock suns are often brighter than the rest. XY is the circumzenithal arc which is observed either in contact with, or nearly in contact with, the halo of 46° radius, DF. The 46° halo and the circumzenithal arc are most likely to be seen when the Ci. cloud is uniform and very thin, showing some blue sky through a milky haze.

WATERSPOUTS.

North Atlantic Ocean.

THE following is an extract from the Meteorological Record of S.S. *Westmoreland*. Captain E. R. KEMP. Australia to London via Cape of Good Hope. Observer, Mr. J. M. TAYLOR, 3rd Officer.

15th January, 1938, 8.03 a.m. A.T.S. A waterspout was observed bearing 124° , distance 7 miles approximately, having formed at the base of Cumb. cloud, and about one mile in advance of a heavy rain squall approaching from the eastward.

It first appeared as a dark, sharply-defined column (Figure 1) which rapidly increased in diameter (Figure 2).

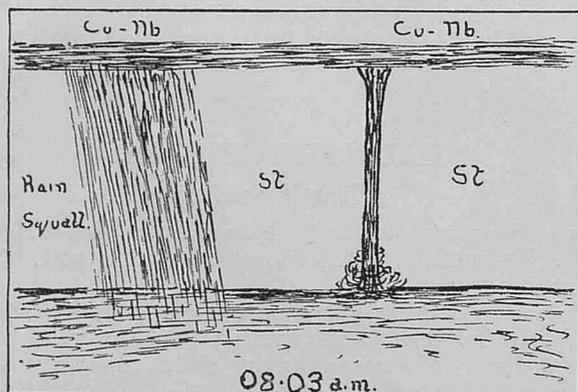


Figure 1.

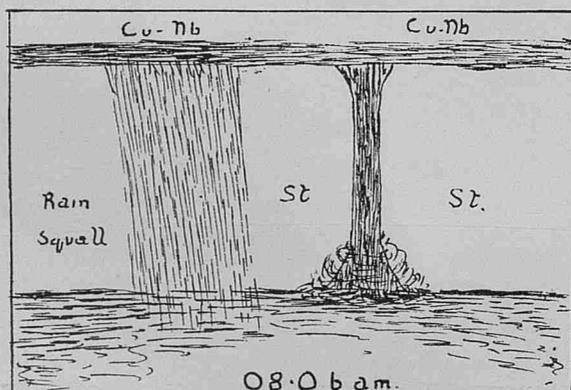


Figure 2.

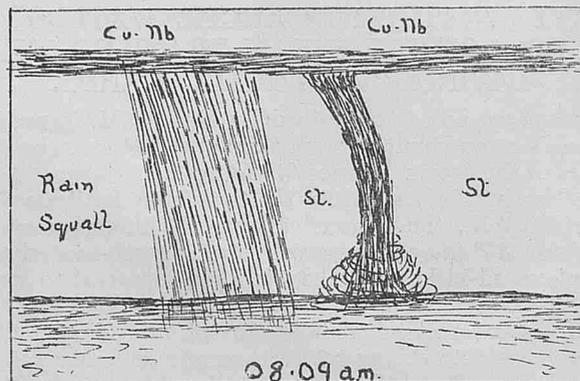


Figure 3.

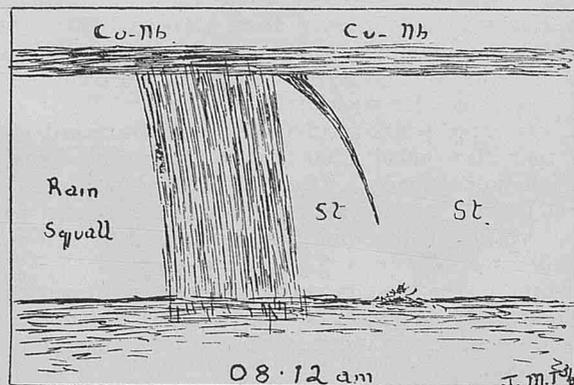


Figure 4.

At 8.09 a.m. the top curved slightly (Figure 3) and the whole column gradually diminished until 8.12 a.m. when it appeared to break near the base and disappear into the clouds (Figure 4).

Height of column estimated at 600 feet. Approximate distance 7 miles, observed angle $0^\circ 46'$.

Barometer 1010.5 mb., steady. Temperature: air $79^\circ F.$, sea $84^\circ F.$, wind S.S.W. force 4.

At 8.15 a.m. vessel experienced a very heavy rain squall lasting 15 minutes, following which the wind veered to N.N.E. force 2.

Position of ship: Latitude $3^\circ 00' N.$, Longitude $10^\circ 54' W.$

South Pacific Ocean.

THE following is an extract from the Meteorological Record of M.S. *Leverbank*. Captain H. A. JONES. Rabaul to Colombo. Observer, Mr. J. W. ROBINSON, 2nd Officer.

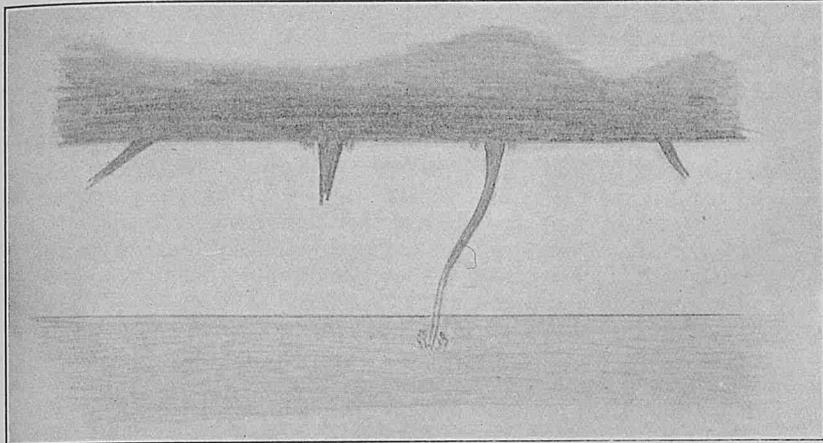
14th February, 1938, 0200 G.M.T., 12.00 A.T.S. A waterspout was observed to commence about 200 yards from the ship. The first sign was a "steamy" disturbance on the surface of the sea, no spout being visible until 0201 G.M.T., when the top of the spout was observed leading down from clouds, the top and bottom rapidly united, the angle of inclination at full formation being 30° (approximately), in a more or less parabolic curve. At 0204 G.M.T. the spout was observed to kink about two-thirds of the way up and form a double curve, although so near, no whirling motion was visible. A remarkable feature of the spout was the very marked difference in colour between the centre and edges, the outer edges being an opaque white, and centre dark grey. The spout was leading down from heavy Cumb. clouds, and moving slowly southwards, estimated height, 200 feet. At 0206 G.M.T. a very heavy rain squall was experienced lasting for 20 minutes, during which the wind backed to N. by E., force 4, which blotted out the waterspout.

Weather at 0200 G.M.T.: Wind E'ly. force 1, sea smooth, sky heavily overcast with Cumb. rolls. Temperature: air $85^\circ F.$, sea $85^\circ F.$, barometer (corrected) 1007.2 mb.

Position of Ship: Latitude $11^\circ 18' S.$, Longitude $156^\circ 51' E.$

North Indian Ocean.

THE following is an extract from the Meteorological Record of S.S. *Diplomat*. Captain J. J. EGERTON. Calcutta to London. Observer, Mr. R. SUTCLIFFE, 3rd Officer.



11th March, 1938. At 0505 G.M.T., from the base of a large dark mass of nimbostratus cloud, a point was observed to form and two minutes later a second point formed to the eastward of the first one.

At 0514 G.M.T. a disturbance on the sea surface occurred below and between these two points of cloud, and a slight waving motion was seen in the first point and it descended to form a complete spout, the point of contact being in the disturbed area. The spout lasted only about four minutes before breaking and the first point quickly disappeared. The second point was still in evidence at 0535 G.M.T., though had not made contact with the sea, and two smaller points appeared, one on each side of the others. At 0540 G.M.T. the whole phenomenon was obscured by a heavy shower.

When first observed the spout was bearing south from the ship and distant about seven miles.

At the time of observation no other clouds were visible; air temperature 86° F., sea 85° F. Barometer 29.79 in., rising slowly, wind W.S.W. force 2.

Position of Ship: Latitude 7° 07' N., Longitude 77° 47' E.

METEORS.**East Coast, South America.**

THE following is an extract from the Meteorological Record of M.S. *Highland Brigade*. Captain R. G. CLAYTON, D.S.C., R.D., R.N.R. London to Brazil. Observer, Mr. F. J. SWALLOW, 2nd Officer.

2nd January, 1938, 0610 G.M.T. Observed large meteor, magnitude greatly exceeding that of Venus, which commenced about 20° west of Arcturus, passed between Alphecca and Arcturus, and culminated in the vicinity of α and β Libræ. During the latter part of its passage, it changed from bright yellow to green, leaving a well-defined "streak" behind it.

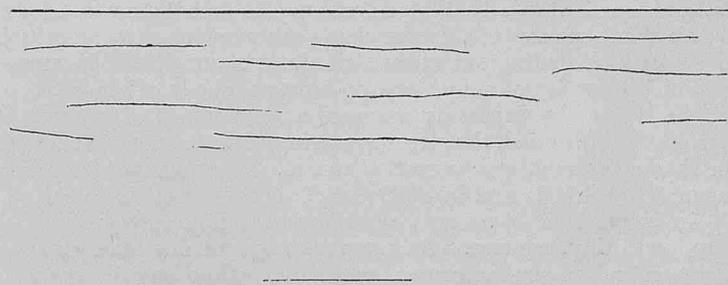
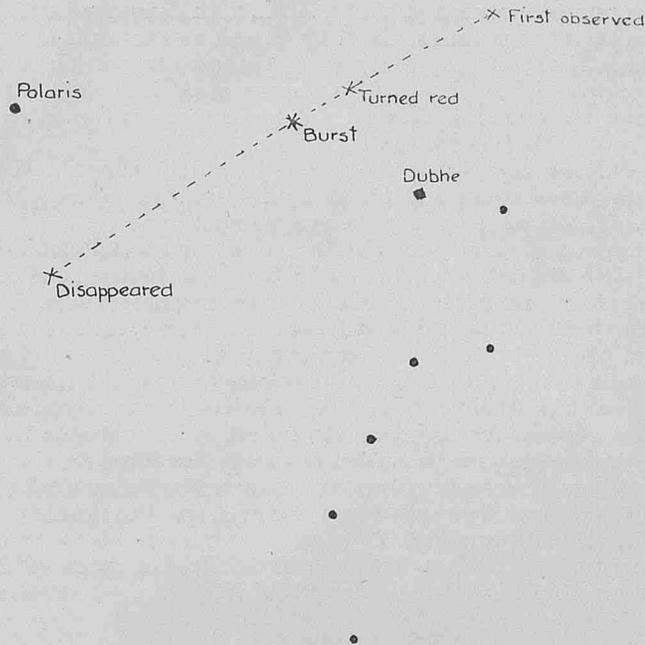
Position of Ship: Latitude 18° 19' S., Longitude 38° 35' W.

Red Sea.

THE following is an extract from the Meteorological Record of S.S. *Clan Macnair*. Captain R. J. W. BENNET. Suez to Colombo. Observer, Mr. R. W. CRAWFORD, 3rd Officer.

18th February, 1938, 1745 G.M.T. While looking at the constellation of Ursa Major a meteor was observed about 8° above Dubhe, travelling in the direction of Polaris. It suddenly became a reddish colour and almost immediately after burst into a brilliant greenish flare, lighting up the whole sky, finally disappearing about 8° below Polaris. The duration of flight was four seconds; it left a whitish trail in the sky which lasted for two minutes.

Position of Ship: Latitude 23° 03' N., Longitude 37° 03' E.

**AURORA.****25th to 26th January, 1938.****S.S. "Beaverburn."**

HALIFAX (N.S.) to London, Captain A. S. PHILLIPS, Observing Officer, Sub-Lieutenant R. J. HYLAND, R.N.R.

25th January, 1938, 2230 G.M.T. Observed brilliant Northern Lights completely lighting up the sky. The altitude of the apex was 62°, bearing 160° (True). The lights consisted of white, yellow and crimson, the latter predominating. Waves of light appeared to be travelling from the horizon to the apex. No crimson patches appeared to the northward of the ship. It was interesting to note that wireless receiving sets appeared to be affected by this phenomenon, and it was impossible to hear European and North American stations. The only stations heard were Spanish-speaking ones, presumably South American. Cloud Ci. 1/10th.

Position of Ship: Latitude 48° 34' N., Longitude 38° 08' W.

26th January, 1938, 0200 G.M.T. Lights gradually began to disappear. The crimson light was the first to fade, and finally the yellow and white lights northward of the ship. There was no appreciable change in the weather during this phenomenon.

Position of Ship: Latitude 48° 46' N., Longitude 36° 57' W.

S.S. "Ausonia."

Halifax (N.S.) to Liverpool. Captain W. C. BATTLE, D.S.C., R.D., R.N.R. Observing Officer, Mr. J. D. ARMSTRONG, 2nd Officer.

The aurora commenced at 2045 G.M.T., 25th January, 1938, from a point on the horizon bearing N.E. by E. and rose towards the zenith, at the same time rising from the west and eventually meeting overhead.

The auroral display began with streaks of diffused light, white in colour; as the radiance ascended, the lower portions turned red, and gradually the whole assumed this colour.

This diffused light gradually turned into well-defined rays which spread downwards towards the northern horizon and formed a brilliant curtain. At this stage red was the predominant colour.

There was a gradual formation of corona, and a well-defined arch formed, with its highest point about 10° above the horizon, and extend over an arc of three points on each side of the magnetic north.

During the formation and persistence of the corona, the red and green rays and ribbons continued to play overhead.

Throughout the period the display was of great brilliancy and activity; at 2245 G.M.T. the sky became dark but shortly afterwards there were irregular recurrences of the aurora, which continued throughout the dark hours, but in much less spectacular form.

The wireless office reported almost complete blanketing of all signals, which would have normally been received in this locality. Sky cloudless, visibility excellent.

Position of Ship: From Latitude 45° 36' N., Longitude 49° 34' W. to Latitude 45° 54' N., Longitude 48° 39' W.

S.S. "Avila Star."

London to River Plate. Captain R. J. THOMAS. Observing Officer, Mr. S. MANSON, 3rd Officer.

Aurora observed while proceeding up the River Tagus.

The phenomenon was first observed at 1835 G.M.T., 25th January, 1938, about one hour after the sun had set. During the time it was visible, no clouds were present in the sky. The aurora appeared from N.E. through N. to a N.W'ly. direction. At first the northern sky was a pale shade of orange, a deeper shade at its lowest altitude, which was over the land, fading out at an altitude of about 45°. The streamers, of which there were many, took on a deeper shade of orange.

The whole sky gradually assumed a deep shade of orange, finally turning to a deep red, the streamers being of the same colour but deeper in shade, resembling a very fine sunset. It commenced to fade out about 1930 G.M.T. and by 2030 G.M.T. nothing was visible at all.

An increase of 4° easterly deviation was noticed while in Cascaes Bay on S.E'ly. courses. On previous voyages deviation in the same position and on similar course, was 2° W., while on this voyage, with a bearing taken during the phenomenon, it was found to be 2° E. In both cases the deviation was obtained by bearings of stars.

S.S. "British General."

London to Aruba. Captain J. A. GILCHRIST. Observing Officers, Mr. R. C. FLAMSTEAD, Chief Officer, and Mr. P. E. F. NORTON, 3rd Officer.

25th January, 1938, 2200 G.M.T. (18.50 A.T.S.). Sky overcast to westward, low lying Cu. around the horizon to the eastward, later

becoming overcast with Cunb. At 18.10 A.T.S., a white glow appeared on the horizon bearing 5°, after which a faint red tinge appeared, gradually becoming a brilliant red glow in the form of a bow (reaching an altitude of 22°, base 28°), similar to the deep red glow given off by neon lights. The reflection of this was noticeable on the white paint work round the bridge.

18.15 A.T.S., two shafts of lighter red radiated from a point bearing 10° (approximately) toward the zenith, disappearing after 30 seconds. 18.28 A.T.S., the red glow began to fade, finally disappearing at 18.50 A.T.S., bearing roughly 90°. This was accompanied with occasional lightning.

At 20.35 A.T.S., sky was 6/10ths. Cunb., when again a light patch was observed followed by a red glow covering a base of at least 90° and reaching to the zenith. It was noticed in this case that the red was far brighter round the edges of the Cunb. clouds. As in the former display, shafts of brighter light radiated (about 10 to 20) from a point bearing 350° (approximately), the glow disappearing to the eastward as the clouds moved across at 21.10 A.T.S.

The only noticeable effect was that on all short wave bands (18 metres, 24 metres, 27 metres, 36 metres) reception from Portishead was negligible and no answer was received from any messages transmitted. Similar conditions occurred on private broadcast sets.

Position of Ship: Latitude 33° 38' N., Longitude 44° 30' W.

S.S. "King Robert."

Vancouver to London. Captain DALE. Observing Officers, Mr. MARK HULSE, Chief Officer, and Mr. JOHN E. BALL, 3rd Officer.

25th January, 1938, at 19.55 A.T.S. (0000 G.M.T. 26th) approximately, the sky to the north gradually assumed a paler hue which gradually deepened to a reddish glow, similar to that seen over a large city at night, through which the constellation Ursa Minor was plainly visible. Low banks of Cu. and distant St. clouds obscured the horizon.

At 20.02 a ray of white light like a searchlight beam appeared from the north point, and was followed shortly after by others, east and west of it, until there were six in all, the outer beams on each side being less bright. Two minutes later the rays gradually faded, and the sky began to lose its deep colour. The phenomenon had completely disappeared within fifteen minutes of the commencement.

Position of Ship: Latitude 24° 03' N., Longitude 58° 55' W.

S.S. "Nardana."

Durban to Dakar. Captain C. DORKIN-WHITE. Observing Officer, Mr. T. BRAIDWOOD, 3rd Officer.

25th January, 1938, 2100 G.M.T. A red glare in the sky to southward was visible during brief openings in the clouds.

0015 G.M.T., January 26th. Shortly after moonrise a bright red glare was seen in sky to southward, low down, lasted for 2 minutes before fading out. Wireless short wave reception poor.

Position of Ship: Approximately, Latitude 31° 50' S., Longitude 15° 30' E.

AURORA AND ALLIED PHENOMENA.

PREPARED IN THE MARINE DIVISION BY E. W. BARLOW, B.Sc.

Introduction.—A very remarkable display of aurora occurred on the night of 25th–26th January, 1938, and was observed over a great part of the northern hemisphere, including the British Isles, Europe, the North Atlantic Ocean and the eastern part of Canada and the United States. Many accounts of the phenomenon have been received by the Marine Division from British observing ships, most of which were in the northern hemisphere and four in the southern. Some portions of the ocean were heavily clouded, others partly clouded or clear. In some areas the spectacle was enhanced by contrast with cumulonimbus or other clouds.

In view of the widespread marine observation of this great aurora, and of the steady rate at which observations of other auroræ are received from the sea, the present article has been written to give a general account of the occurrence, appearance and cause of aurora. At the same time some of the special features of the January aurora are commented upon. The author was fortunate in being able to observe this aurora in a cloudless sky in south-east England over a period of 6½ hours.

The Occurrence of Aurora.—Solar activity, as evidenced by the proportion of the sun's surface covered by sunspots, varies from year to year. It reaches a minimum and some years later attains a maximum. The period from one minimum to the next is called a sunspot cycle, the mean duration of which, over 300 years of observation, is about 11 years. The length of the cycle varies, the extremes so far observed being 8 and 17 years. For a year or two on either side of the maximum the number and size of sunspots is considerable and similarly for a year or two on either side of the minimum sunspots are small and infrequent, or often absent. The sun is at present near its maximum phase, during which time sunspots are not infrequently visible to the unaided eye, if protected by tinted or smoked glass.

Aurora may occur on any night, irrespective of whether solar activity is at its maximum or minimum. It is, however, more frequent in years when the spotted area of the sun is large and in general there is a fairly close relationship with the solar cycle. Great displays, such as that of January 25th, 1938, observed in latitudes where auroræ are not most frequently seen, usually occur at or not far from the time

of maximum solar activity. Magnetic storms, with which auroræ are closely associated, as will be seen later, are also more frequent when solar activity is high. Dr. C. L. PRINCE observed at Crowborough, Sussex, over the period 1871 to 1897 and saw auroræ on 18 nights. Only ten of these occasions were within 5-year periods centred on the dates of maximum solar activity, while 2 were at times of minimum activity.

It is not easy to determine the frequency of aurora with accuracy, since the phenomenon cannot be observed in daylight or twilight, or when the sky is heavily clouded. Also bright moonlight will obscure the weaker displays. Auroræ are most frequently seen in the neighbourhood of the magnetic poles. The north magnetic pole is situated in Latitude $70^{\circ} 40' N.$, Longitude $96^{\circ} 30' W.$, and the south magnetic pole, according to Shackleton's observations in 1908, is in Latitude $72^{\circ} 25' S.$, Longitude $154^{\circ} E.$ Along an oval line surrounding the north magnetic pole, at a mean distance of about 23° , the number of auroræ is a maximum, probably about one on every night. With increasing distance from this zone auroræ are less frequent and it has been estimated that the number visible, for example, at Gibraltar is only one in 10 years. The frequency for London is between 5 and 10 per year, mostly inconspicuous. The lines of diminishing frequency of auroræ are not parallel with the circles of geographical latitude in the region containing Western Europe, the North Atlantic Ocean and North America, but incline in general from S.W. to N.E. Thus, while auroræ are very rare in Southern Europe they may often be seen in the central part of the United States. Similarly, an observation at relatively low latitudes in the western North Atlantic is more common than in the eastern part of the ocean. Also the frequency of auroræ in the British Isles increases rapidly from the South of England to the Shetland Isles, while the number observed are much greater still in the north of Norway and region of Iceland.

In any one year auroræ tend to be more frequent about the time of the spring and autumn equinoxes, in latitudes such as these of the British Isles. Also they usually begin there in the late evening before midnight. In the north of Norway and Greenland they appear to be most frequent in midwinter.

The duration of an aurora is very variable. It may be only a few minutes or it may last for 6 or 7 hours in relatively low latitudes, as on 25th January. Further north, aurora often persists all night.

When a conspicuous aurora borealis is observed it will often be found that aurora australis has been seen at the same time in the southern hemisphere. In general, opportunities for observation of aurora australis are less than for those of aurora borealis. The simultaneous occurrence of both, in moderately high latitudes, is probably the rule rather than the exception. On occasions of great magnetic disturbance aurora may be visible in all latitudes, north and south, except for a zone of about 20° wide on either side of the Equator.

The Forms of Aurora.—Aurora is one of the most complex of natural phenomena and the varieties of form which it may assume are infinite in number. We must distinguish between the form of individual manifestations of auroral light, rays, arcs, etc., and the combination of those which constitute the whole auroral display at a given moment. Auroral form is thus exactly analogous to cloud form; we may consider the form of a detached cloud or part of a cloud sheet and we may also consider the character of the mixture of clouds which constitutes so many partly clouded skies. The individual forms of auroral light may be classified into types, just as is done with individual forms of cloud. We can carry the analogy further for, as in the case of cloud forms, so the typical forms of aurora are not sharply differentiated, but merge into one another by gradation of intermediate types.

Here the analogy ends, for in many of the more active auroral displays the change of form of auroral light, or the establishment of other forms, is much more rapid than similar changes in the clouds. Also the movement of auroral light in the sky may not infrequently be quicker than that of cloud driven by the strongest wind.

The classification adopted by the International Geodetic and Geophysical Union distinguishes twelve forms and this has now come into general use. It is given below, with the definition of each type in full, save that the references to the photographs in the published atlas are omitted. The single or double letter preceding each form is the abbreviation adopted, similar to those used for cloud forms. With the exception of flaming aurora, all the forms fall into two groups, those with ray structure and those without. This distinction is not difficult and may be illustrated by one of the most common forms,

the well-known auroral arc. The arc with ray structure is composed of a great number of short separate rays, perpendicular to the length of the arc and therefore vertical in the region of the apex of the arc. An arc without ray structure is not so composed and is called homogeneous, since the light is continuous, though not necessarily of the same intensity in all parts of the arc.

International Classification of Auroral Forms.

I.—FORMS WITHOUT RAY-STRUCTURE.

HA. Homogeneous Quiet Arcs.—May appear near the horizon; between the arc and the horizon a dark segment is often seen. They may be narrow or broad. They are very often diffuse along the upper border but sharp along the lower one.

They may be single or double. When the arc is double, the upper arc may turn round at the eastern end and continue as the lower arc (in the northern hemisphere). The lower border may be regular like a rainbow, or irregular (in the latter case it is often strongly luminous and is transformed soon afterwards into rays). The arc may also extend across the heavens from horizon to horizon. The two borders are in this case generally similar, very often with more faint arcs parallel to and beside the main arc. Several parallel arcs may appear at the same time.

Sometimes the arc is diffuse, with an irregular distribution of brightness. Parallel arcs may merge together and form a large arc or zone across the heavens. The arc may also be divided into several narrow arcs, or be split up into irregular fibres in the direction of the arc. Often only remnants of arcs may appear, from the horizon to a certain height, or as isolated parts.

HB. Homogeneous Bands.—These forms have not the regular shape of the arcs and they are also more rapidly moving phenomena. The lower border is often irregular and sharp. Sometimes the band consists of a segment of semi-circular or ellipsoidal shape, more luminous where it is seen tangentially, and moving independently across the sky in the usual direction of the arcs. The band may also show one or more folds. The breadth may vary from a very narrow band to a band which is so large that it resembles a curtain hanging down. Those bands very often turn into bands with ray structure (RB).

PA. Pulsating Arcs.—Parts of an arc may flash up and disappear rhythmically with a period of several seconds. This form often stands quite isolated in the sky without other auroræ. The pulsation may often be rapid and intense so that the whole arcs appear and disappear one after another almost at the same place.

DS. Diffuse Luminous Surfaces.—These may appear like a diffuse veil or glow over great parts of the heavens without any distinct boundary, or as more isolated feebly luminous residual luminosity, which sometimes have a striking resemblance to clouds, often appearing after intense displays of rays and curtains. Sometimes large areas of the heavens may be coloured by a diffuse violet or red light.

PS. Pulsating Surfaces.—Diffuse patches may appear and disappear rhythmically at the same place with a period of several seconds, retaining the same irregular shape throughout. When the patches lie near the magnetic zenith the contours may be sharper. These forms often appear in connection with flaming aurora (F).

G. Feeble Glow.—Near the horizon resembling the dawn, of white or reddish colour. This form is often the upper part of an arc whose lower border is underneath the horizon.

II.—FORMS WITH RAY-STRUCTURE.

These forms are made up of short or long rays which may be arranged in different ways.

RA. Arcs with Ray-Structure.—A homogeneous arc which for a rather long time has remained quiet and unaltered may become sharp and luminous along the lower border, and then very rapidly change into an arc of rays. The rays may be short or long.

RB. Bands with Ray-Structure.—These resemble the bands mentioned under HB., but are constituted of a series of rays which may be arranged close to each other along the band, or may appear more scattered. Often a series of parallel bands appear. When a band is near the magnetic zenith it may have the form of a corona.

D. Draperies.—If the rays become very long the band appears like a curtain of drapery, whose lower border is often more luminous. Several parallel curtains may frequently appear at the same time.

Near the zenith the curtain, on account of perspective, may have a fanlike form.

R. Rays.—The rays may also be isolated, or narrow, or broad, short or long. They may appear in great bundles or like masses of rays, very often resembling curtains.

C. Corona.—When the rays approach the magnetic zenith they seem, on account of perspective, to converge to this point and we get a corona. This may be formed by long rays or by shorter ones, may be complete or incomplete; for instance, we may have only half a corona developed. A corona may also be formed by bands or by draperies near the magnetic zenith.

III.—FLAMING AURORA.

F. This is a characteristic, rapidly moving form, consisting of strong waves of light which rapidly move upwards one after another in the direction of the magnetic zenith. The waves may have the form of detached arcs which move upwards normally to the direction of the arcs, or they may be compared with invisible waves, which in their passage illuminate broad rays and patches, which appear and disappear rhythmically when the waves pass them.

This form frequently appears after strong displays of rays and curtains, and is frequently followed by the formation of a corona.

The Auroral Display.—The most common manifestation of aurora for the European, North Atlantic or United States observer, takes the form of a single or double arc, with or without rays radiating from it. The most usual colours are shades of white, greenish white, yellowish white or greenish yellow. There may be a certain amount of red coloration in rays or arcs. Sometimes the rays move laterally along the arc sufficiently quickly for the motion to be seen. Curtains and draperies are rarely seen in the lower magnetic latitudes. In the case of the more intense magnetic storms, particularly those which give auroral displays in relatively low latitudes, the display is usually more varied, both as to form, colour and movement. In some cases, as in the aurora of 25th January, as seen in the British Isles, the display is very complex, both in form, colour and rapidity of change. Such auroræ, if of considerable duration, usually show alternate periods of activity and quiescence; during the quiet periods the aurora may persist in simpler form or may disappear entirely. With an intense magnetic storm there is often an especially fine display towards the end of the storm.

It is important to distinguish movement and rapid change. The visible lateral movement of rays across the sky may occur in relatively quiet auroræ. Rapidity of change is different, being the quick alteration of outline of a form or the quick dissolution of one form and the formation of others. Of intermediate character are the flaming and pulsating forms. The movements associated with auroræ are the origin of the name "merry dancers" by which aurora is known in the Shetland Isles.

When colour is well developed it is usually either some shade of red, orange or green. The red may be such colours as pink, salmon-pink, brick red or blood red. Some of the rays or other forms may be pure white, orange-white and shades of orange or orange-red. Blue, violet and grey tints are known, but are much rarer. Rays may be bi-coloured, red and green at different altitudes. Sometimes areas of the sky are suffused with a low luminosity, showing no definite form, of a colour such as deep blood-red or violet. The aurora of 25th January was remarkable in giving, as seen in the British Isles, many different shades of colour, including blue and deep purple.

In places nearer the magnetic poles, where auroræ are much more frequent, the usual display, though it may give more light than auroræ seen in lower latitudes, has not the colour and complexity of the auroræ associated with the most intense magnetic storms. It is to be presumed, however, that when an intense storm is in progress, giving a fine aurora in relatively low magnetic latitudes, that it will be equally fine in higher magnetic latitudes.

Aurora borealis in big active displays is not confined to the northern part of the sky and similarly aurora australis is not confined to the southern part of the sky. The well-developed corona is one of the finest forms of the aurora and this radiates from the magnetic zenith which in temperate latitudes in the northern hemisphere is south of the zenith. Rays may radiate from the magnetic zenith to cover the whole or a great part of the sky. Apart from the corona, bands or patches may be seen south of the zenith or even on the southern horizon, as seen from the south of England on 25th January. This is, however, rare and only occurs when aurora is visible in unusually low latitudes. The

magnetic north pole being situated to the south of the geographical north pole, auroræ in very high geographical latitudes may be seen to the south of the observer, while near the south pole aurora may be seen to the north of the observer.

The brightness of auroræ varies considerably. It is said at times to be equal to that of the full moon, but such brilliance is not usually observed in lower latitudes. A fine display in these latitudes will, however, afford enough light to give some general illumination of objects, to throw shadows and to enable large print to be read. Also, as in the case of the aurora of 16th April, 1938, it may be bright enough to be visible in a bright moonlit sky.

The "dark segment," that part of the sky between the lower edge of the auroral arc and the horizon, is often very conspicuous. It appears darker than the rest of the normal sky and has frequently been mistaken for cloud. This is, however, purely an effect of contrast with the brilliance of the arc, the lower edge of which is usually its brightest and best defined part. There are two proofs of this statement: (i) stars may be seen in the dark segment with the unaided eye or by using binoculars; (ii) the same illusion occurs with a good photograph of the arc, but if the arc itself is covered over, the sky above or below it will be seen to be equally dark.

The Height of Aurora.—This is best determined by the taking of simultaneous photographs at each end of a measured base line, preferably of considerable length, say 10 to 20 miles or more, the observers being connected by telephone. In this way a sharply defined edge or feature is seen to be differently situated with respect to the stars behind it and the height is readily calculated. The most usual height of the bottom of the arcs and the lower end of rays is about 60 miles, though one as low as 40 miles has been found. In an upward direction aurora is found to extend to 300 miles or more. Professor STÖRMER's photographs of the aurora of 25th January, 1938, in Norway have shown that the upper parts of this aurora were exceptionally high, from 300 up to a little over 400 miles.

On some infrequent occasions the observer is so situated with regard to the aurora that the upper part of the aurora is in sunlight. The effect of sunlight appears to increase the auroral activity, so rendering it visible at greater heights in the atmosphere. It was not possible to photograph the sunlit parts of the aurora of 25th January, in Norway, owing to cloud in the early evening. Had it been possible new records for the height of the aurora, and hence for the height to which the atmosphere is known to extend, would probably have been obtained.

The Sound of Aurora.—The question whether auroræ produce any sound is still unsettled. The great height of auroræ seems to rule out the possibility of audible sound, yet some observers of repute have stated that they have heard crackling or hissing noises, difficult to describe. Others have definitely stated that no sound is heard that can be attributed to the aurora. The latest evidence of auroral sound comes from the experienced observers, Professor STÖRMER and his assistant Mr. TJÖNN, who independently, several miles from each other, heard "a curious sound which came from above, first from the south-west, then from the zenith and at last from the north-east. The sound lasted about ten minutes, rose to a maximum and fell down again, following the intensity of the aurora. I had the impression that it had something to do with the white rays. . . . The sound is difficult to describe, it was similar to the sound from burning grass and spray." Professor STÖRMER also says "On account of the great height of the aurora, it is clear that the sound could not come from the aurora itself, but from lower parts of the atmosphere, but where its origin was future observations may decide."

The Origin of Magnetic Storms.—Aurora and magnetic storms are closely related. An intense magnetic storm is always accompanied by an aurora and if a fine aurora is observed a magnetic storm will be found to be in progress. An aurora will, however, not always come far enough south (in the northern hemisphere) to be visible in relatively low latitudes, as was that of 25th January, or even in the latitude of the south of England.

The relation between magnetic storms and sunspots is exactly similar to that between auroræ and sunspots, given above. Magnetic storms are more frequent in years when sunspots are frequent and large, but may occur at any time. Furthermore, it is often found that when a large sunspot crosses the central meridian of the sun, in which position the spot is most directly facing the Earth, a more or less intense magnetic storm afterwards occurs. The greater the intensity

of the storm the greater the probability of it being so accompanied by a large sunspot. The average time between the passage of the spot over the central meridian and the beginning of the magnetic storm is about a day, so that the storm cannot be due to an increase in the emission of ultra-violet light from the region of the sunspot, as this would take only about $8\frac{1}{2}$ minutes to reach the Earth. The speed at which the disturbing effect travels to the Earth is much less than that of light, and is about 1,000 miles a second.

On the other hand an intense magnetic storm may occur when no spots or only very small ones are visible. It is thus impossible to regard a large sunspot, or even any sunspot, as the cause of the magnetic storm. This must be produced by some other form of solar disturbance which is frequently, but not necessarily, accompanied by a large spot. It should be understood that other forms of solar disturbances are not in general visible when viewing the sun in a telescope in the ordinary way, but they can be seen and photographed by the use of special methods, necessitating the cutting off of all light save that coming from one chemical element, such as hydrogen or calcium. By this means solar disturbances can be seen anywhere on the sun's disc and may also be seen in profile when they are on the sun's limb. The emissions of hydrogen, known as prominences, may exist in a more or less stable form, for a long time, sometimes for months. They may then undergo a violent eruption and be dissipated in a few hours. On such occasions jets of gaseous matter seem to be ejected so violently that the force of gravitation is overcome and the matter leaves the sun entirely. Sunspots and prominences are often associated, but are not necessarily so. It is conjectured that the very great magnetic storms are due to the violent break-up of prominences, while the smaller storms are due to more continuous emissions, either from prominences or other disturbed areas.

While the cause of auroræ and magnetic storms undoubtedly lies in the storms and explosions which occur on the sun, the actual cause can only be indicated in a general way. It is believed to be the emission of some form of electrically charged particles coming from a restricted area of the sun's surface. The ejected matter will thus form a stream travelling outwards into space in a straight line, but this line is not necessarily exactly perpendicular to the sun's surface at the point of exit, though on the average it is so. The Earth is a very small target, as viewed from the Sun, and a moving one, so that the beam may or may not encounter it. If it does, the electric charges of the particles produce electric currents in the upper layers of the atmosphere. It is believed that these currents may have an intensity of as much as one million amperes. These temporary currents give rise to a temporary magnetic field, thus producing temporary changes in the normal magnetic field of the Earth. These changes, which may be more or less intense, constitute magnetic storms. As with auroræ, magnetic storms are most intense in regions about 23° from the north magnetic pole, decreasing progressively in lower magnetic latitudes. There is also, as with auroræ, a slight decrease in intensity in the neighbourhood of the magnetic pole. A magnetic storm begins practically instantaneously at all points of the Earth's surface where it is recorded.

Like auroræ, magnetic storms are most frequent at the time of the equinoxes. This is explained by the above theory. Owing to the inclination of the sun's axis of rotation, circles of latitude on its surface would appear as curved lines during the greater part of the year, but about the time of the equinoxes they would present themselves as straight lines. Hence an emission perpendicular to the solar surface from a disturbance on the central meridian of the sun would at these times be aimed directly at the Earth.

By a combination of two movements, the rotation of the Sun and the Earth's movement in its orbit, the same meridian of the sun is again presented to the Earth after an interval of 27.2 days. Hence, if the region of disturbance is still active a magnetic storm should recur after this interval of time. Such recurrent storms have often been observed. The time interval is not necessarily exact, since sunspots and other disturbances may shift their position slightly on the sun's surface. The most intense magnetic storms are those least liable to recur. This is remarkable since such storms are frequently associated with large sunspots, and large sunspots usually persist for a time longer than one solar rotation. The explanation must be that although the spot itself is long lived, the emission which gives rise to an intense magnetic storm is violent, but short-lived. As in the case of magnetic storms, auroræ also show a tendency to recur after an interval of 27 or 28 days.

The Origin of Aurora.—On entering the Earth's atmosphere the charged particles from the sun are affected in two ways. The lines of force of the earth's magnetic field divert and guide them towards the magnetic poles, which they approach in spiral paths. Impacts with the atoms and molecules of the high atmosphere gradually diminish the speed until finally the downward movement ceases.

Under the impact of the particles, the molecules of the atmosphere may be broken up into their constituent atoms or be ionized, losing electrons. Also molecules or atoms may be excited to states of abnormal energy without ionization; this arises from an enlargement of the orbits of the electrons of an atom without an actual breakaway of electrons. In returning to their normal states this excess of energy, which has been derived from the solar particles, is transformed into light of particular wavelengths and therefore of particular colours. The details of the process are not yet known and they must be very complex, judging by the variety of form and movement which aurora shows. No simple explanation can account for the details of all the observed phenomena. This theory explains why auroræ are much more frequent near the region of the earth's magnetic poles, and also why aurora borealis and aurora australis are often visible at the same time.

A magnetic storm is usually intermittent, with periods of greater activity at times, these often beginning very suddenly. In between these times there are periods of relative quiescence. Similar fluctuations take place in the character and intensity of the accompanying aurora. In a magnetic storm showing marked changes of intensity, simultaneous changes in the aurora may be seen. A description of some of the more striking simultaneous changes in the case of the aurora of 25th January is given later.

When rays are seen they are directed along the lines of magnetic force. When rays are seen rising from an auroral arc they usually appear radial to the circumference of the arc, diverging with increasing altitude. This is the effect of perspective. If we imagine the rays produced downwards they would converge at a point below the horizon, approximately that to which the north (lower) end of the dipping needle points (in the northern hemisphere). Similarly, the rays, if long enough, converge in the neighbourhood of the magnetic zenith, which is the point on the sky to which the south (upper) end of the needle points (in the northern hemisphere). This convergence produces the corona, the radiations of rays from which, downwards in all directions, is a matter of perspective. The arc is at right angles to the magnetic meridian. It must be remembered that owing to the great height of aurora, definite features observed such as arcs or rays, may be situated over the earth's surface at points up to some hundreds of miles away from the observer. During the aurora of 25th January, 1938, Professor STÖRMER photographed in Norway a red spot which he found to be situated over a point in the Atlantic Ocean, north west of Ireland, about 900 miles away. This is one of the reasons why rays and arcs do not necessarily conform to the magnetic elements of the place of observation. It is not unusual for example to find that the apex of the arc is not exactly on the magnetic meridian of the place of observation. Sometimes also the arc appears to descend more steeply to the horizon on one side. Thus the arcs seen by the author on 25th January, 1938, descended more steeply at the west end than at the east end, and he noticed the same feature in auroræ seen in September, 1932, in the Atlantic Ocean, eastward of Belle Isle Strait.

The spectrum of aurora is that of the constituents of the upper atmosphere. The chief line shown in the well-known green auroral lines, with a wavelength of 5577 Angstrom units.* This is now known to be produced by atomic oxygen. There are other oxygen lines and lines produced by nitrogen in different physical states, also those from other atmospheric gases. The red coloration is largely produced by a red line also due to oxygen.

The Aurora of 25th January, 1938, British Isles.—This aurora was not associated with a large sunspot. It was very extensively observed over the British Isles and space will not permit of a detailed account of its appearance. Apart from the variety of forms and their frequent changes, as observed at any one place, the aurora presented different features at the same time, at places at considerable distances apart, for example in Yorkshire and Sussex. The author observed the aurora for long continuous times between 1830 G.M.T. and 0100 G.M.T. on 26th January, at Wadhurst, Sussex. Eight distinct periods

* Unit of wavelength=one ten-millionth of a millimetre.

were noted, during five of which the aurora was more or less quiescent, though it remained visible in varying degrees. In the other three periods it was particularly active. These were from 1855 to 2015, from 2142 to 2215 and from 2353 to 0030. Activity at one or more of these periods was noted in many of the observations of British observing ships, but in some cases the display was not active during one of these periods. Many of these observations were, however, only partial, being interrupted by cloud.

The aurora was accompanied by a magnetic storm which was of greater intensity than any other recorded by the Greenwich observers since 25th September, 1909. A close relation between the fluctuation of this storm and those of the aurora, as observed by the author, has been demonstrated. Only a few of the more striking correspondences can be given here. The beginning of the aurora at 1815 G.M.T. was accompanied by much agitation of the magnetic elements. The periods in which the aurora was most active agreed with those during which the storm was most intense. Between 1952 and 1958 there was a great sweep of the declination needle over a range of more than 2° and at this time two-thirds of the sky became covered with a great flame-coloured sheet, in which long orange-coloured rays could be distinguished, forming a partial corona south of the zenith. This phase of the aurora ended at 2015 when the declination rapidly became normal. The sudden reformation of the arc at 2142 coincided with a sudden increase in magnetic activity. At midnight pulsating arcs suddenly appeared when the declination needle made several swings of 1° 20' and less.

The aurora, at Wadhurst, lasted without complete disappearance for 6½ hours and may have persisted longer, as observation was then discontinued. At times bands and patches were seen right down to the southern horizon. Besides the great variety of orange, pink and red coloration seen in rays and patches, three special colorations were observed, a large blue mass, bi-coloured rays (red and green) and a deep purple light without definite form covering a considerable area of the sky. Various shades of green were seen in the arcs, which were often very complex and irregular. At times they were homogeneous and at other times rayed. The altitude of the apex of the arc varied considerably at different times.

Two features of special interest were noted in the arcs. At 1915 a number of what appeared like brush discharges flashed out one by one in succession from east to west along the upper edge of the arc. At 2035 the arc changed its character very suddenly, from a well defined greenish homogeneous arc to a yellowish-green rayed arc of very smoky or misty appearance.

Radio reception in the British Isles was seriously affected, short-wave reception being either completely absent or very weak and subject to fading. European stations near the lower end of the medium waveband were also faint. Telegraphic and telephonic communications were strongly interfered with.

The observations of British observing ships range in latitude from 52° 28' N. to 24° 03' N., the latter being in longitude 58° 55' W. A selection of these will be found in the "Marine Observers' Log" in the present number. A fine display of aurora, though not equal to that of 25th January, 1938, was seen, mainly in the western part of the United States, but extending unusually far south, on 21st-22nd January, 1938.

Other Recent Auroræ.—Accounts of other subsequent auroræ have been received in the Marine Division from British observing ships.

The aurora of 16th April is of special interest. It was not visible in the British Isles or similar longitudes, owing to daylight, but the magnetic storm accompanying it was the greatest ever recorded in the British Isles. The range of swing in declination was 5° 07' at Abinger (Greenwich observations) and 6° 25' at Eskdalemuir.

An aurora of short duration but brilliant enough to be visible in bright moonlight was seen in London and other parts of the British Isles and adjacent waters on the night of 11th-12th May. On this occasion the range of the declination needle was 1° 20'.

Including these two, 16 magnetic storms, mostly small or very small, have been recorded at Abinger since that of 25th January, up to 14th October. The following table shows the dates of all these storms together with the dates for which observations of aurora have been received in the Marine Division.

| Magnetic Storms Recorded at Abinger. (The more intense storms are starred.) | Ships' Observations of Aurora. |
|--|-----------------------------------|
| 1938 | 1938 |
| 8th February | 6th February |
| 5th-6th March | — |
| 22nd-23rd March | 22nd March. |
| 14th April | — |
| *16th April | 16th April. |
| 4th May | — |
| *11th May | 11th-12th May. |
| 29th May | — |
| 12th June | — |
| 4th July | — |
| *15th July | — |
| *3rd August | 5th-7th August. |
| *22nd-23rd August | 23rd August. |
| | 13th September. |
| | 14th .. |
| | 15th .. |
| | 23rd .. |
| *26th-27th September | 28th September |
| 30th September | — |
| *7th October | 8th October. |

The exact correspondence of several of the dates will be noted, clearly showing the connection between the particular magnetic storm and the aurora. The fact that storms occurred on dates when no aurora was reported in no way disproves the connection, the number of marine observers being limited. In the first place, the aurora, accompanying a weak storm, may be confined to high latitudes and possibly be inconspicuous even there. Also, if it is visible in lower latitudes it can only be observed from those parts of the world where it is night. In the case of aurora with no corresponding storm, it must be remembered that these storms are only those recorded in the south of England.

It will be seen that the aurora and storm dates differ by a couple of days in some cases and we cannot then assume that this particular aurora and storm are associated. Different regions of disturbance on the Sun may be near one another, with a consequent difference of only two or three days in the effects produced on the Earth. Usually, in fact, even near the time of sunspot maximum, all longitudes of the Sun are not equally liable to disturbances, which tend to occur in certain regions only. The dates of some of the storms and auroræ given in the table, agree approximately with those of subsequent returns of the region producing the disturbance which caused the aurora of 25th January.

Miscellaneous.—Some of the older observations of aurora are now largely discredited in view of our greater knowledge of aurora and its cause. Occasionally aurora was thought to be seen in the daytime. This seems impossible in view of the relative faintness of the brightest aurora. Confusion doubtless arose with cirrus and other high cloud which might by coincidence form an arc in the approximate position for aurora. Radiating forms of thin high cloud might easily be confused with aurora, if the point of radiation happened to be in the direction of the magnetic meridian.

The older text-books contained much about the relationship believed to exist between cirrus cloud and aurora. Cirrus cloud in the afternoon was believed to show as aurora of similar form after dark and vice versa. In view of the modern theory of aurora and of the fact that its lowest height is so much greater than the highest cloud this seems improbable.

Certain observers have stated that they have seen aurora near the ground, for example projected against a distant hill or mountain. This again appears to be impossible unless the phenomenon is due to some such cause as the illumination of patches of mist by a bright aurora.

We do not, however, know all about aurora yet, as the continued uncertainty as to sound accompanying aurora shows, and it is well to bear some of these older observations in mind, since some of them may possibly find explanation in the future.

The Permanent Aurora.—A photograph of the spectrum of the night sky will always show the green auroral line. Careful observation will show that the background of the starlit sky is not always equally bright, even where there is no interference from mist or haze. Sometimes also, a faint illumination of patches of the sky may be seen in situations where there is no possibility of any source of light in the sky other than aurora. These patches are sometimes referred to as "earthlight." All this points to the existence of some form of faint permanent aurora, of variable intensity.

The permanent aurora is considered to be unconnected with the solar disturbances producing auroræ and magnetic storms. Radio investigation has shown that an electrically conducting layer exists at a height of about 100 miles above the earth's surface, with other similar layers at higher altitudes. The electrical conductivity is produced by ionization of the atoms of the atmosphere by the ultra-violet light from the Sun. During the night there is a slow reversal of the process producing a faint emission of light.

Since the emission of ultra-violet light by the Sun is greatest about the period of maximum solar activity the permanent aurora should, in general, be brightest at this time.

It is believed that a system of electric currents circulates in the ionized layer, though the way in which they are produced is not known with certainty. The variation of these currents from day to night is held to account for the small but fairly regular diurnal variation of the recorded magnetic elements. At sunrise the north ends of the magnetic needle points slightly east of its mean position; at noon it is in approximately its mean position. It then gradually moves slightly to the westward until sunset. During the night it returns, passing the mean position about midnight. Measurement of the amount of diurnal variation shows that its range changes with the progress of the solar cycle, being greatest at the time of maximum activity, when ultra-violet emission is greatest.

Practical Effects of Solar Disturbances.—Omitting the meteorological effects associated with the solar cycle, which present many problems, and effects related to these such as variation in the rate of tree growth, the practical results of solar disturbances, or of the magnetic storms associated with these, are :—

- (1) The temporary deflection of ships' compass needles.
- (2) Interference with short or medium wave radio transmission.
- (3) Interference, in some cases serious, with telegraph and telephone communication and with the electrical signalling systems of railways.

A short account of these is given below.

- (1) Three elements of terrestrial magnetism are recorded and measured, the horizontal intensity, the vertical intensity and the declination. Of these the variations in declination are the same as those of the compass needle. During the more intense magnetic storms sudden variations from the normal direction of 1° or upward may be experienced and these may persist for some time, for example 10 or 20 minutes.

In the storm accompanying the aurora of 25th January, 1938, the declination needle at one time swung through a range of over 2° , as recorded by the Greenwich observers, and remained in this position for a time. In the still greater storm of 16th April, 1938, the needle swung through a range of nearly 7° , as recorded at Eskdalemuir in Southern Scotland, and over 5° as recorded by the Greenwich observers, this being, as stated above, the greatest swing ever recorded in the British Isles. In the observations of aurora made at sea, some ships definitely state that no compass deviation occurred. On the other hand S.S. *Avila Star* recorded a deviation of 4° to the eastward (25th January), and S.S. *Clan Mactavish* (12th May) one of $3\frac{1}{4}^\circ$ to the westward. When bright aurora is seen, especially if it shows much movement or rapid changes of form, the possibility of temporary deflection of the compass needle should be borne in mind.

- (2) Freak reception may occur or shortwave transmission fade to complete silence. Two accounts have been received in the Marine Division relating to radio reception in the early part of 1938. M.S. *Rangitiki* on passage from London to Auckland, 9th January to 10th February, 1938, reports that short wave reception was unaccountably bad, worse

than for several years. S.S. *Somerset* reports that on 26th to 28th March, 1938, freak radio reception was experienced on both medium and short wave lengths. Position of ship at noon, A.T.S., 26th March, Latitude $29^\circ 47' S.$, Longitude $62^\circ 27' E.$; 28th March, Latitude $29^\circ 44' S.$, Longitude $51^\circ 11' E.$

It has been established with certainty that there is a close relationship between a special kind of solar disturbance and radio fading. What are called "bright eruptions" occur suddenly on the sun, with violent outbursts of matter in gaseous form. Their cause is not yet understood. These can be photographed in the light of either calcium or hydrogen. These eruptions, unlike the red "prominences" of hydrogen, are nearly always associated with sunspots and, beginning suddenly, rise to their maximum intensity in from 5 to 10 minutes, dying gradually away and usually ending within 40 to 45 minutes of their commencement. On the average, a radio fading begins about 7 minutes after a bright eruption is seen to commence. Only the more intense eruptions, however, are followed by fading. The highest frequency signals appear, in general, to be less affected and for a shorter time. Excessive weakness or fading may last from 10 to 45 minutes, followed by a period of gradual recovery, which may extend over an hour or more. Fading due to this cause is only observed on waves which traverse a daylight path. Sometimes the shorter wavelengths of the medium band are also affected.

The time interval of 7 minutes is much shorter than that between the passage of a sunspot over the sun's central meridian and the magnetic storm produced. In fact, the speed of the disturbance is much more closely related to the speed of light. Furthermore, it produces the effect whether it is on the sun's central meridian or not. It cannot, therefore, be due to the same cause as magnetic storms and it is possible that it results from a considerable increase in the emission of ultra-violet light from the sun, whereby the Heaviside Layer is considerably disturbed and no longer presents a regular reflecting surface.

In the observations of auroræ made at sea, there are four references to radio interference during the aurora of 25th January (S.S. *Ausonia*, *Beaverburn*, *British General* and *Nardana*). Similar remarks were made by M.S. *Lobos* (11th May) and S.S. *Beaverford* (5th August). We thus have proof that radio interference may also occur during the progress of intense magnetic storms and auroræ.

- (3) The variations of the magnetic field of the earth which constitute magnetic storms induce variations in the currents used for electrical communications and railway signalling, which may thus be affected or even completely disorganized for a time. Electrical signalling systems have to be so designed that when such interference occurs the signals indicate danger.

Historical.—Aurora was known in very early times. Accounts exist written by the Greeks, Romans, Chinese, Hindus and other nations of antiquity. According to BIOT, the first recognizable description of an aurora in Chinese records was one written in B.C. 208. Amongst the classical authors, ARISTOTLE, CICERO, PLINY and SENECA wrote of the aurora and even distinguished certain of the features by different names. There seems, however, to have been confusion at times between faint auroræ and comets, which lasted into the Middle Ages.

GREGORY of TOURS (540–594) was the first to describe the auroral corona. The name "aurora borealis" originated with GASSENDI, in 1621. The first certain observations of aurora australis were made by ANTONIO DE ULLOA on his voyage round Cape Horn in 1745.

HALLEY was the first to conjecture that auroræ were associated with terrestrial magnetism. The present theory of the origin of aurora was formulated by Professor BIRKELAND over 40 years ago. Professor STÖRMER was the first to determine the height of the aurora by the photographic method, though visual estimation of the height had been made, often with fair accuracy, for a century or more.

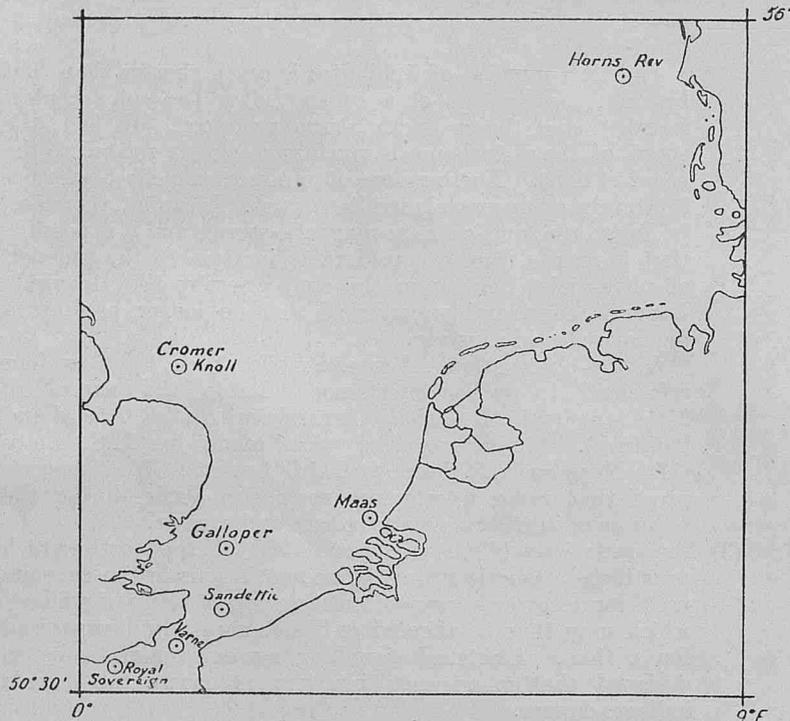
As in the case of other impressive natural phenomena, auroræ were, until comparatively recent times, often regarded with fear and considered to be portents of grave events. Even now the belief that they influence the weather persists to some extent.

EXCEPTIONAL TIDAL STREAMS IN THE SOUTHERN NORTH SEA AND EASTERN ENGLISH CHANNEL.

BY J. N. CARRUTHERS, D.Sc., F.Inst.P. (Fisheries Laboratory, Lowestoft.)

On the evening of Saturday, 12th February, 1938, the sea burst over the low lying coastland at Horsey between Winterton and Palling in Norfolk and flooded an area of farms and marshes, estimated at about 15 square miles. On 3rd April of the same year, the sea again broke through defences which had recently been constructed at Horsey. It is thought that the following information concerning exceptional tidal streams in the southern North Sea and the eastern English Channel at the time of the earlier and more serious flooding will be of interest to seamen who navigate these waters.

With the permission of the Elder Brethren of Trinity House, and for application to problems of fishery research, *continuous* observations upon the water-flow past various English lightships are made on behalf of the Ministry of Agriculture and Fisheries by the officers and crew. The observers employ a very robust current-measuring instrument which goes under the name of "Vertical Log." This was specially designed in Lowestoft for the purpose, and, using it, there is never any need to stop observing on account of bad weather or very silty water. At the time when the serious inroad of the sea occurred, Vertical Logs were in use aboard each of the seven lightships, whose positions are shown on the accompanying chart, except at the Varne.



At the latter very important key position, the observers were using another type of current-measuring instrument which had been in continuous use there for upwards of ten years. That instrument, known as a "Drift Indicator," was in use at the depth of 6 fathoms—whereas the working depth of the Vertical Logs was 2 fathoms. At each of the lightships the observing went on without intermission and the observers sent in with their observation forms, a full record of wind conditions. It is proposed to set down below, information concerning the average run of the tidal streams at the positions in question, so that certain exceptional events may stand out in clear contrast.

The day of chief interest was Saturday, 12th February—it being in the evening of that day when the break-through of the sea at Horsey took place. The flooding was due (as is well known) to a pronounced deepening of the waters of the southern North Sea brought about by winds blowing from the N.W. quadrant. This wind-caused deepening, occurred at a time when the tide would have been high in any case. It must be mentioned, however, that the Horsey flooding took place about 48 hours before full moon, and that the highest predicted water-level was not due until the eighth high tide following. This shows how very fortunate it was that the wind left the danger quarter—that it veered from the N.W. quadrant, after the destructive tide (see TABLE 1

—Saturday evening). Although this article is concerned chiefly with tidal streams, it will be of interest to show how tidal heights were affected. The following statement shows how much in excess of prediction were the observed heights at the times of the most affected high and low waters—at a number of places concerning which information has been kindly supplied.

| Place. | High-water Excess (feet). | Low-water Excess (feet). |
|------------------------|---------------------------|--------------------------|
| Dover | Just over 5 | About 2 |
| Southend | Nearly 6 | Very nearly 2½ |
| Hook of Holland | 6½ | 2¾ |
| Harwich | 5½ | Just over 2 |
| Sheerness | 6½ | Just over 2 |

That the tidal streams also were profoundly affected, can be easily shown by reference to the results of the continuous observations made aboard the lightvessels by means of the Vertical Log. The method of using this for fishery research purposes, does not provide records in the form of observations of stream strength and direction at fixed time intervals. What is obtained, is a daily record showing how many "miles of water" ran towards each of the 4-point divisions of the compass centred on North, North-East, East, South-East ... and so on. Such daily records are particularly instructive, but it has not been thought worth while to have them centred on times of high or low water. That would involve practical difficulties. It results that the records chosen to show how the streams were affected, are those for 24-hour periods centred on various times. TABLE 2 shows how the streams ran at the time of the wind-caused deepening of the southern extremity of the North Sea, and lets it be seen how they differed from average conditions. The reader will realize that the results are not to be taken as showing how the wind *directly* influenced the water movements—how it *directly* modified the tidal streams. It is not a question of wind-influenced water movements in a really wide expanse of sea; the head of water set up would complicate matters.

The surge of water into the narrow part of the southern North Sea which caused such an alteration in depth, might be expected to give rise to an escape current (to relieve the head) into the Channel. It has been known for a number of years that there is usually a flow of water from English Channel to North Sea through the Strait of Dover. The rate of flow is about 3 miles a day on the average—that figure showing by how much the daily run of the flood streams exceeds that of the ebb streams when averaged out over a number of years. It was also known that this flow from Channel to North Sea can be reversed at times under meteorological conditions of which those of 12th February, 1938, provide an extreme example.

It is of interest to point to the events at the Royal Sovereign lightship as showing how pronounced this effect can be so far west.

It is also of interest to relate, that during the four-day period centred at 8 p.m. on 11th February, there was a set past the Varne lightvessel at the depth of 6 fathoms, amounting to nearly eight miles a day. To what appears in TABLE 2, should be added a few words concerning the events at the Maas and Horns Rev lightvessels at the time when the wind conditions had so deepened the southern North Sea. A usual daily flood excess (towards N.E. by E.) amounting to about 1¾ miles on the average, had given place to a set of 7 miles towards a south-westerly point at the Maas on 12th February. A day earlier, the south-westerly set had been as much as 12 miles.

At the Horns Rev, where the daily flood excess (towards N.N.W.) is about 3½ miles on the average, there was, on one day, a set of about 6½ miles towards S.S.E.

There seems no need to discuss the entries in TABLE 2; they are sufficiently self-explanatory to show quite impressively how the tidal streams were running at the time when the waters of the southern North Sea were so piled up under the influence of strong winds from the N.W. quadrant.

In this article, we have been talking of the run of the streams in miles per day because that is the form in which our records are made out. The navigator who may be interested in what has been said, can easily halve our entries in TABLE 2 to get mileage run per tide.

TABLE 1.
Wind Observations (Beaufort Scale) as Logged Aboard Three Stated Lightvessels during the Period
10th to 13th February, 1938.

| Time. | | Cromer Knoll. | | Galloper. | | Royal Sovereign. | |
|-----------------------------------|----------|---------------|------------|-----------|------------|------------------|------------|
| Date. | Hour. | Wind. | | Wind. | | Wind. | |
| | | Strength. | Direction. | Strength. | Direction. | Strength. | Direction. |
| Thursday, 10th February, 1938 ... | 3 a.m. | 4 | W. | 4 | W. | 4 | W. |
| | 6 a.m. | 5-6 | W. | 4 | W.S.W. | 4 | W. |
| | 9 a.m. | 5-7 | W.N.W. | 5 | W.S.W. | 5-6 | S.W. |
| | Noon | 5-6 | W.N.W. | 5-6 | W.N.W. | 6 | S.W. |
| | 3 p.m. | 6 | N.W. | 6-7 | W.N.W. | 6 | N.W. |
| | 6 p.m. | 6 | N.W. | 6-7 | W.N.W. | 5 | W.N.W. |
| | 9 p.m. | 5-7 | N. | 6-7 | N.N.W. | 5 | W.N.W. |
| | Midnight | 6-8 | N. | 7-9 | N.N.W. | 7 | N.W. |
| Friday, 11th February, 1938 ... | 3 a.m. | 7-9 | N. | 7-8 | N.N.W. | 6 | N. |
| | 6 a.m. | 7-9 | N. | 7-8 | N.N.W. | 6 | N. |
| | 9 a.m. | 6-8 | N. | 7-8 | N.N.W. | 5 | N. |
| | Noon | 6-7 | N. | 6-7 | N.N.W. | 4-5 | N.N.E. |
| | 3 p.m. | 5-7 | W.N.W. | 5-6 | N.N.W. | 4 | N.E. |
| | 6 p.m. | 5-6 | W.N.W. | 5-6 | N.N.W. | 4 | N.E. |
| | 9 p.m. | 4-6 | W.N.W. | 5 | N.W. | 4 | N.E. |
| | Midnight | 4-6 | W.N.W. | 5 | W. | 3 | N.W. |
| Saturday, 12th February, 1938 ... | 3 a.m. | 5 | W.N.W. | 5 | W.N.W. | 6 | N.W. |
| | 6 a.m. | 5-6 | W.N.W. | 6 | W. | 6 | N.W. |
| | 9 a.m. | 5-7 | W.N.W. | 6-7 | W.N.W. | 7 | W.N.W. |
| | Noon | 8-10 | N.W. | 7-8 | N.N.W. | 7-8 | W.N.W. |
| | 3 p.m. | 8-10 | N.W. | 8-9 | N.N.W. | 7-8 | N.W. |
| | 6 p.m. | 9-10 | N. | 8-9 | N.N.W. | 8 | N. |
| | 9 p.m. | 7-8 | N. | 8-9 | N.N.W. | 9 | N.E. |
| | Midnight | 8-9 | N.N.E. | 8-9 | N.N.E. | 9-10 | N.E. |
| Sunday, 13th February, 1938 ... | 3 a.m. | 7-9 | N.N.E. | 8-9 | N.N.E. | 9-10 | N.E. |
| | 6 a.m. | 7-9 | N.N.E. | 7-8 | N.N.E. | 9 | N.E. |
| | 9 a.m. | 7-8 | N.N.E. | 7-8 | N.N.E. | 6-7 | N.E. |
| | Noon | 5-8 | N.N.E. | 7-8 | N.N.E. | 6-7 | N.E. |
| | 3 p.m. | 6-7 | N.N.E. | 7-8 | N. | 6 | N.E. |
| | 6 p.m. | 5-7 | N.N.E. | 7-8 | N. | 5 | N.E. |
| | 9 p.m. | 5-7 | N.N.E. | 7-8 | N. | 6 | N.E. |
| | Midnight | 5-6 | N.N.E. | 7-8 | N.N.E. | 6 | N.E. |

TABLE 2.

The Run of the Tidal Streams in Sea-Miles per Day at Four Lightvessels during the Time of the Horsey Flooding compared with Average Conditions.

In the rows of average values are given those relating to the stated periods of observation with the Vertical Log. The exceptional values are given for the direction most affected, the Dates and Central Times of the Days concerned being stated. In all cases entries denote Miles of Water Movement in a Day towards the direction indicated.

| Lightvessel | Average and Exceptional. | Between N.N.W. and N.N.E. | Between N.N.E. and E.N.E. | Between E.N.E. and E.S.E. | Between E.S.E. and S.S.E. | Between S.S.E. and S.S.W. | Between S.S.W. and W.S.W. | Between W.S.W. and W.N.W. | Between W.N.W. and N.N.W. |
|------------------|---------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Cromer Knoll ... | Average for whole year 1937 | 0·19 | 0·14 | 0·21 | 10·00 | 0·19 | 0·17 | 0·21 | 9·49 |
| | Exceptional, 1515 (12.2.38) ... | 1·72 | 0·21 | 0·39 | 10·69 | 0·21 | 0·12 | 0·18 | 4·60 |
| Galloper ... | Average for Winter 1937-38... | 0·20 | 10·91 | 0·11 | 0·05 | 0·21 | 11·04 | 0·14 | 0·18 |
| | Exceptional, 0735 (13.2.38) ... | — | 6·50 | — | 1·33 | — | 18·48 | 0·08 | — |
| Sandettie ... | Average for Winter 1937-38... | 0·03 | 12·34 | 0·18 | 0·13 | 0·18 | 12·68 | 0·06 | 0·03 |
| | Exceptional, 2345 (12.2.38) ... | — | 3·55 | 1·34 | 0·54 | 9·04 | 11·22 | — | — |
| Royal Sovereign | Average for whole year 1937... | — | 0·02 | 9·57 | 0·01 | 0·00 | 7·95 | 0·01 | — |
| | Exceptional, 0935 (13.2.38) ... | — | — | 9·15 | — | — | 15·68 | — | — |

WINTER GALES IN THE NORTH ATLANTIC 1930-1938.

PREPARED IN THE MARINE DIVISION BY COMMANDER J. HENNESSY, R.D., R.N.R.

The season for winter load line laid down in the Merchant Shipping (Safety and Load Line Conventions) Act, 1932, for the North Atlantic, north of Latitude 45° N., between Longitude 15° W. and 50° W., and north of Latitude 60° N., from Longitude 15° W. to the Norwegian coast, extends from 16th October to 15th April.

For the remainder of the North Atlantic north of Latitude 36° N., the winter season extends from 1st November to 31st March.

Covering the above dates the following tables and graphs give the number of days on which gales (Force 8) were reported in the Western, Central and Eastern zones of the North Atlantic, during the years 1930-38. In addition they give the number of days included in the above on which the wind reached the force of a whole gale (Force 10) and also that of a hurricane (Force 12).

Since 1st May, 1930, there has been a fairly constant distribution of British Voluntary Observing Ships covering the North Atlantic routes, the meteorological returns of which have been regularly received, and though at times unreported gales may have passed between them, such cases must be few, so that the tables give a good indication of the numbers of days on which gales occurred.

In the open ocean the damage sustained by shipping is in the majority of cases due not so much to the direct force of the wind as to the effect of the sea and swell which the wind raises, and in no part of the oceans are worse conditions reported than during the winter months in the North Atlantic. Here a succession of gales, combined with the frequent veering of the wind in cyclonic storms cause such a confused heavy sea and swell as to test the seaworthiness of the staunchest ships.

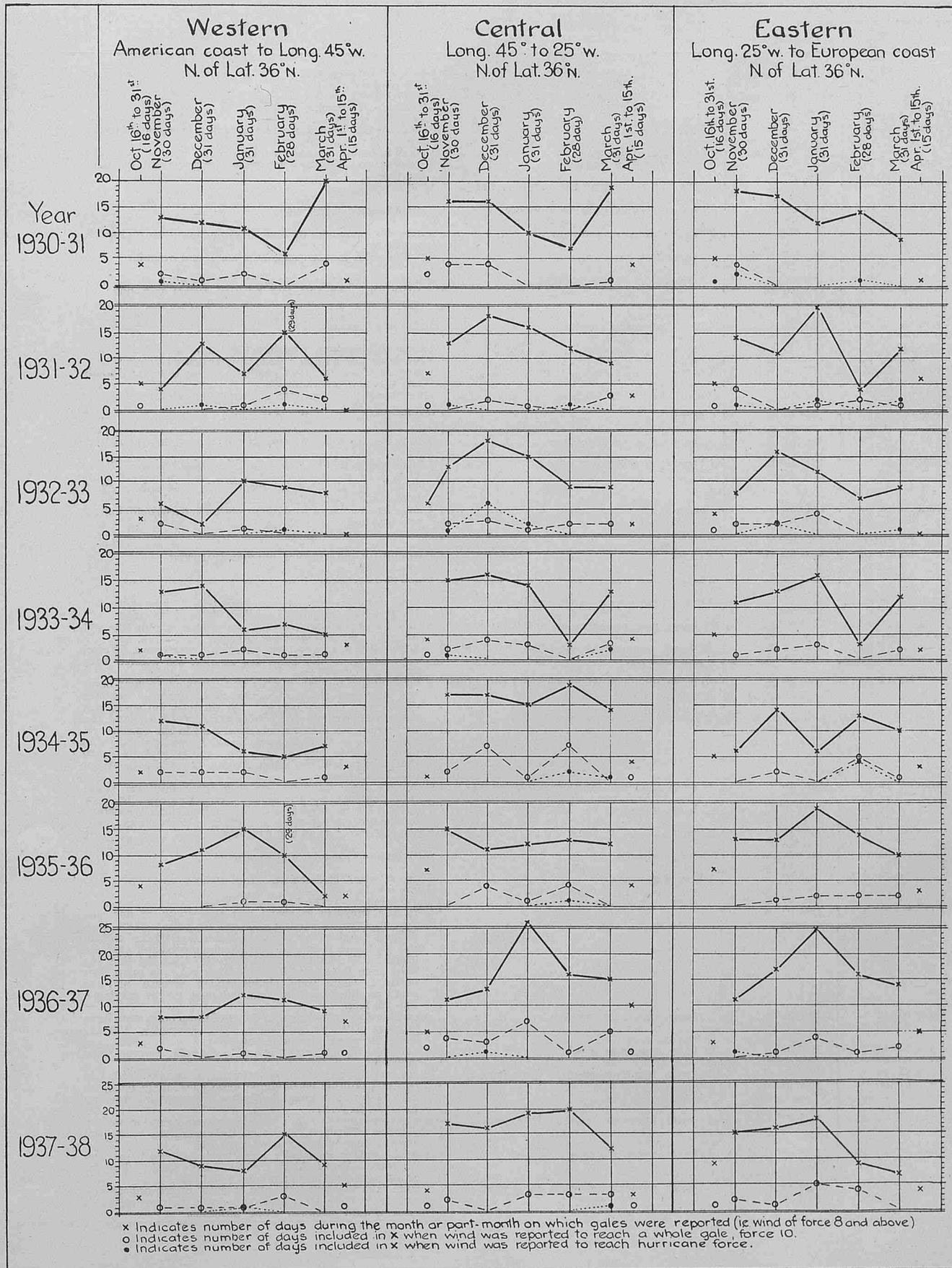
Number of Days on which Gales were reported by British Observing Ships in the North Atlantic, North of Latitude 36° N. during the Winter Months 1930-31 to 1937-38, excluding Coastal and Narrow Waters.

| Month. | WESTERN. American Coast to Longitude 45° W. North of Latitude 36° N. | | | CENTRAL. Longitude 45° W. to 25° W. North of Latitude 36° N. | | | EASTERN. Longitude 25° W. to European Coast North of Latitude 36° N. | | |
|---------------------------|--|---|---|--|---|--|--|---|---|
| | No. of Days on which GALES were reported. | No. of Days on which WHOLE GALES were reported. | No. of Days when reached HURRICANE force. | No. of Days on which GALES were reported. | No. of Days on which WHOLE GALES were reported. | No. of Days when wind reached HURRICANE force. | No. of Days on which GALES were reported. | No. of Days on which WHOLE GALES were reported. | No. of Days when reached HURRICANE force. |
| 1930 October 16-31 | 4 | 0 | 0 | 5 | 2 | 0 | 5 | 0 | 1 |
| November | 13 | 2 | 1 | 16 | 4 | 0 | 18 | 4 | 2 |
| December | 12 | 1 | 0 | 16 | 4 | 0 | 17 | 0 | 0 |
| 1931 January | 11 | 2 | 0 | 10 | 0 | 0 | 12 | 0 | 0 |
| February | 6 | 0 | 0 | 7 | 0 | 0 | 14 | 0 | 1 |
| March | 20 | 4 | 0 | 19 | 1 | 0 | 9 | 0 | 0 |
| April 1-15 | 1 | 0 | 0 | 4 | 0 | 0 | 1 | 0 | 0 |
| Total for Season | 67 | 9 | 1 | 77 | 11 | 0 | 76 | 4 | 4 |
| 1931 October 16-31 | 5 | 1 | 0 | 7 | 1 | 0 | 5 | 1 | 0 |
| November | 4 | 0 | 0 | 13 | 0 | 1 | 14 | 4 | 1 |
| December | 13 | 0 | 1 | 18 | 2 | 0 | 11 | 0 | 0 |
| 1932 January | 7 | 1 | 0 | 16 | 1 | 0 | 20 | 1 | 2 |
| February | 15 | 4 | 1 | 12 | 0 | 1 | 4 | 2 | 0 |
| March | 6 | 2 | 0 | 9 | 3 | 0 | 12 | 1 | 2 |
| April 1-15 | 0 | 0 | 0 | 3 | 0 | 0 | 6 | 0 | 0 |
| Total for Season | 50 | 8 | 2 | 78 | 7 | 2 | 72 | 9 | 5 |
| 1932 October 16-31 | 3 | 0 | 0 | 6 | 0 | 0 | 4 | 1 | 0 |
| November | 6 | 2 | 0 | 13 | 2 | 1 | 8 | 2 | 0 |
| December | 2 | 0 | 0 | 18 | 3 | 6 | 16 | 2 | 2 |
| 1933 January | 10 | 1 | 0 | 15 | 1 | 2 | 12 | 4 | 0 |
| February | 9 | 0 | 1 | 9 | 2 | 0 | 7 | 0 | 0 |
| March | 8 | 0 | 0 | 9 | 2 | 0 | 9 | 0 | 1 |
| April 1-15 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Total for Season | 38 | 3 | 1 | 72 | 10 | 9 | 56 | 9 | 3 |
| 1933 October 16-31 | 2 | 0 | 0 | 4 | 1 | 0 | 5 | 0 | 0 |
| November | 13 | 1 | 1 | 15 | 2 | 1 | 11 | 1 | 0 |
| December | 14 | 1 | 0 | 16 | 4 | 0 | 13 | 2 | 0 |
| 1934 January | 6 | 2 | 0 | 14 | 3 | 0 | 16 | 3 | 0 |
| February | 7 | 1 | 0 | 3 | 0 | 0 | 3 | 0 | 0 |
| March | 5 | 1 | 0 | 13 | 3 | 2 | 12 | 2 | 0 |
| April 1-15 | 3 | 0 | 0 | 4 | 0 | 0 | 2 | 0 | 0 |
| Total for Season | 50 | 6 | 1 | 69 | 13 | 3 | 62 | 8 | 0 |
| 1934 October 16-31 | 2 | 0 | 0 | 1 | 0 | 0 | 5 | 0 | 0 |
| November | 12 | 2 | 0 | 17 | 2 | 0 | 6 | 0 | 0 |
| December | 11 | 2 | 0 | 17 | 7 | 0 | 14 | 2 | 0 |
| 1935 January | 6 | 2 | 0 | 15 | 1 | 0 | 6 | 0 | 0 |
| February | 5 | 0 | 0 | 19 | 7 | 2 | 13 | 5 | 4 |
| March | 7 | 1 | 0 | 14 | 0 | 1 | 10 | 1 | 0 |
| April 1-15 | 3 | 0 | 0 | 4 | 1 | 0 | 3 | 0 | 0 |
| Total for Season | 46 | 7 | 0 | 87 | 18 | 3 | 57 | 8 | 4 |
| 1935 October 16-31 | 4 | 0 | 0 | 7 | 0 | 0 | 7 | 0 | 0 |
| November | 8 | 0 | 0 | 15 | 0 | 0 | 13 | 0 | 0 |
| December | 11 | 0 | 0 | 11 | 4 | 0 | 13 | 1 | 0 |
| 1936 January | 15 | 1 | 0 | 12 | 1 | 0 | 19 | 2 | 0 |
| February | 10 | 1 | 0 | 13 | 4 | 1 | 14 | 2 | 0 |
| March | 2 | 0 | 0 | 12 | 0 | 0 | 10 | 2 | 0 |
| April 1-15 | 2 | 0 | 0 | 4 | 0 | 0 | 3 | 0 | 0 |
| Total for Season | 52 | 2 | 0 | 74 | 9 | 1 | 79 | 7 | 0 |
| 1936 October 16-31 | 3 | 0 | 0 | 5 | 2 | 0 | 3 | 0 | 0 |
| November | 8 | 2 | 0 | 11 | 4 | 0 | 11 | 0 | 1 |
| December | 8 | 0 | 0 | 13 | 3 | 1 | 17 | 1 | 0 |
| 1937 January | 12 | 1 | 0 | 26 | 7 | 0 | 25 | 4 | 0 |
| February | 11 | 0 | 0 | 16 | 1 | 0 | 16 | 1 | 0 |
| March | 9 | 1 | 0 | 15 | 5 | 0 | 14 | 2 | 0 |
| April 1-15 | 7 | 1 | 0 | 10 | 1 | 0 | 5 | 0 | 0 |
| Total for Season | 58 | 5 | 0 | 96 | 23 | 1 | 91 | 8 | 1 |
| 1937 October 16-31 | 3 | 0 | 0 | 4 | 1 | 0 | 9 | 1 | 0 |
| November | 12 | 1 | 0 | 17 | 2 | 0 | 15 | 2 | 0 |
| December | 9 | 1 | 0 | 16 | 0 | 0 | 16 | 1 | 0 |
| 1938 January | 8 | 1 | 1 | 19 | 3 | 0 | 18 | 5 | 0 |
| February | 15 | 3 | 0 | 20 | 3 | 0 | 9 | 4 | 0 |
| March | 9 | 0 | 0 | 12 | 3 | 1 | 7 | 0 | 0 |
| April 1-15 | 5 | 1 | 0 | 3 | 1 | 0 | 4 | 0 | 0 |
| Total for Season | 61 | 7 | 1 | 91 | 13 | 1 | 78 | 13 | 0 |

Taking the North Atlantic as a whole, during the period under review, more gales were reported during the winter 1936-37 than in the other years, but the greatest number of severe gales, that is gales with wind reaching Force 10 and above, were recorded during the winter of 1934-35. Throughout the whole period 13 per cent. of the total number of gales recorded reached Force 10 and 3 per cent., Force 12.

In all but one winter, namely that of 1935-36, more gales were recorded in the Central Region than in the other two areas, and in all years, gales recorded in the Eastern area show a higher frequency than in the Western area. The percentage frequency of severe gales is also generally highest in the Central region where 19 per cent. of the total gales reported throughout the period reach Force 10 or above.

Number of Days on which Gales were Reported in the North Atlantic during the Months and Part-months of the Winters 1930 to 1938.



SOUTHERN ICE REPORTS, January—continued.

| Year. | Day. | Position of Ice. | | Description. | Remarks. | Name of Ship reporting. |
|-------|---------|--|--|---|---|---|
| | | Latitude. | Longitude. | | | |
| 1938 | 21 | From 66° 30' S. To 66° 26' S. | 160° 44' E. 161° 21' E. | 39 bergs, numerous growlers and bergy bits, loose pack ice. | Vessel approaching Balleny Islands, skirting edge of loose pack ice, which trended to the S.E. from this last position. An interesting feature of the ice in this area was the large number of high, weathered and irregular bergs. | R.R.S. <i>Discovery II</i> |
| | 21 & 22 | From 66° 26' S. To 66° 25' S. From 66° 15' S. To 67° 08' S. | 161° 21' E. 161° 50' E. 162° 20' E. 165° 00' E. | 9 bergs, several growlers Numerous small bergs and growlers, floe ice and pack ice. | 2 large tabular, remainder irregular and weathered Vessel approaching Young I., Balleny Islands. The N.W. group of islands, comprising Young, Row, Borradaile and Buckle Islands, were entirely free of pack ice and on the 21st and 22nd a running survey of this group was carried out. Numerous small bergs and growlers were observed in the near vicinity, also several large floes, probably of Ross Sea origin. During the course of this survey an attempt was made to close Sturge Island, the S.E. Island of the Balleny group, but when approximately 16 miles north of this island further progress to the south was prevented by heavy hummocked pack ice, which entirely surrounded the island and trended E.-W.N.W. | do. |
| | 22 | From 66° 06' S. To 65° 48' S. From 65° 48' S. To 65° 33' S. | 162° 18' E. 162° 18' E. 162° 18' E. 162° 17' E. | 17 bergs, numerous growlers 20 bergs, numerous growlers and bergy bits | Bergs, all old and weathered, mostly irregular, within 5 miles of track. 3 large tabular, remainder medium-sized and irregular, all old weathered and sea-worn, within 6 miles of track. | do. |
| | 23 | From 65° 33' S. To 64° 57' S. From 64° 57' S. To 64° 18' S. From 64° 18' S. To 63° 45' S. | 162° 17' E. 162° 16' E. 162° 16' E. 162° 15' E. 162° 15' E. 162° 22' E. | 14 bergs, numerous growlers and bergy bits 22 bergs, numerous growlers 17 bergs, numerous growlers and bergy bits | 8 large tabular, remainder irregular, old weathered and much indented. 12 large tabular, remainder irregular, weathered. Several morainic and "bottle-green" growlers. 8 tabular, remainder irregular, all old, weathered and sea-worn, within 7 miles of track, tabular bergs were much caved and arched. 1 small berg, black in colour, laden with morainic deposit. | do. |
| | | From 63° 45' S. To 63° 09' S. 63° 02' S. | 162° 22' E. 162° 34' E. 162° 38' E. | 16 bergs, several growlers 2 bergs | 11 tabular bergs, medium-sized, broken down and sea-worn, remainder irregular, all within 5 miles of track. 1 medium-sized tabular, one small and irregular, within 2 miles of track. | do. |
| | 24 | 61° 34' S. | 163° 36' E. | 3 growlers | | do. |
| | 19 | 56° 15' S. | 144° 20' W. | Large berg | Approximate dimensions: Length 3,700 feet, height 300 feet, obtained by horizontal and vertical sextant angles. Berg appeared to be wedge shaped. | M.V. <i>Port Gisborne</i> . |
| | 1 | 58° 50' S. | 32° 04' W. | Berg and 2 growlers | Small, low irregular | R.R.S. <i>William Scoresby</i> . |
| | 2 | 59° 03' S. 59° 17' S. 59° 39' S. 59° 43' S. | 32° 22' W. 32° 30' W. 32° 14' W. 32° 08' W. | Berg Berg 2 bergs Berg | Small irregular Small tabular 1 small irregular, 1 small tabular Small irregular | do. do. do. do. |
| | 3 | 59° 58' S. 60° 13' S. 60° 15' S. 60° 17' S. 60° 19' S. 60° 22' S. | 31° 39' W. 30° 58' W. 30° 51' W. 30° 45' W. 30° 38' W. 30° 31' W. | Berg Berg, 2 growlers 2 bergs Berg Berg Berg, 2 bergy bits, numerous growlers | Medium tabular Small irregular berg Small irregular Medium tabular Small tabular Small tabular berg | do. do. do. do. do. do. |
| | 4 | 60° 32' S. 60° 34' S. 60° 35' S. 60° 34' S. 60° 33' S. 60° 33' S. From 60° 34' S. To 60° 23' S. | 30° 06' W. 29° 50' W. 29° 42' W. 28° 57' W. 28° 50' W. 28° 50' W. 28° 39' W. 27° 56' W. | Bergy bit Berg and numerous growlers Brush-growlers Berg and many growlers 2 bergs Growlers 5 bergs, many growlers, 2 bergy bits, 15 bergs, numerous bergy bits, drift ice and heavy weathered floes. | Tabular berg Medium tabular berg, 6 of the growlers large 1 large tabular, 1 small irregular 7 large, many very small 1 large tabular, 4 small irregular, small irregular bergs, 5 tabular. | do. do. do. do. do. do. |
| | | 60° 20' S. 60° 19' S. 60° 10' S. | 27° 52' W. 27° 51' W. 27° 44' W. | Berg 2 bergs Berg | Small irregular, very weathered Medium tabulars Small irregular | do. do. do. |
| | | From 60° 04' S. To 60° 04' S. To 60° 14' S. From 60° 17' S. To 60° 26' S. To 60° 18' S. | 27° 33' W. 27° 03' W. 26° 50' W. 26° 30' W. 26° 47' W. 27° 03' W. | Pack 6 bergs Berg Pack Pack and many bergy bits | Very open, mainly single, large, heavy (10-15 feet, above water) floes very weathered, 2 tabulars, 4 small irregulars, small tabular. Lying to in open lead, in pack Working through leads in heavy pack | do. do. |
| | | 60° 17' S. 60° 14' S. 60° 11' S. 60° 08' S. | 27° 19' W. 27° 31' W. 27° 41' W. 27° 56' W. | 5 bergs Berg 3 bergs Berg | Heavy floes 2 tabular, 4 irregular. Heavy floes gradually decreasing in numbers. No definite edge to area of pack drift ice. 2 small tabular, 1 irregular Small high tabular (breaking up). Occasional remnants of heavy floes. | do. do. do. |
| | | 60° 06' S. 60° 04' S. 60° 01' S. 59° 58' S. 59° 51' S. | 28° 03' W. 28° 13' W. 28° 28' W. 28° 42' W. 29° 10' W. | 2 bergs Berg Berg Berg Berg | Small irregular Small irregular Small tabular Large tabular Medium irregular | do. do. do. do. do. |
| | 6 | 60° 04' S. 59° 58' S. | 29° 44' W. 30° 09' W. | 2 bergs 4 bergs | Small irregular, large tabular 2 tabular, 2 irregular | do. do. |
| | 7 | 59° 46' S. 59° 28' S. 59° 27' S. 59° 21' S. | 30° 08' W. 31° 29' W. 32° 14' W. 33° 01' W. | Berg, several growlers 2 bergs Bergy bit Berg | Large tabular berg 1 low tabular (small), 1 high irregular (small) Small irregular Small tabular | do. do. do. do. |
| | 8 | 59° 18' S. 59° 32' S. 59° 33' S. 59° 34' S. 59° 37' S. 59° 39' S. 59° 39' S. | 33° 42' W. 34° 52' W. 35° 00' W. 35° 14' W. 35° 32' W. 36° 07' W. 36° 15' W. | Berg Bergy bit Berg Berg 3 bergs 3 bergy bits 2 bergs | Small Small irregular (pinnacle) Small irregular Small tabular Small tabular Small irregular | do. do. do. do. do. do. |
| | 9 | 59° 43' S. 59° 44' S. 59° 45' S. 59° 45' S. 59° 46' S. 59° 47' S. 59° 44' S. 59° 35' S. 59° 50' S. | 36° 50' W. 37° 13' W. 37° 22' W. 37° 29' W. 38° 00' W. 38° 07' W. 38° 22' W. 38° 47' W. 39° 00' W. | Berg and three growlers 2 bergy bits 2 bergs 2 bergs Bergy bit Berg 2 growlers berg Berg | Small tabular berg Small irregulars Small irregulars Small irregulars Medium tabular | do. do. do. do. do. do. |
| | 10 | 59° 41' S. 59° 42' S. 60° 00' S. | 39° 00' W. 39° 19' W. 40° 07' W. | Berg Berg, growlers and brash Berg, bergy bit | Large tabular, estimated four miles, or more long (Dist. 14) Medium tabular berg Small irregular and 1 growler; bergy bit-pinnacle (distant) | do. do. do. |
| | 11 | 60° 00' S. 59° 59' S. 59° 59' S. | 41° 08' W. 43° 17' W. 44° 10' W. | Bergy bit Berg and a few small growlers Growler | Discoloured Medium tilted tabular. Dark green with white pinnacle | do. do. do. |
| | 12 | 59° 59' S. 59° 59' S. From 59° 59' S. To 60° 01' S. To 60° 15' S. To 60° 04' S. To 60° 10' S. | 44° 36' W. 44° 52' W. 45° 19' W. 45° 55' W. 46° 13' W. 46° 51' W. 47° 05' W. 47° 41' W. 48° 21' W. | Berg Bergy bit 5 bergs 2 bergy bits 5 bergy bits and several small growlers 5 bergy bits and numerous growlers 4 bergy bits and several growlers 2 bergy bits 2 bergy bits | Small irregular Small irregular Small irregular 1 tabular with dark blue patches 2 discoloured bergy bits | do. do. do. do. do. do. do. do. do. |

SOUTHERN ICE REPORTS, January—continued.

| Year. | Day | Position of Ice. | | Description. | Remarks. | Name of Ship reporting. |
|-----------------|-----------------|--|---|--|---------------------|----------------------------------|
| | | Latitude. | Longitude. | | | |
| 1938 | 13 | 60° 17' S. | 49° 31' W. | 4 bergs ... | Small irregular ... | R.R.S. <i>William Scoresby</i> . |
| | | From 60° 19' S. | 49° 48' W. | 4 bergy bits ... | ... | do. |
| | To 60° 21' S. | 50° 26' W. | 6 growlers ... | ... | do. | |
| | 60° 24' S. | 50° 43' W. | Bergy bit and several growlers ... | ... | do. | |
| | From 60° 29' S. | 50° 24' W. | 3 bergy bits and several growlers ... | ... | do. | |
| | To 60° 30' S. | 50° 06' W. | ... | ... | do. | |
| | 60° 31' S. | 49° 49' W. | 3 bergy bits ... | ... | do. | |
| | 60° 32' S. | 49° 32' W. | 2 bergy bits ... | ... | do. | |
| | 60° 34' S. | 49° 20' W. | Bergy bit ... | Small ... | do. | |
| | 60° 36' S. | 49° 02' W. | Bergy bit ... | Small ... | do. | |
| | 60° 44' S. | 48° 42' W. | Bergy bit ... | Small ... | do. | |
| | 60° 46' S. | 48° 32' W. | Berg ... | Small irregular ... | do. | |
| | 61° 06' S. | 47° 56' W. | Bergy bit ... | ... | do. | |
| | 61° 06' S. | 47° 49' W. | 2 bergy bits ... | ... | do. | |
| | 61° 07' S. | 47° 49' W. | Bergy bit ... | ... | do. | |
| | 61° 07' S. | 47° 33' W. | Berg ... | Small irregular ... | do. | |
| | 61° 07' S. | 47° 20' W. | Berg ... | Long tabular (distant) ... | do. | |
| | 61° 30' S. | 46° 36' W. | 2 bergs and 2 growlers ... | Small irregular ... | do. | |
| | 61° 16' S. | 46° 23' W. | Berg ... | Small tabular ... | do. | |
| | 61° 27' S. | 46° 10' W. | Drift ice ... | Large stream of old heavy pack much broken, in line East-West ... | do. | |
| | 61° 09' S. | 45° 50' W. | Berg ... | Small tabular ... | do. | |
| | 61° 37' S. | 45° 48' W. | Drift ice ... | Stream of old pack similar to above ... | do. | |
| | 61° 54' S. | 46° 04' W. | Pack ... | Entered open pack, very weathered, scattered floes, much open water. | do. | |
| | 62° 00' S. | 46° 54' W. | Berg and pack ... | Small tabular ... | do. | |
| | 61° 31' S. | 48° 07' W. | Berg, pack and drift ... | Low irregular ... | do. | |
| | From 61° 32' S. | 48° 59' W. | 7 bergs, pack and drift... | Small irregular on edge of open pack; drift ice in vicinity ... | do. | |
| | To 61° 25' S. | 49° 15' W. | ... | ... | do. | |
| | 61° 18' S. | 49° 58' W. | Several bergy bits. Loose drift ice. ... | ... | do. | |
| | 61° 24' S. | 49° 37' W. | Berg ... | Medium tabular ... | do. | |
| | 61° 24' S. | 49° 39' W. | Large growler; drift ice ... | ... | do. | |
| | 61° 23' S. | 49° 40' W. | Bergy bit ... | ... | do. | |
| | From 61° 22' S. | 49° 52' W. | Berg, drift ice and pack ... | ... | do. | |
| | To 61° 18' S. | 50° 02' W. | ... | ... | do. | |
| | 61° 18' S. | 50° 14' W. | Pack ... | Open pack to southward ... | do. | |
| | From 61° 16' S. | 50° 23' W. | 2 bergy bits and drift ice ... | ... | do. | |
| | To 61° 14' S. | 50° 35' W. | ... | ... | do. | |
| | 61° 14' S. | 50° 43' W. | Berg ... | Small tabular ... | do. | |
| | 61° 15' S. | 50° 48' W. | 2 bergy bits ... | Small ... | do. | |
| | From 61° 15' S. | 50° 59' W. | Drift ice ... | ... | do. | |
| | To 61° 15' S. | 51° 08' W. | ... | ... | do. | |
| | 61° 15' S. | 51° 35' W. | 4 bergs ... | 2 small tabular, 2 irregular ... | do. | |
| | 61° 18' S. | 52° 12' W. | 3 bergs; several growlers ... | Small irregular ... | do. | |
| 61° 20' S. | 52° 36' W. | 3 bergy bits ... | ... | do. | | |
| 61° 22' S. | 52° 45' W. | 2 Bergs, 1 bergy bit ... | Small irregular ... | do. | | |
| 61° 24' S. | 52° 51' W. | Bergy bit ... | ... | do. | | |
| 61° 25' S. | 52° 52' W. | 2 bergy bits, 1 berg ... | Medium tabular, brash and fragments, close to it ... | do. | | |
| 61° 26' S. | 53° 00' W. | Berg ... | Small irregular ... | do. | | |
| From 61° 28' S. | 53° 18' W. | 2 bergy bits, 1 berg ... | Small irregular ... | do. | | |
| To 61° 39' S. | 54° 20' W. | 3 bergs, 6 bergy bits ... | Small irregular ... | do. | | |
| 61° 42' S. | 54° 30' W. | 3 bergy bits ... | ... | do. | | |
| 61° 44' S. | 54° 38' W. | 2 bergy bits ... | ... | do. | | |
| 61° 47' S. | 55° 00' W. | Berg ... | Small irregular ... | do. | | |
| 61° 50' S. | 55° 16' W. | 2 growlers ... | ... | do. | | |
| 61° 56' S. | 55° 52' W. | 3 bergs ... | Small irregular ... | do. | | |
| From 61° 57' S. | 55° 58' W. | Bergy bit ... | ... | do. | | |
| To 61° 59' S. | 56° 54' W. | 3 bergs, 4 bergy bits, several growlers ... | Small irregulars ... | do. | | |
| To 61° 39' S. | 57° 32' W. | Berg, brash and growlers ... | Small irregular ... | do. | | |
| 69° 21' S. | 79° 23' W. | Berg and pack ... | Light pack, no open water ... | do. | | |
| 69° 23' S. | 79° 48' W. | 2 bergy bits, several growlers, and pack ... | Bottle green bergy bits. Navigating along edge of close packs light at edge, but appeared very heavy a short distance in. No open water in pack, and very little brash outside well defined edge of pack. | do. | | |
| From 69° 23' S. | 79° 48' W. | 5 bergy bits, a few growlers and pack ... | 2 bottle green, working along edge of pack ... | do. | | |
| To 69° 11' S. | 80° 00' W. | ... | ... | do. | | |
| To 69° 08' S. | 79° 58' W. | 2 bergy bits and pack ... | Working along edge of pack ... | do. | | |
| To 69° 04' S. | 79° 56' W. | Berg and drift ... | Small irregular. A little drift ice on edge of pack ... | do. | | |
| 67° 40' S. | 88° 35' W. | Berg ... | Pinnacle well below southern horizon ... | do. | | |
| 65° 14' S. | 69° 28' W. | Growler ... | Small ... | do. | | |
| 65° 08' S. | 69° 12' W. | Growler ... | Small ... | do. | | |

February.

| | | | | | | |
|----|----|------------|-------------|--|--|----------------------------------|
| 15 | 1 | 65° 00' S. | 68° 40' W. | Berg ... | Small irregular ... | R.R.S. <i>William Scoresby</i> . |
| | 15 | 61° 18' S. | 168° 11' W. | 2 bergs ... | Large irregular, within two miles of track ... | R.R.S. <i>Discovery II</i> . |
| 16 | | 61° 43' S. | 167° 57' W. | 1 berg ... | Irregular and weathered ... | do. |
| | | 62° 12' S. | 167° 40' W. | 1 berg ... | Small and irregular ... | do. |
| 17 | | 63° 21' S. | 167° 00' W. | 2 bergs ... | 1 medium sized tabular, 122 feet high. 1 small, much sea-worn and irregular. | do. |
| | | 63° 33' S. | 167° 16' W. | 1 berg ... | Small irregular ... | do. |
| 18 | | 64° 08' S. | 167° 00' W. | 1 berg ... | Small low-lying tabular ... | do. |
| | | 64° 19' S. | 166° 51' W. | 1 berg ... | Small tabular ... | do. |
| 19 | | 64° 28' S. | 166° 47' W. | 6 bergs ... | 3 small and irregular, 3 medium-size tabular, all old and weathered. | do. |
| | | 64° 51' S. | 166° 34' W. | ... | ... | do. |
| 20 | | 64° 59' S. | 166° 38' W. | 1 berg ... | Medium size tabular ... | do. |
| | | 65° 29' S. | 166° 24' W. | 1 berg ... | Small low-lying ... | do. |
| 21 | | 65° 56' S. | 166° 10' W. | 7 bergs ... | All small and irregular, within 4 miles of track ... | do. |
| | | 66° 15' S. | 165° 59' W. | 4 bergs ... | 1 large tabular, remainder small and irregular, within 5 miles of track. | do. |
| 22 | | 66° 24' S. | 165° 52' W. | ... | ... | do. |
| | | 66° 43' S. | 165° 36' W. | Berg ... | Small irregular, old and sea-worn ... | do. |
| 23 | | 67° 24' S. | 165° 02' W. | Berg ... | Small irregular ... | do. |
| | | 67° 46' S. | 164° 44' W. | 3 bergs ... | Small and irregular, within 4 miles of track ... | do. |
| 24 | | 68° 06' S. | 164° 28' W. | ... | ... | do. |
| | | 68° 21' S. | 164° 14' W. | 2 bergs ... | Small and irregular, weathered... ... | do. |
| 25 | | 68° 39' S. | 164° 01' W. | Pack ice, streams of drift ice, numerous bergs ... | Vessel turned to the Eastward at this last position, heavy pack ice, close S'ward trending E.N.E.-W. Between these positions vessel was skirting pack ice edge, numerous small bergs and growlers, streams of drift ice in vicinity. | do. |
| | | 68° 24' S. | 163° 11' W. | ... | ... | do. |
| 26 | | 68° 24' S. | 163° 11' W. | Pack ice numerous bergs ... | Vessel skirting pack ice edge throughout watch. Numerous small bergs and growlers. | do. |
| | | 68° 14' S. | 161° 46' W. | Pack ice, drift and brash ice, 6 bergs, numerous growlers. | Vessel skirting pack ice edge between positions. Encountered frequent streams of drift and brash ice. 1 large tabular berg, remainder small and irregular. | do. |
| 27 | | 68° 12' S. | 161° 41' W. | ... | ... | do. |
| | | 67° 47' S. | 160° 33' W. | Pack ice, 5 bergs ... | Ice edge trending away E.S.E. At this last position 2 large tabular bergs, remainder medium size and irregular. All old and weathered. | do. |
| 28 | | 67° 47' S. | 160° 33' W. | ... | ... | do. |
| | | 67° 36' S. | 159° 09' W. | 7 bergs ... | 3 large tabular, remainder small and irregular. Tabular bergs much weathered and broken down. | do. |
| 29 | | 67° 35' S. | 157° 58' W. | 11 bergs, numerous growlers ... | Mostly small irregular bergs, weathered and pinnacled ... | do. |
| | | 67° 35' S. | 157° 58' W. | ... | ... | do. |
| 30 | | 67° 34' S. | 156° 33' W. | ... | ... | do. |
| | | 67° 34' S. | 156° 33' W. | 28 bergs, bergy bits, several growlers ... | 16 medium size tabular, remainder small and irregular, all old and sea-worn. The majority of irregular bergs were obviously the remains of broken up tabulars. Numerous bergy bits in vicinity. | do. |

SOUTHERN ICE REPORTS, February—continued.

| Year. | Day. | Position of Ice. | | Description. | Remarks. | Name of Ship reporting. | | | |
|-----------------|-----------------|------------------|--|--|--|--|---|---|-----|
| | | Latitude. | Longitude. | | | | | | |
| 1938 | 20 | From 67° 10' S. | 155° 17' W. | 30 bergs, bergy bits, several growlers ... | Mostly small irregular bergs, within 5-6 miles of track ... | R.R.S. <i>Discovery II</i> . | | | |
| | | To 66° 50' S. | 154° 11' W. | | | | | | |
| | | From 66° 50' S. | 154° 11' W. | | | | 27 bergs, bergy bits, and numerous growlers | Mostly medium-size and irregular, much sea and weather worn. Several bottle-green and morainic growlers. Numerous bergy bits close to ship's track. | do. |
| | | To 66° 28' S. | 153° 01' W. | | | | | | |
| | | From 66° 28' S. | 153° 01' W. | | | | | | |
| | To 66° 10' S. | 152° 05' W. | | | | | | | |
| | 21 | From 66° 10' S. | 152° 05' W. | 23 bergs, numerous growlers ... | 23 bergs, numerous bergy bits... ... | 1 medium-size tabular, remainder small and irregular ... | do. | | |
| | | To 65° 51' S. | 151° 01' W. | | | | | | |
| | | From 65° 51' S. | 151° 01' W. | | | | | | |
| | | To 65° 29' S. | 149° 54' W. | | | | | | |
| | | To 65° 29' S. | 149° 54' W. | | | | | | |
| | 22 | From 65° 04' S. | 148° 34' W. | 34 bergs, numerous growlers ... | 13 medium-size tabular, remainder irregular ... | do. | | | |
| | | To 64° 41' S. | 147° 29' W. | | | | | | |
| | | From 64° 41' S. | 147° 29' W. | | | | | | |
| | | To 64° 23' S. | 146° 31' W. | | | | | | |
| | | From 64° 23' S. | 146° 31' W. | | | | | | |
| | | To 64° 01' S. | 145° 29' W. | | | | | | |
| | | From 64° 01' S. | 145° 29' W. | | | | | | |
| | | To 63° 40' S. | 144° 23' W. | | | | | | |
| | | From 63° 40' S. | 144° 23' W. | | | | | | |
| To 64° 01' S. | | 143° 26' W. | | | | | | | |
| From 64° 01' S. | | 143° 26' W. | | | | | | | |
| To 64° 25' S. | | 142° 19' W. | | | | | | | |
| From 64° 25' S. | | 142° 19' W. | | | | | | | |
| To 64° 47' S. | | 141° 23' W. | | | | | | | |
| From 64° 47' S. | | 141° 23' W. | | | | | | | |
| 23 | From 65° 10' S. | 140° 27' W. | 8 bergs ... | 8 bergs ... | 3 medium size tabular, remainder small and irregular, all old and weathered. | do. | | | |
| | To 65° 35' S. | 139° 25' W. | | | | | | | |
| | From 65° 35' S. | 139° 25' W. | | | | | | | |
| | To 66° 00' S. | 138° 26' W. | | | | | | | |
| | From 66° 00' S. | 138° 26' W. | | | | | | | |
| | To 66° 24' S. | 137° 23' W. | | | | | | | |
| | From 66° 24' S. | 137° 23' W. | | | | | | | |
| | To 66° 43' S. | 136° 26' W. | | | | | | | |
| | From 66° 43' S. | 136° 26' W. | | | | | | | |
| | To 67° 02' S. | 135° 22' W. | | | | | | | |
| 24 | From 67° 02' S. | 135° 22' W. | 7 bergs ... | 7 bergs ... | 5 medium size tabular, remainder small and irregular ... | do. | | | |
| | To 67° 22' S. | 134° 30' W. | | | | | | | |
| | From 67° 22' S. | 134° 30' W. | | | | | | | |
| | To 67° 41' S. | 133° 48' W. | | | | | | | |
| | From 67° 41' S. | 133° 48' W. | | | | | | | |
| | To 67° 59' S. | 133° 01' W. | | | | | | | |
| | From 67° 59' S. | 133° 01' W. | | | | | | | |
| | To 68° 15' S. | 132° 25' W. | | | | | | | |
| | From 68° 15' S. | 132° 25' W. | | | | | | | |
| | To 68° 34' S. | 131° 36' W. | | | | | | | |
| 25 | From 68° 34' S. | 131° 36' W. | 15 bergs, numerous growlers ... | Mostly small and irregular ... | do. | | | | |
| | To 68° 53' S. | 130° 41' W. | | | | | | | |
| | From 68° 53' S. | 130° 41' W. | | | | | | | |
| | To 69° 01' S. | 130° 20' W. | | | | | | | |
| | From 69° 01' S. | 130° 20' W. | | | | | | | |
| | To 69° 03' S. | 129° 15' W. | | | | | | | |
| | From 69° 03' S. | 129° 15' W. | | | | | | | |
| | To 69° 20' S. | 128° 27' W. | | | | | | | |
| | From 69° 20' S. | 128° 27' W. | | | | | | | |
| | To 69° 40' S. | 127° 27' W. | | | | | | | |
| 26 | From 70° 01' S. | 126° 24' W. | Numerous small bergs and growlers and drift ice. | Numerous streams of drift ice ... | do. | | | | |
| | To 69° 57' S. | 125° 45' W. | | | | | | | |
| | From 69° 57' S. | 125° 45' W. | | | | | | | |
| | To 69° 37' S. | 125° 33' W. | | | | | | | |
| | From 69° 37' S. | 125° 33' W. | | | | | | | |
| | To 69° 22' S. | 124° 17' W. | | | | | | | |
| | From 69° 22' S. | 124° 17' W. | | | | | | | |
| | To 69° 07' S. | 123° 58' W. | | | | | | | |
| | From 69° 07' S. | 123° 58' W. | | | | | | | |
| | To 68° 52' S. | 123° 13' W. | | | | | | | |
| 27 | From 68° 52' S. | 122° 26' W. | Numerous small bergs, growlers and bergy bits | 8 large tabular bergs, remainder small and irregular, numerous streams of drift ice. | do. | | | | |
| | To 68° 35' S. | 122° 26' W. | | | | | | | |
| | From 68° 35' S. | 122° 26' W. | | | | | | | |
| | To 67° 59' S. | 121° 37' W. | | | | | | | |
| | From 67° 59' S. | 121° 37' W. | | | | | | | |
| | To 67° 01' S. | 120° 20' W. | | | | | | | |
| | From 67° 01' S. | 120° 20' W. | | | | | | | |
| | To 66° 57' S. | 119° 52' W. | | | | | | | |
| | From 66° 57' S. | 119° 52' W. | | | | | | | |
| | To 66° 26' S. | 117° 30' W. | | | | | | | |
| 28 | From 66° 26' S. | 117° 30' W. | 1 berg ... | Small and irregular ... | do. | | | | |
| | To 66° 04' S. | 116° 34' W. | | | | | | | |
| | From 66° 04' S. | 116° 34' W. | | | | | | | |
| | To 63° 25' S. | 62° 03' W. | | | | | | | |
| | From 63° 25' S. | 62° 03' W. | | | | | | | |
| | To 63° 19' S. | 61° 58' W. | | | | | | | |
| | From 63° 19' S. | 61° 58' W. | | | | | | | |
| | To 63° 08' S. | 61° 10' W. | | | | | | | |
| | From 63° 08' S. | 61° 10' W. | | | | | | | |
| | To 63° 01' S. | 60° 36' W. | | | | | | | |
| 2 | From 63° 01' S. | 60° 36' W. | 2 bergs and brash ... | Small tabular, very close together, probably recently split. Brash to leeward. | R.R.S. <i>William Scoresby</i> . | | | | |
| | To 62° 55' S. | 60° 14' W. | | | | | | | |
| | From 62° 55' S. | 60° 14' W. | | | | | | | |
| | To 62° 42' S. | 59° 42' W. | | | | | | | |
| | From 62° 42' S. | 59° 42' W. | | | | | | | |
| | To 62° 41' S. | 59° 19' W. | | | | | | | |
| | From 62° 41' S. | 59° 19' W. | | | | | | | |
| | To 62° 39' S. | 58° 35' W. | | | | | | | |
| | From 62° 39' S. | 58° 35' W. | | | | | | | |
| | To 62° 34' S. | 58° 06' W. | | | | | | | |
| 3 | From 62° 34' S. | 58° 06' W. | 3 bergy bits ... | 3 bergy bits ... | do. | | | | |
| | To 62° 24' S. | 57° 42' W. | | | | | | | |
| | From 62° 24' S. | 57° 42' W. | | | | | | | |
| | To 62° 22' S. | 57° 33' W. | | | | | | | |
| | From 62° 22' S. | 57° 33' W. | | | | | | | |
| | To 62° 18' S. | 57° 27' W. | | | | | | | |
| | From 62° 18' S. | 57° 27' W. | | | | | | | |
| | To 62° 15' S. | 57° 18' W. | | | | | | | |
| | From 62° 15' S. | 57° 18' W. | | | | | | | |
| | To 62° 13' S. | 57° 07' W. | | | | | | | |
| 4 | From 62° 13' S. | 57° 07' W. | 4 bergs and several growlers, 3 bergy bits ... | 2 small tabular, 2 small irregular. Close to Deception Island | do. | | | | |
| | To 62° 09' S. | 56° 54' W. | | | | | | | |
| | From 62° 09' S. | 56° 54' W. | | | | | | | |
| | To 62° 06' S. | 56° 23' W. | | | | | | | |
| | From 62° 06' S. | 56° 23' W. | | | | | | | |
| | To 62° 07' S. | 56° 06' W. | | | | | | | |
| | From 62° 07' S. | 56° 06' W. | | | | | | | |
| | To 62° 07' S. | 56° 01' W. | | | | | | | |
| | From 62° 07' S. | 56° 01' W. | | | | | | | |
| | To 62° 11' S. | 55° 13' W. | | | | | | | |
| 5 | From 62° 11' S. | 55° 13' W. | 4 bergs, 1 bergy bit, 5 growlers ... | 2 tabular, 2 irregular ... | do. | | | | |
| | To 62° 12' S. | 55° 06' W. | | | | | | | |
| | From 62° 12' S. | 55° 06' W. | | | | | | | |
| | To 62° 14' S. | 54° 48' W. | | | | | | | |
| | From 62° 14' S. | 54° 48' W. | | | | | | | |
| | To 62° 17' S. | 54° 18' W. | | | | | | | |
| | From 62° 17' S. | 54° 18' W. | | | | | | | |
| | To 62° 19' S. | 53° 49' W. | | | | | | | |
| | From 62° 19' S. | 53° 49' W. | | | | | | | |
| | To 62° 13' S. | 53° 55' W. | | | | | | | |
| 6 | From 62° 13' S. | 53° 55' W. | 2 bergs, 3 bergy bits, and 2 growlers ... | Small tabular ... | do. | | | | |
| | To 62° 18' S. | 53° 44' W. | | | | | | | |
| | From 62° 18' S. | 53° 44' W. | | | | | | | |
| | To 62° 19' S. | 53° 26' W. | | | | | | | |
| | From 62° 19' S. | 53° 26' W. | | | | | | | |
| | To 62° 21' S. | 52° 39' W. | | | | | | | |
| | From 62° 21' S. | 52° 39' W. | | | | | | | |
| | To 62° 22' S. | 52° 20' W. | | | | | | | |
| | From 62° 22' S. | 52° 20' W. | | | | | | | |
| | To 62° 27' S. | 50° 57' W. | | | | | | | |

SOUTHERN ICE REPORTS, February—continued.

| Year. | Day. | Position of Ice. | | Description. | Remarks. | Name of Ship reporting. |
|-----------------|-----------------|--|--|--|---|----------------------------------|
| | | Latitude. | Longitude. | | | |
| 1938 | 6 | 62° 23' S. | 52° 09' W. | Bergy bit, brash, growlers, and fragments of drift ice. | ... | R.R.S. <i>William Scoresby</i> . |
| | | From 62° 27' S. | 50° 53' W. | Light scattered drift ice | Very weathered heavy floes, with close pack to South and East. Steaming along northern edge of pack, amongst drift ice. | do. |
| | To 62° 17' S. | 50° 42' W. | 1 berg, 4 bergy bits | One small tabular berg | do. | |
| | From 62° 17' S. | 50° 42' W. | 4 bergs, 3 growlers, light scattered drift ice | One large tabular, one medium tabular, two small tabular | do. | |
| | To 62° 15' S. | 50° 07' W. | 4 bergs | 3 small irregular bergs | do. | |
| | From 62° 15' S. | 50° 07' W. | 2 bergy bits, brash, light scattered drift ice | ... | do. | |
| | To 62° 15' S. | 49° 29' W. | } 9 growlers, light scattered drift ice | Large | do. | |
| | From 62° 15' S. | 48° 29' W. | | 6 bergs | Small irregular | do. |
| | To 62° 15' S. | 48° 52' W. | 3 bergs | Ice blink on northern horizon | do. | |
| | From 62° 14' S. | 48° 44' W. | 2 bergy bits, numerous growlers | Working through fairly open pack | do. | |
| | To 62° 14' S. | 48° 41' W. | 2 bergs, 5 bergy bits | Clearing pack, much drift ice | do. | |
| | From 62° 12' S. | 48° 24' W. | Drift ice pack, 4 bergy bits, 4 growlers | ... | do. | |
| | To 62° 11' S. | 48° 18' W. | } 5 bergs, 5 bergy bits | 2 tabular bergs, remainder small irregular | do. | |
| | To 62° 08' S. | 47° 28' W. | | 3 bergy bits, 2 growlers | One bergy bit, discoloured | do. |
| | From 62° 08' S. | 47° 13' W. | 2 bergs, 7 bergy bits | 1 small tabular berg | do. | |
| | To 62° 13' S. | 46° 11' W. | 1 berg, 1 growler | ... | do. | |
| | From 62° 38' S. | 45° 02' W. | 3 bergs, 2 bergy bits | One medium tabular berg | do. | |
| | To 62° 51' S. | 44° 27' W. | Pack, 2 bergs | Very open pack. Heavy floes very weathered | do. | |
| | From 62° 58' S. | 44° 28' W. | } Pack | Cleared pack | do. | |
| | To 63° 05' S. | 44° 31' W. | | 3 bergs, 1 bergy bit | Small irregular bergs | do. |
| | From 63° 00' S. | 45° 00' W. | 3 bergs | Medium tabular | do. | |
| | To 62° 47' S. | 46° 07' W. | 9 bergy bits, pack | Several bottle green growlers | } Keeping to N'wd. of loose pack and drift ice. | |
| | From 62° 43' S. | 46° 14' W. | 2 bergs | Small irregular | | |
| | To 62° 38' S. | 46° 25' W. | 1 berg, 2 bergy bits | Small tabular berg | } Working through drift ice pack to S'ward. | |
| | From 62° 36' S. | 46° 35' W. | 5 bergy bits, drift and pack ice | Low tabular berg | | |
| | To 62° 31' S. | 47° 00' W. | 1 berg, 11 bergy bits, drift and pack ice | ... | do. | |
| | To 62° 24' S. | 47° 12' W. | } 4 bergs | 1 large tabular, 2 small tabular, 1 medium irregular | do. | |
| | To 62° 13' S. | 47° 31' W. | | 2 bergs, 4 bergy bits, brash and growlers | 2 medium tabular bergs | do. |
| | To 62° 06' S. | 48° 15' W. | 8 bergs, 8 bergy bits, numerous brash and growlers. | ... | do. | |
| | To 62° 04' S. | 48° 25' W. | 1 berg, 6 bergy bits, drift and pack ice | 1 medium tabular (drift ice and pack to southward) | do. | |
| | From 61° 50' S. | 48° 33' W. | 2 bergy bits, 6 growlers, pack ice | Pack to southward | do. | |
| | To 61° 43' S. | 49° 02' W. | } Berg | Low tabular | do. | |
| | From 61° 43' S. | 49° 17' W. | | Berg | Large tabular. Proceeding along southern face of berg for 2 to 3 miles trending W.N.W., obscured by snow. | do. |
| | To 61° 50' S. | 49° 50' W. | } Berg, 4 growlers, drift ice | Small irregular, to southward, large quantities of brash | do. | |
| | From 61° 52' S. | 50° 46' W. | | Berg, 1 berg bit | Medium tabular berg | do. |
| | To 61° 54' S. | 51° 48' W. | 5 bergs, 1 bergy bit | 3 tabular bergs, 1 very weathered | do. | |
| | From 61° 56' S. | 52° 32' W. | 6 bergy bits | ... | do. | |
| | To 61° 57' S. | 53° 16' W. | Bergy bit | Half white, half bottle green | do. | |
| | From 61° 56' S. | 53° 21' W. | Bergy bit | ... | do. | |
| | To 61° 56' S. | 53° 38' W. | Bergy bit | ... | do. | |
| | From 61° 55' S. | 53° 57' W. | Bergy bit | ... | do. | |
| | To 61° 54' S. | 54° 18' W. | 2 bergs, 3 growlers | 1 medium tabular | do. | |
| | From 61° 53' S. | 54° 43' W. | 2 bergs, 1 bergy bit | 1 small tabular | do. | |
| | To 61° 52' S. | 55° 07' W. | 4 bergy bits, 2 growlers | ... | do. | |
| | From 61° 49' S. | 55° 38' W. | 2 bergs, 2 bergy bits | 1 bergy bit with dark green stains in marble effect | do. | |
| To 61° 46' S. | 55° 57' W. | 2 bergs | Small irregular | do. | | |
| From 61° 39' S. | 56° 27' W. | 1 growler | ... | do. | | |
| To 61° 32' S. | 56° 53' W. | Berg | Medium tabular | do. | | |
| From 61° 31' S. | 57° 09' W. | 2 growlers | Dark colour, awash | do. | | |
| To 61° 31' S. | 59° 26' W. | 1 bergy bit | Sea breaking right over it | do. | | |
| From 63° 18' S. | 64° 51' W. | Pack | Loose pack, light, very weathered | do. | | |
| To 67° 06' S. | 71° 48' W. | Drift ice | Many fragments and brash | do. | | |
| From 67° 02' S. | 71° 37' W. | Sludge | ... | do. | | |
| To 67° 06' S. | 71° 35' W. | Sludge | ... | do. | | |
| From 67° 07' S. | 71° 35' W. | Brash | Small patch. Pack to southward | do. | | |
| To 67° 04' S. | 71° 16' W. | Drift pack | To S.S.E. | do. | | |
| From 66° 52' S. | 70° 15' W. | 3 bergy bits | ... | do. | | |
| To 66° 49' S. | 69° 33' W. | Pack | Pack to eastward, distant 3½ miles. A few bergs in direction of Adelaide Island. | do. | | |
| From 64° 18' S. | 64° 08' W. | Berg | Tabular | do. | | |
| To 64° 14' S. | 64° 20' W. | Berg, several growlers | Irregular berg | do. | | |
| From 64° 08' S. | 63° 48' W. | Berg | Small tabular | do. | | |
| To 64° 06' S. | 63° 39' W. | 3 growlers | ... | do. | | |
| From 64° 08' S. | 63° 00' W. | Bergy bit, growler | ... | do. | | |
| To 64° 03' S. | 62° 50' W. | 2 bergs, 2 growlers | Small irregular bergs | do. | | |
| From 63° 56' S. | 62° 50' W. | Berg | Small irregular | do. | | |
| To 63° 54' S. | 62° 44' W. | Growler | Large, awash | do. | | |
| From 63° 43' S. | 62° 18' W. | Berg | Small irregular | do. | | |
| To 63° 33' S. | 62° 00' W. | 2 bergs and 1 growler | Small irregular | do. | | |
| From 63° 32' S. | 61° 57' W. | 5 bergs, 10 bergy bits, several growlers | Small irregular bergs | do. | | |
| To 63° 10' S. | 60° 55' W. | } 1 berg, 4 bergy bits | Small tabular berg | do. | | |
| To 63° 06' S. | 60° 29' W. | | 1 berg, 7 bergy bits, several growlers | Small tabular berg | do. | |
| From 62° 47' S. | 58° 32' W. | 3 bergs, 10 bergy bits, several growlers | Small irregular bergs | do. | | |
| To 62° 27' S. | 57° 32' W. | 2 bergs, 9 bergy bits, several growlers | Small irregular bergs, 1 bergy bit, discoloured | do. | | |
| From 62° 24' S. | 57° 17' W. | 3 bergs, 3 bergy bits, 1 growler | Small irregular bergs | do. | | |
| To 62° 04' S. | 56° 40' W. | } Berg | Small irregular | do. | | |
| To 61° 46' S. | 56° 40' W. | | ... | ... | do. | |

March.

| | | | | | | | |
|------|---------------|-----------------|-----------------|--|---|------------------------------|---|
| 1938 | 1 | 66° 20' S. | 115° 26' W. | Berg | Small tabular | R.R.S. <i>Discovery II</i> . | |
| | | From 70° 26' S. | 103° 24' W. | } Pack ice, numerous bergs | Encountered heavy pack ice at this first position, consisting of large old hummocked floes, and although visibility was poor, numerous large bergs, tabular and irregular, were observed. Vessel skirted close to ice edge between positions, bergs lying approximately 1-2 miles south of track. | do. | |
| | To 70° 20' S. | 102° 36' W. | From 70° 20' S. | | 102° 36' W. | } Pack ice, numerous bergs | Vessel skirting pack ice edge, conditions similar to above |
| | To 70° 11' S. | 100° 56' W. | From 70° 11' S. | 100° 56' W. | } Pack ice, numerous bergs | | Vessel skirting pack ice between positions. Numerous bergs mostly irregular were observed fast in the pack. |
| | To 69° 59' S. | 99° 40' W. | From 69° 59' S. | 99° 40' W. | | } Berg | Large and irregular, weathered |
| | To 69° 30' S. | 97° 06' W. | From 69° 30' S. | 97° 06' W. | } Berg | | Small and irregular |
| | To 58° 35' S. | 49° 58' W. | 2 bergs | Small and irregular, much seaworn, within 4 miles of track | | do. | |
| | To 59° 53' S. | 48° 35' W. | ... | ... | do. | | |

SOUTHERN ICE REPORTS, March—continued.

| Year. | Day. | Position of Ice. | | Description. | Remarks. | Name of Ship reporting. |
|------------|------|------------------|---------------------|--|---|------------------------------|
| | | Latitude. | Longitude. | | | |
| 1938 | 24 | 60° 03' S. | 48° 21' W. | Berg | Small and irregular, within 1 mile of track | R.R.S. <i>Discovery II</i> . |
| | | 60° 19' S. | 48° 01' W. | 2 bergs | Medium size tabular | do. |
| | | 60° 40' S. | 47° 37' W. | Berg | Small and irregular | do. |
| | | 60° 50' S. | 47° 24' W. | Berg | | do. |
| | | 61° 15' S. | 46° 53' W. | Berg | Low lying and irregular | do. |
| | | 61° 22' S. | 46° 44' W. | Berg | Small and irregular | do. |
| | | 61° 59' S. | 46° 02' W. | 3 bergs | All small and irregular, within 3 miles of track | do. |
| | 25 | 62° 07' S. | 45° 53' W. | Berg | Medium size and irregular, discoloured, with morainic deposit | do. |
| | | 62° 17' S. | 45° 41' W. | Berg | Small and irregular | do. |
| | | 60° 27' S. | 49° 27' W. | 2 bergs, 1 growler | Small and irregular, within 4 miles of track | do. |
| | 26 | 59° 42' S. | 41° 25' W. | Berg | | do. |
| | | 55° 40' S. | 127° 18' W. | 1 large berg and several bergy bits | Dimensions: Height, 240 feet; length, 600 feet. Measured by sextant angles. (Photograph see Marine Observers' log). The berg appeared to be old and weather-worn. Several large bergy bits in vicinity. These, apparently, had broken away from the main berg. | M.V. <i>Durham</i> . |
| | 25 | Same Position. | | 1 small berg, several bergy bits | Small peaked berg. Several small bergy bits in vicinity | do. |
| | | 56° 00' S. | 127° 18' W. | 1 large berg | A typical tabular berg estimated to be at least 1 mile in length and not less than 500 feet high. | do. |
| | | 55° 40' S. | 126° 42' W. | 1 large berg and several bergy bits | Estimated dimensions: Height, 240 feet; length, 600 feet. The berg was surrounded by numerous small bergy bits. | do. |
| | | 55° 30' S. | 124° 05' W. | 1 large berg | Estimated to be not less than 500 feet high. Tabular berg | do. |
| | | 55° 44' S. | 117° 54' W. | 1 large berg | Estimated to be not less than 250 feet high. Peaked berg | do. |
| 56° 04' S. | | 117° 54' W. | 1 large berg | Estimated to be not less than 200 feet high. Peaked berg | do. | |
| 56° 04' S. | | 117° 26' W. | 1 large berg | Estimated to be not less than 400 feet high. Tabular berg | do. | |

Reports of Ice previous to January, February and March, 1938 will be found in the "MARINE OBSERVER," Volume XV, No. 129, p. 22.

WIRELESS WEATHER SIGNALS.

Under the heading "Wireless Weather Signals" it is intended to publish particulars and concise descriptions of Signals and Code used for reporting Weather, Ice and Time, in conformity with the International Convention of Safety of Life at Sea, in four sections.

I. Ships' Wireless Weather Signals.

II. Wireless Weather Signals made from the shore to ships. (Weather Bulletins and Storm Warnings.)

III. Wireless Time Signals.

IV. Wireless Ice Signals.

Sections II, III and IV will be published as far as possible in geographical order, so that the most suitable of these signals for all parts of the world may be as complete as possible in each year's Numbers of THE MARINE OBSERVER.

The International Ships' Wireless Weather Telegraphy Code, which came into force on May 1st, 1930, is given on pp. 38 to 41.

Request for information to Meteorological Services of Maritime Countries.

Invitation is hereby given to send concise descriptions of Weather Signals made for the information of shipping and seamen in all parts of the World, in accord with the International Convention of Safety of Life at Sea, 1929, with a view to publication in the appropriate number of "The Marine Observer." Only limited space is available.

REQUEST TO WEATHER SERVICES OF ALL MARITIME COUNTRIES.

In conformity with the International Convention for Safety of Life at Sea, the State Weather Services of maritime countries in all parts of the world, desiring to receive routine weather reports from British shipping, are invited to forward the names of W.T. stations appointed to receive weather reports from Selected Ships in order that the British Meteorological Office may be enabled to encourage the service specified in Article 35, clause (c) of that Convention, and so fulfil Great Britain's part in this International Contract.

The organization of British Selected Ships has now been worked up to a high state of efficiency and, where necessary, other British ships are invited to complete the desired service as far as possible. It is therefore necessary that the lists of wireless stations detailed to receive reports from British Selected Ships should be kept up to date and be as complete as possible in "The Marine Observer" so that these lists may be copied in other publications available generally to British shipping. Foreign, British Dominion and Colonial Weather Services are therefore asked—if they desire weather reports from British ships—to forward the following information:—

(1) The name of the receiving station which is appointed to work in conformity with the schedule given on page 31 for Type A.1, C.W. ships ("A" Selected Ships), with its call sign, latitude and longitude, similar to that given on page 33 for Portishead, GKU, except that the control system is only necessary in areas of great congestion such as the Eastern North Atlantic and North Sea.

(2) The name of the station or stations detailed to receive reports from "B" Selected Ships, working the schedule given on page 31, for Type A.2, I.C.W., and Type B ships, with call sign, latitude and longitude, similar to that given on page 35 for Humber, GKZ.

(3) The telegraphic address of the appropriate meteorological centre should be given in each case, together with the desired groups of the International Ships' Wireless Weather Telegraphy Code.

(4) It is desirable that the stations appointed to receive reports from British Selected Ships and other British ships where and when necessary should be well distributed, and as far as possible that one station only should be appointed to serve an area consistent with the wireless range of Selected Ships, which is up to about 1,800 miles for "A" Selected Ships, and upwards from 200 miles for "B" Selected Ships.

I. SHIPS' WIRELESS WEATHER SIGNALS.

WORLD-WIDE SYSTEM OF VOLUNTARY SELECTED SHIPS ROUTINE WIRELESS WEATHER TELEGRAPHY.

(1) For the purpose of aiding navigation, in accordance with Article 35, para. (c) of the International Convention for Safety of Life at Sea, 1929, Merchant Shipping (Safety and Load Line Conventions) Act, 1932, First Schedule (see The Marine Observers Handbook, Sixth Edition, page 106), and to assist the meteorological services of the world with weather intelligence, it is intended that there shall be an agreed number of regularly reporting ships, termed Selected Ships, of all nations, distributed over all oceans, working voluntarily under their national state meteorological institutions.

At present the number agreed upon is 1,000 of all nations.

(2) In order that this work may be fairly distributed amongst the different national merchant navies, and to prevent congestion in wireless communication, it is intended that each national meteorological service should maintain in voluntary service a number of Ships on the register of their own country as Selected Ships, in accordance with their proportion of the world's tonnage of steam and motor vessels of over 100 tons.

The following table gives the world's tonnage and the number of Selected Ships at present desired for each maritime country of the world, including those that are not yet party to the Convention of Safety of Life at Sea.

**Total Merchant Tonnage Approximate (Steam and Motor)
of the World.**

(Vessels over 100 tons, Lloyd's Register Book, 1938-39)

**And Number of Selected Ships Required for Making W.T.
Weather Reports in all Oceans, World Wide.**

| Country. | Steamers and Motor Vessels. | | Percentage of World Tonnage. | Number of Selected Ships required. | Approximate Number of Ships fitted for C.W. Long Wave Transmission (July, 1938) |
|---|-----------------------------|-------------|------------------------------|------------------------------------|---|
| | Number. | Gross Tons. | | | |
| British Empire Total | 8,899 | 20,314,978 | 31.7 | 317 | 168 |
| America (United States)(excluding Lakes). | 2,436 | 9,047,828 | 14.2 | 142 | 226 |
| Argentina ... | 293 | 280,814 | 0.4 | 4 | 4 |
| Belgium ... | 206 | 430,624 | 0.7 | 7 | 10 |
| Brazil ... | 286 | 483,446 | 0.7 | 7 | 6 |
| Chile ... | 94 | 157,707 | 0.3 | 3 | — |
| China ... | 247 | 472,578 | 0.7 | 7 | — |
| Denmark ... | 694 | 1,129,556 | 1.8 | 18 | 23 |
| Finland ... | 352 | 542,741 | 0.8 | 8 | — |
| France ... | 1,246 | 2,880,783 | 4.5 | 45 | 14 |
| Germany ... | 2,321 | 4,231,657 | 6.6 | 66 | 35 |
| Greece ... | 638 | 1,889,269 | 2.9 | 29 | — |
| Holland ... | 1,473 | 2,852,012 | 4.5 | 45 | 16 |
| Italy ... | 1,156 | 3,258,992 | 5.1 | 51 | 147 |
| Japan ... | 2,187 | 5,006,712 | 7.8 | 78 | 467 |
| Jugo-Slavia ... | 178 | 386,187 | 0.6 | 6 | — |
| Latvia ... | 91 | 193,083 | 0.3 | 3 | — |
| Norway ... | 1,963 | 4,613,175 | 7.2 | 72 | 11 |
| Panama ... | 134 | 611,207 | 1.0 | 10 | 13 |
| Portugal ... | 214 | 249,776 | 0.4 | 4 | 13 |
| Russia (Soviet Union). | 680 | 1,272,897 | 2.0 | 20 | 13 |
| Spain ... | 793 | 947,963 | 1.5 | 15 | 14 |
| Sweden ... | 1,239 | 1,571,054 | 2.5 | 25 | 3 |
| Turkey ... | 185 | 220,636 | 0.3 | 3 | — |
| Other Countries ... | 725 | 952,934 | 1.5 | 15 | 31 |
| Total ... | 28,728 | 63,998,609 | 100.0 | 1,000 | 1,214 |

| Country. | Steamers and Motor Vessels. | | Percentage of World Tonnage. | Number of Selected Ships required. | Approximate Number of Ships fitted for C.W. Long Wave Transmission (July, 1938) |
|-----------------------------------|-----------------------------|-------------|------------------------------|------------------------------------|---|
| | Number. | Gross Tons. | | | |
| Great Britain and Ireland. | 6,843 | 17,675,404 | 27.6 | 276 | 148 |
| Australia and New Zealand. | 529 | 674,258 | 1.0 | 10 | 1 |
| Canada (excluding Lakes). | 625 | 807,515 | 1.3 | 13 | 17 |
| Hong Kong ... | 117 | 291,415 | 0.4 | 4 | — |
| India and Ceylon... | 179 | 237,450 | 0.4 | 4 | — |
| South Africa and Other Colonies*. | 606 | 628,936 | 1.0 | 10 | 2 |
| British Empire Total. | 8,899 | 20,314,978 | 31.7 | 317 | 168 |

* Including Dominion of Newfoundland.

(3) Selected Ships are broadly divided into two types, "A" and "B."

"A" Selected Ships are ships fitted for long range W.T. transmission (Type A.1, C.W. apparatus) mostly mail steamers sailing and arriving at dates fixed by advertised programmes.

"B" Selected Ships are ships fitted for shorter range W.T. transmission (Type A.2, I.C.W. apparatus), including passenger and cargo liners sailing according to an advertised programme, as well as a number of vessels whose movements are not advertised and may vary from voyage to voyage.

(4) It is necessary that observations reported by wireless telegraphy should synchronize. The International times of observation for weather telegraphy at sea are 0000, 0600, 1200 and 1800 hours G.M.T.

(5) It is necessary that weather reports made for the information of all ships and the meteorological services of the different countries should be in one code, simple and concise, giving only essential information.

Selected Ships use the International Ships' Wireless Weather Telegraphy Code.

British Selected Ships.

(6) When British ships become regular voluntary observing ships to the Meteorological Office, London, their Commanders volunteer to carry out the duties of Selected Ships when required.

The names of all British observing ships are published in a fleet list at the end of THE MARINE OBSERVER, corrected monthly by supplement.

(7) Selected Ships are selected from this list, according to their sailing schedules and trades to provide distribution, and according to their wireless apparatus to ensure efficient communication.

(8) When observing ships are detailed as Selected Ships, their commanders are specially notified; and each Selected Ship is identified by a number placed before her name in the fleet list.

(9) There are (July 1st, 1938), 4,056 British ships fitted with wireless telegraphy. The proportion fitted with Type A.1 is about 1 to every 26 fitted with Type A.2 or Type B apparatus.

Of the total of 4,056 British ships fitted with W/T.—

148 are fitted for sending Medium Wave, C.W.

460 " " " " Short Wave, I.C.W.

Nearly all British ships carrying W/T are capable of receiving on medium wave, and this is not subject to skip, whereas far fewer can receive on short wave, and it is subject to skip.

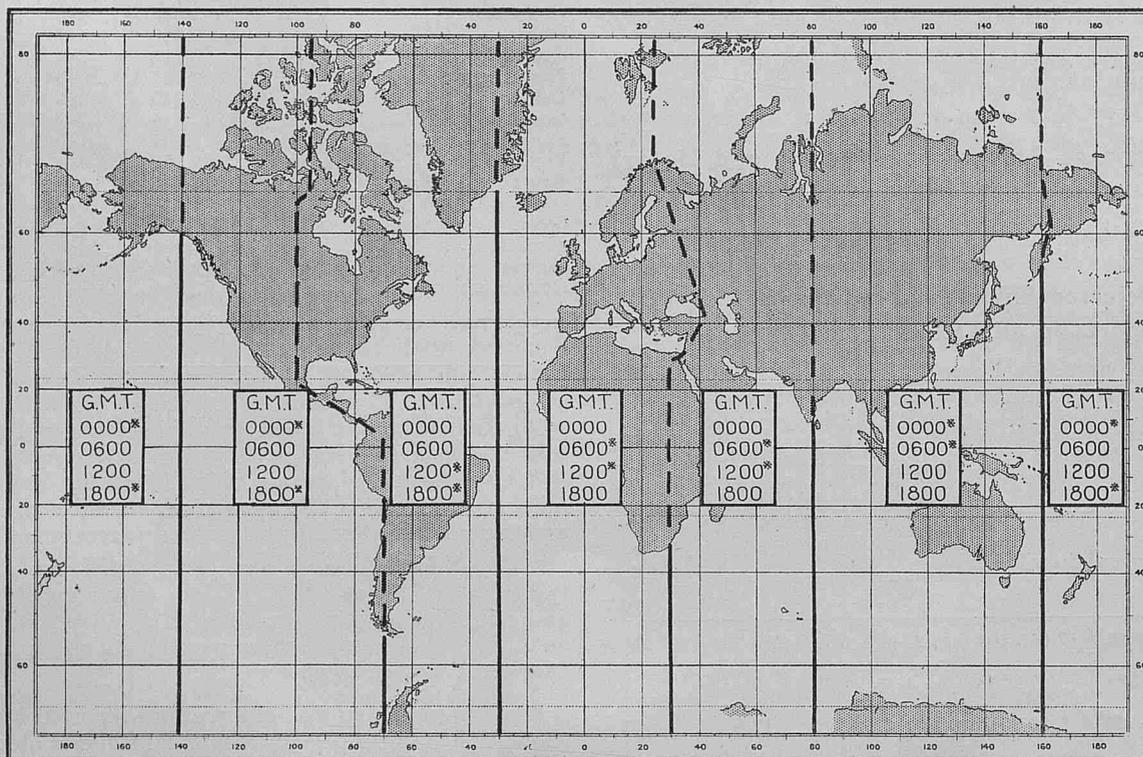
(10) A fairly long range without skip being desirable, at present medium wave, C.W., is more reliable, and British "A" Selected Ships are at present confined to ships so fitted.

Times of Observation.

(11) The following Chart indicates the zones for which the International watch-keeping periods are fixed for wireless operators, all four times of meteorological observation being indicated in each zone.

International Observation Times for Weather Telegraphy at Sea.

* Indicates usually daylight.



(12) Many Selected Ships only have one officer in each watch. The first essential for safe navigation is a good lookout kept by the officer of the watch, as well as the lookout man. The officer of the watch is responsible for meteorological observation, and the accuracy of reports. If the officer of the watch at night goes into the lighted chart house to read meteorological instruments and record them, not

only does he leave his post of lookout, but he returns to the bridge momentarily blinded.

(13) Wireless meteorological reports are not asked for in British Selected Ships during the hours of darkness in which there is only one officer in each watch.

The times of observation which are starred on the chart are those which generally fall during daylight in the different zones, and at these times all British Selected Ships are requested to record observations for reporting by wireless.

(14) In certain parts of the world "A" Selected Ships having two officers in each watch are requested to record observations at all four times, and report them to certain meteorological services.

Communication.

(15) In order that communication may be effective (that is, that the reports may reach as many ships as possible as well as the appropriate meteorological centres), British Selected Ships work a time schedule for transmitting their reports and use prescribed wave lengths both when addressing specified stations or all ships.

(16) Generally Selected Ships address their reports to specified centres, when within range of coast stations appointed to receive weather reports in this service, through such stations (on the appropriate wave length).

When not within range of such stations, or when those stations indicate that the reports are not desired ashore, to **CQ**.

(17) It cannot be too strongly emphasized that these reports are intended for all ships; and therefore, particularly when reports are not desired ashore, and within range of an appointed station, or in parts of the world where stations are not appointed to receive these reports, the routine report should be made to **CQ**.

(18) Great importance is attached to the S O S periods of silence.

Therefore the times of transmission for "A" Selected Ships are fixed to commence immediately at the end of the appropriate S O S silence period.

This allows a sufficient interval from the time of observation for recording and coding the observations carefully and sending the coded messages from the bridge to the wireless house.

(19) Usually the times of commencement of transmission for "A" and "B" Selected Ships are fixed at 18 minutes and 30 minutes respectively after observation time; but for ships with only one W.T. operator in certain zones, special commencing periods are fixed to accord with wireless watch.

(20) The schedule which follows indicates the times of observation and commencement of times of transmission for both "A" and "B" Selected Ships in the different zones. Reports of observations made at intermediate times, *see* (35), should be made at 18 or 30 minutes past the hour respectively by "A" or "B" Selected Ships.

Schedule.

All times are G.M.T.

| Zones between Greenwich Meridians. | FIRST WEATHER REPORT. | | | SECOND WEATHER REPORT. | | |
|------------------------------------|------------------------|---|---|------------------------|---|---|
| | Times of observations. | Times of reporting by Type A1 (C.W.) Ships. | Times of broadcasting by Type A2 (I.C.W.) and Type B (Spark) Ships. | Times of observations. | Times of reporting by Type A1 (C.W.) Ships. | Times of broadcasting by Type A2 (I.C.W.) and Type B (Spark) Ships. |
| 30° W.-30° E. | 0600 | { 0618 0818 } | 0830 | 1200 | 1218 | 1230 |
| 30° E.-80° E. | 0600 | { 0618 0818 } | 0630 0830 | 1200 | 1218 | 1230 |
| 80° E.-160° E. | 0000 | 0018 | 0030 | 0600 | { 0618 0818 1818 } | 0830 |
| 160° E.-140° W. | 0000 | 0018 | 0030 | 1800 | { 2018 1818 2018 } | 2030 |
| 140° W.-70° W. | 0000 | 0018 | 0030 | 1800 | { 2018 1818 2018 } | 1830 2030 |
| 70° W.-30° W. | 1200 | 1218 | 1230 | 1800 | { 1818 2018 } | 2030 |

It will be noted that against some of the observation times there are two times of commencement of periods for transmitting. The second of these times, where two occur, are for single operator ships to report, in cases where they would not be keeping wireless watch following the observation hour. It should be remembered that a large proportion of "Selected Ships" carry two or three operators, and they should use the earlier periods for transmission, also repeating for the benefit of ships with one operator during the second period.

In working this schedule, Selected Ships should be careful not to jam each other.

It may be advantageous for Selected Ships—beyond the region of the Eastern North Atlantic, regulated by Roll Calls, and when not reporting to a shore station—when in W/T communication previous to reporting time to arrange the order in which they will transmit their weather reports to **CQ** at the next scheduled time.

(21) For "A" Selected Ships the wave length to be used in reporting to shore stations is specified in a list of stations detailed to receive coded weather reports from "A" Selected Ships, published in the latest number of *THE MARINE OBSERVER*. In the Eastern North Atlantic, where there is great congestion of wireless traffic, British Selected Ships work in accordance with roll calls for the day, broadcast from the specified W/T stations for the information of all shipping, particulars of which are given in the detailed list of wireless stations above mentioned.

In parts of the world where there are not stations detailed to receive reports from "A" Selected Ships, they make their reports to **CQ** on 2100 metres.

(22) "B" Selected Ships should use 600 metres wave length throughout the service in all parts of the world.

The names of stations detailed to receive weather reports from "B" Selected Ships are given in a list following that for "A" Selected Ships in the latest number of *THE MARINE OBSERVER*.

(23) The Chart of the World accompanying the lists of wireless stations detailed to receive reports from British Selected Ships, at the end of *THE MARINE OBSERVER* is revised and kept up to date quarterly. It is intended to illustrate the foregoing description by indicating graphically the stations and their approximate range, or the limits of the areas for which they should be used by British Selected Ships, and for which the details are given in the aforementioned lists.

(24) In order that all ships should know when Selected Ships make their reports, and be able to decode them, a pamphlet M.O. 329, entitled *DECODE FOR USE WITH THE INTERNATIONAL CODE FOR WIRELESS WEATHER MESSAGES FROM SHIPS* has been published since May, 1930. This has been placed on board British ships by their owners, and the schedule of communication is now so well known throughout the sea service that jamming and confusion have been much reduced.

All are asked to help in maintaining the success of this voluntary scheme.

(25) No communication charges are made to the ship for Selected Ships' routine wireless weather reports broadcast to all ships, or addressed to meteorological centres specified in the lists in the last number of *THE MARINE OBSERVER*. Wireless weather reports addressed by ships to meteorological centres not conforming to these instructions may be liable to charges.

(26) The number of messages required for this service is comparatively small, when effectively organized.

Relaying on wave lengths specified in (21), (22), and in the lists of stations in *THE MARINE OBSERVER* (that is to say, wave lengths used for Selected Ship weather reporting) should not be resorted to.

Every endeavour should be made for the reports in areas in which International W/T link or collective ships, such as the French S.S. *Cuba*, are working, to reach those ships, who will relay them to special shore stations for the information of meteorological centres on a special short wave (long range).

The main object of this system is to make one transmission serve as many ships as possible and the appropriate meteorological centre with the information reported.

(27) While there is congestion in the Eastern North Atlantic and Selected Ships and other British ships are therefore indicated by roll call to report, in other parts of the world there may often be insufficient Ships to provide an adequate service of routine reports.

In the regions of heavy weather on the less frequented routes of the Southern Ocean, and particularly in the Hurricane regions during the Hurricane season, British ships other than Selected Ships are asked to assist in this service.

This will be dealt with in (34).

Observation and Coding.

(28) Guidance in observing and recording meteorological elements will be found in the *MARINE OBSERVER'S HANDBOOK*.

(29) The code, and guidance for its use are given on pages 38 to 41 of this number. For working purposes a glazed code card Form 138A with Code Tables and schedule for communication is supplied to the commanders of Selected Ships.

Brief Instructions for the Guidance of British Selected Ships.

(30) The work of "A" and "B" Selected Ships is interdependent.

It is essential that observing officers should be conversant with communication as well as being skilled in observation, and the application of the meteorological information; and that wireless operators should be conversant with the general purpose and application of the information communicated as well as skilled in this system of communication.

It is therefore essential that all concerned should be familiar with the whole scheme.

The following brief instructions are intended to assist the Commanders of Selected Ships in regulating the work under their command.

All Selected Ships.

(31) **Observing Officers.**—At the times indicated for observation on the chart, *see* (13) and (14), carefully enter your observations in the record of synchronized observations, Form 911 or 915.

Code these observations on to the Register, Form 138.

If the message is to be broadcast to **CQ** the weather information may be conveniently abbreviated to the four universal groups of figures; and instead of using supplementary groups, information of Ice or Set and Drift of current may be given briefly in plain language.

If the message is to be sent to a meteorological centre, ascertain from the list in the latest *MARINE OBSERVER* what groups are desired, and make out the message accordingly.

Write out the message on Form 139 and address carefully to **CQ Weather** or the specified meteorological centre for the part of the world given in the lists in the latest number of *THE MARINE OBSERVER*. Send it to the wireless operator just before the commencement of the S O S period following the observation time.

Example. For Meteorological centre.—From **GMLJ** to **GKU** Weather London 20506, 13106, 18603, 88660, 35x08, 54528, 65825.

Example. For all ships.—**CQ** Weather 13167, 55106, 00000, 16979 Current from 15N. 52E. to 16N. 54E. 58 degrees one knot Dalgoma.

“ A ” Selected Ships.

(32) **Wireless Operator.**—Consult the list of stations detailed to receive reports from “ A ” Selected Ships in *THE MARINE OBSERVER*.

In the Eastern North Atlantic, when on the roll call transmit the weather report to **GKU** accordingly on the appointed wave length, following the order of the roll call at the schedule time. The reports for 0000 and 1800 hours G.M.T. should be made as soon as convenient after the silence period.

In parts of the world where the message is addressed to a meteorological centre call the station detailed in *THE MARINE OBSERVER* at schedule time, see (20), and on the wave length specified, and transmit the report, which will be acknowledged in the ordinary way, remembering that this message is intended for ships within range as well as the shore station.

In parts of the world where there is no station detailed in *THE MARINE OBSERVER* the message should be addressed to **CQ** and broadcast at schedule time on 2100 metres.

Make your transmissions as above with due consideration to circumstances.

“ B ” Selected Ships.

(33) **Wireless Operator.**—Consult the list of stations detailed to receive reports from “ B ” Selected Ships in *THE MARINE OBSERVER*.

When within range of any of these stations the message should be addressed direct to the appropriate meteorological centre. When not within range of any station detailed to receive reports from “ B ” Selected Ships the message should be broadcast to **CQ** at or following schedule time given in (20) on 600 metres.

In the Eastern North Atlantic, when on the roll call of *GMH* or *GCK*, transmit the weather report to that station on 600 metres, following the order of roll call and at schedule time.

Ships' Wireless Weather Reports in Parts of the World where there are not sufficient Selected Ships to provide an adequate Service.

(34) Under Article 34 of the Convention for Safety of Life at Sea, the master of every ship meeting a dangerous tropical storm, is bound by law to report to ships in the vicinity, and to the first point of the coast with which he can communicate (see *THE MARINE OBSERVER HANDBOOK*, Sixth Edition, page 106). In addition to this, the voluntary service of routine reports is particularly desirable in all parts of the world; and where there are not sufficient Selected Ships to provide an adequate service, all British Ships fitted with wireless telegraphy are asked to assist in the service.

This applies particularly to the regions of heavy weather in the Southern Ocean and to regions of tropical revolving storms.

With a view to stimulating this supplementary service of making weather reports in the Selected Ship service when and where there are not Selected Ships, a supplementary list of British Weather Reporting Ships is being made.

Only British ships suitably fitted with wireless telegraphy, and who have been visited by the Merchant Navy Agents to the Meteorological

Office, and whose masters have then undertaken to perform this service, are included in this list, which is not published, but which is sent for information to stations working a roll call.

As far as possible the International Ships' Wireless Weather Telegraphy Code should be used and the procedure for Selected Ships should only make routine wireless weather reports to the shore through stations which have been detailed to receive weather reports without charge to the ship. Such stations are notified in the lists before mentioned in *THE MARINE OBSERVER*, and these lists are copied in the Admiralty list of Wireless Signals, and are kept up to date by Admiralty Notices to Mariners.

Reprints of the list of Stations to which “ B ” Selected Ships make their reports and the accompanying chart of the world, are also supplied to the Commanders of British Supplementary Weather Reporting Ships.

The masters of all British ships are advised to procure the pamphlet, M.O.329, *DECODE FOR USE WITH THE INTERNATIONAL CODE FOR WIRELESS WEATHER MESSAGES FROM SHIPS*, published and sold by H.M. Stationery Office, through any bookseller, price 6d.

M.O. 379, a *HANDBOOK OF WEATHER, CURRENTS, AND ICE FOR SEAMEN*, gives guidance in weather forecasting, also published by H.M. Stationery Office, price 4s. 0d.

Additional Local Reports.

(35) If for local reasons, British ships are asked to report weather at times other than those of the routine times for British Selected Ships, they are requested to do so if convenient; but British Selected Ships, and British ships carrying on the service where there are not Selected Ships, should in such cases also report at the routine times laid down, so that there may always be a service of routine weather reports made at Schedule times for the benefit of navigation.

In regions where for local reasons observations are desired to be reported additional to those specified in the schedule on page 30 by ships at sea to meteorological centres ashore, Notices to Mariners, specifying a special time of observation, will be published through the appropriate State nautical authority.

These reports should be made in the International Ships' Wireless Weather Telegraphy Code.

The observations need not be recorded on the Forms supplied to British Selected Ships, for the return of observations to the Marine Division of the British Meteorological Office, for the purpose of world-wide weather investigation. Records of synchronized observations made at the four International times given in Sections (4), (11) and (20) are sufficient for this purpose.

The following additional observation times for reports to shore stations have been notified:—

| | | |
|--|--------|-------------|
| GREAT BRITAIN.—For one-operator ships only, in the Eastern North Atlantic, when reporting to Weather London and on the roll calls for Malin Head or Valentia, usually during the summer months, 15th April to 15th October inclusive, but occasionally at other times of the year when specially desired | | 2100 G.M.T. |
| INDIA.—For the stations named in the lists bordering the Arabian Sea and Bay of Bengal | | 0300 G.M.T. |
| HONG KONG.—For the stations named in the lists bordering the China Seas and Western North Pacific | | 2200 G.M.T. |
| FIJI.—For Suva, when in range of that station and between Longitude 160° E. and 140° W. | | 2000 G.M.T. |

**WIRELESS STATIONS DETAILED TO RECEIVE ROUTINE CODED WEATHER REPORTS FROM
"A SELECTED SHIPS."**

Request for Information.

THE ATTENTION OF METEOROLOGICAL SERVICES IS DIRECTED TO THE INVITATION GIVEN ON PAGE 28 OF THIS NUMBER.

| Ocean. | Station. | Position. | Call Sign. | Frequency and Wave Length. | | Area and limits covered by Station. | Telegraphic address of Meteorological Centre. | Information required—Limit of Groups. | Notes. |
|-----------------------------------|---|---|--|---|--|---|---|--|--|
| | | | | For Station to call up "Selected Ships." | For "Selected Ships" to report to Station. | | | | |
| Column No. 1. | No. 2. | No. 3. | No. 4. | No. 5. | No. 6. | No. 7. | No. 8. | No. 9. | No. 10. |
| North Atlantic and North Sea. | Portishead. | Lat. 51° 28' 41" N. Long. 2° 47' 30" W. | GKU | 149 kc/s. (2013 metres) and 121 kc/s. (2479 metres) simultaneously | 143 kc/s. (2100 metres). | North Sea and Eastern North Atlantic East of Longitude 40° W. but not within 300 miles of station. (see Chart of the World.) | Weather London. | Weather only, up to seven groups, preferably No. 3 Supplementary Groups. | "Selected Ships" chosen to report in given order notified by station daily at 2300, 0330, and 1030 G.M.T. Roll call thus—Weather London—call sign of chosen "Selected Ships" to report through GKU at schedule times on 2100 m. and observations for 0000 and 1800 G.M.T. as convenient. |
| North Atlantic and Mediterranean. | Gibraltar. | Lat. 36° 08' 32" N. Long. 5° 20' 29" W. | GYW | 125 kc/s. (2400 metres). | 143 kc/s. (2100 metres). | Eastern North Atlantic, South of Lat. 37° N. and Mediterranean Sea. | Meteor Gibraltar. | Weather only. No. 3 Supplementary Groups. | All British "A Selected Ships" within area should report in accordance with Schedule. |
| North Atlantic. | Horta, Azores. | Lat. 38° 32' N. Long. 28° 38' W. | CTG | 125 kc/s. (2400 metres). | 125 kc/s. (2400 metres). | Those "A Selected Ships" not in the Roll Call for reporting to Weather London through Portishead, in the Eastern North Atlantic, east of Long. 40° W should report to this station. | Radio Horta. | Weather only, up to seven groups, preferably No. 3 Supplementary Groups. | "A Selected Ships" in the Eastern North Atlantic not on the roll call made through Portishead (described in these notes for Portishead) should report to Horta in accordance with schedule given in the instructions for British "A Selected Ships." |
| | Lagos. | Lat. 6° 26' 45" N. Long. 3° 21' 34" E. | ZDN | 8840 kc/s. (33·94 metres). | 143 kc/s. (2100 metres). | Between Lat. 20° N. and 10° S. and from the coast to Long. 20° W. | Meteo Lagos. | Weather only. Four universal groups and first two of No. 3 Supplementary Groups. | 0600 G.M.T. observations only required. |
| | Louisburg. | Lat. 46° 09' 16" N. Long. 59° 56' 48" W. | VAS | 143 kc/s. (2100 metres). | 143 kc/s. (2100 metres). | North Atlantic West of Longitude 40° W. | Weather Toronto. | Weather only, preferably No. 3 Supplementary Groups. | All British "A Selected Ships" within area when bound to or from Newfoundland and Canadian ports or ports to the northward to report through VAS at schedule times and observations for 0000 and 0600 G.M.T. as convenient. |
| | Chatham Mass. Amagansett (Montauk). Thomaston. Jupiter. Lake Worth. | Lat. 41° 43' N. Long. 70° 47' W. Lat. 41° 00' N. Long. 72° 03' W. Lat. 44° 01' N. Long. 69° 13' W. Lat. 26° 56' N. Long. 80° 06' W. Lat. 26° 38' N. Long. 80° 03' W. | WCC WSL WAG WMR WOE | 142·9 kc/s. (2098 metres). | | North Atlantic West of Longitude 40° W. | Observer Washington | Weather only. First four groups of observations taken at 0000 and 1200 G.M.T. only required. | All British "A Selected Ships" within area when bound to or from United States ports or ports to the southward to address their 0000 and 1200 G.M.T. observations to Observer Washington and their 1800 G.M.T. observations to CQ in accordance with schedule. |

WIRELESS STATIONS DETAILED TO RECEIVE ROUTINE CODED WEATHER REPORTS FROM

"A SELECTED SHIPS."

(Continued.)

| Ocean. | Station. | Position. | Call Sign. | Frequency and Wavelength. | | Area and limits covered by Station. | Telegraphic address of Meteorological Centre. | Information required—Limit of Groups. | Notes. |
|------------------------------|--------------------------------|--|------------|---|--|--|---|--|---|
| | | | | For Station to call up "Selected Ships." | For "Selected Ships" to report to Station. | | | | |
| Column No. 1. | No. 2. | No. 3. | No. 4. | No. 5. | No. 6. | No. 7. | No. 8. | No. 9. | No. 10. |
| South Atlantic. | Slangkop (Cape Town) | Lat. 34° 08' 46" S. Long. 18° 19' 18" E. | ZSC | — | 143 kc/s. (2100 metres). | South Atlantic Westward of 25° E. and within a range of about 2,000 miles of station. | Met. | Weather only. Four universal groups and first group of No. 6 Supplementary Groups. | Only 0600 G.M.T. observations required. All British "A Selected Ships" within area should report, commencing at 0618 G.M.T. |
| | General Pacheco (Buenos Aires) | Lat. 34° 27' 33" S. Long. 58° 37' 35" W. | LPD | — | 143 kc/s. (2100 metres). | Within a range of about 1,300 miles of station. | Meteoro Baires | Weather only. No. 6 Supplementary Groups. | |
| Red Sea and Indian Ocean. | Port Sudan. | Lat. 19° 36' 35" N. Long. 37° 13' 28" E. | STP | — | 143 kc/s.† (2100 metres). | From Suez to Ras Fartak, Ras Hafun, and western limit of Colombo area. | Prognostic Khartoum. | Weather only. Four universal groups. | All British "A Selected Ships" within area should report in accordance with Schedule. † Alternatively see particulars on p. 36 and use wavelength and times for "B Selected Ships." |
| Indian Ocean. | Jacobs (Durban). | Lat. 29° 55' 40" S. Long. 30° 58' 50" E. | ZSD | — | 143 kc/s. (2100 metres). | Indian Ocean S. of 20° S. and Eastward of 25° E. and within a range of about 2,000 miles of station. | Met. | Weather only. Four universal groups and first group of No. 6 Supplementary Groups. | Only 0600 G.M.T. observations required. All British "A Selected Ships" within area should report, commencing at 0618 G.M.T. |
| | Bombay. | Lat. 19° 04' 55" N. Long. 72° 49' 54" E. | VWB | — | 143 kc/s. (2100 metres). | Arabian Sea N. of line C. Comorin to Ras Fartak. | Obs. Weather. | Weather only, including No. 9 Supplementary Groups. | |
| | Madras. | Lat. 12° 59' 17" N. Long. 80° 10' 56" E. | VWM | — | 143 kc/s. (2100 metres). | Bay of Bengal N. of line C. Comorin to Achin Head. | Obs. Weather. | Weather only including No. 9 Supplementary Groups. | |
| | Colombo. | Lat. 6° 55' 14" N. Long. 79° 52' 46" E. | VPB | 143 kc/s. (2100 metres). | 143 kc/s. (2100 metres). | Indian Ocean South of a line Ras Fartak, C. Comorin and Achin Head, and within a range of about 1,500 miles. | Weather. | Weather only. No. 6 Supplementary Groups preferred. | |
| | Mombasa. | Lat. 4° 03' 11" S. Long. 39° 39' 49" E. | VPQ | — | 125 kc/s. (2400 metres). | From Ras Hafun to Lat. 20° S. when westward of the Colombo area. | Weather Nairobi. | Weather only. No. 6 Supplementary Groups. | |
| | Perth. | Lat. 32° 01' 51" S. Long. 115° 49' 31" E. | VIP | 125 kc/s. (2400 metres). | 143 kc/s. (2100 metres). | Indian Ocean and Southern Ocean between Long. 90° and 135° E.; but not within 100 miles of the coast. | Weather Melbourne and Weather Perth. | Weather only. No. 9 Supplementary Groups. | |
| North Pacific and China Sea. | Cape d'Aguilar, Hong Kong. | Lat. 22° 12' 39" N. Long. 114° 15' 11" E. | VPS | 8330 kc/s. (36 metres) or 500 kc/s. (600 metres). | 143 kc/s.* (2100 metres). | China Sea and North Pacific to about 1,500 miles from station. | Royal Observatory | Weather only No. 9 Supplementary Groups. | All British "A Selected Ships" within area should report in accordance with Schedule. * Alternatively see particulars on p. 37, and use wavelength and times for "B Selected Ships." |
| South Pacific. | Sydney. | Lat. 33° 46' 00" S. Long. 151° 03' 09" E. | VIS | 125 kc/s. (2400 metres). | 143 kc/s. (2100 metres). | S. Pacific Coral and Tasman Seas and Southern Ocean between Long. 135° and 160° E.; but not within 100 miles of the coast. | Weather Melbourne and Weather Sydney. | Weather only. No. 9 Supplementary Groups. | All British "A Selected Ships" within area should report in accordance with Schedule. Reports not required for observation times not starred on Chart, p. 30, of this number. |

WIRELESS STATIONS DETAILED TO RECEIVE ROUTINE CODED WEATHER REPORTS FROM
 " B SELECTED SHIPS."

| Ocean. | Station. | Position. | Call Sign. | Telegraphic address of Meteorological Centre desiring information. | Information desired. | Notes. |
|-----------------------------------|---|---|--|--|---|--|
| Column No. 1. | No. 2. | No. 3. | No. 4. | No. 5. | No. 6. | No. 7. |
| Norwegian Sea. | Wick. | Lat. 58° 26' 16" N. Long. 3° 05' 53" W. | GKR | Weather London. | Weather in four universal groups. | No roll call. British " B Selected Ships " should report at routine times when North of Lat. 60° N. and eastward of Long. 7° W., and when more than 20 miles from the coasts. |
| North Sea. | Humber. | Lat. 53° 19' 43" N. Long. 0° 16' 34" E. | GKZ | Weather London. | Weather in four universal groups, optional No. 3 Supplementary Groups. | No roll call. British " B Selected Ships " should report at routine times when more than 20 miles from the coasts. |
| North Atlantic. | Malin Head. | Lat. 55° 21' 45" N. Long. 7° 20' 30" W. | GMH | Weather London. | Weather in four universal groups, optional No. 3 Supplementary Groups. | Station will indicate at 0805 G.M.T. and when additional reports of 2100 G.M.T. observations are desired, at 2005 G.M.T., with ordinary traffic calls, the names of British " B Selected Ships " and other British ships within range and North of Lat. 54° N., and West of Long. 7° W., who are desired to report weather at routine times. Thus:—Call signs of ships to report weather through G.M.H. See Section (35), p. 32 of this number. |
| | Valentia. | Lat. 51° 55' 48" N. Long. 10° 20' 54" W. | GCK | Weather London. | Weather in four universal groups, optional No. 3 Supplementary Groups. | Station will indicate at 0825 G.M.T. and when additional reports of 2100 G.M.T. observations are desired, at 2025 G.M.T., with ordinary traffic calls, the names of British " B Selected Ships " and other British ships within range, South of Lat. 54° N., and to southward of Ireland West of Long. 7° W., who are desired to report weather at routine times. Thus:—Call signs of ships to report weather through G.C.K. See Section (35), p. 32 of this number. |
| | Lagos | Lat. 6° 26' 45" N. Long. 3° 21' 34" E. | ZJW | Meteo Lagos | Weather only, four universal groups and first two of No. 3 Supplementary Groups. | 0600 G.M.T. observations only required. [Reports will be acknowledged on 333 kc/s (900 metres)] |
| | Point Amour* St. John's N.F. Cape Race. | Lat. 51° 27' 28" N. Long. 56° 51' 31" W. Lat. 47° 34' 09" N. Long. 52° 41' 04" W. Lat. 46° 39' 25" N. Long. 53° 04' 15" W. | VCL VON VCE | Weather Toronto Weather Toronto Weather Toronto | Weather only, (No. 3 Supplementary Groups when convenient). Weather only, (No. 3 Supplementary Groups when convenient). Weather only, (No. 3 Supplementary Groups when convenient). | *For use during the season when Belle Isle route is open to navigation. |
| North Atlantic and Mediterranean. | Gibraltar. | Lat. 36° 08' 32" N. Long. 5° 20' 29" W. | GYW | Meteor Gibraltar. | Weather in four universal groups only. | |
| Mediterranean. | Alexandria. | Lat. 31° 11' 53" N. Long. 29° 51' 46" E. | SUH | Meteor Heliopolis | Weather in four universal groups, optional Supplementary Groups. | |
| South Atlantic. | Salinas. | Lat. 0° 37' 00" S. Long. 47° 23' 00" W. | PPL | Meteoro Rio. | Weather only, including Supplementary Groups. | |
| | S. Luiz. | Lat. 2° 31' 28" S. Long. 44° 16' 30" W. | PXM | | | |
| | Fortaleza. | Lat. 3° 42' 49" S. Long. 38° 30' 56" W. | PPC | | | |
| | Natal. | Lat. 5° 45' 27" S. Long. 35° 11' 42" W. | PXN | | | |
| | Olinda. | Lat. 8° 00' 55" S. Long. 34° 50' 40" W. | PPO | | | |

**WIRELESS STATIONS DETAILED TO RECEIVE ROUTINE CODED WEATHER REPORTS FROM
" B SELECTED SHIPS."**

(Continued.)

| Ocean. | Station. | Position. | Call Sign. | Telegraphic address of Meteorological Centre desiring information. | Information desired. | Notes. | |
|---------------------------------------|--|--|------------------------------|--|---|---|---|
| <i>Column No. 1.</i> | <i>No. 2.</i> | <i>No. 3.</i> | <i>No. 4.</i> | <i>No. 5.</i> | <i>No. 6.</i> | <i>No. 7.</i> | |
| South Atlantic <i>(continued).</i> | Amaralina. | Lat. 13° 00' 50" S. Long. 38° 28' 27" W. | PPA | } Meteorological Centre Baires. | Weather only, including supplementary groups. | | |
| | Abrolhos. | Lat. 17° 57' 35" S. Long. 38° 42' 00" W. | PXH | | | | |
| | Victoria. | Lat. 20° 18' 52" S. Long. 40° 19' 06" W. | PPT | | | | |
| | Rio. | Lat. 22° 59' 19" S. Long. 43° 11' 26" W. | PPR | | | | |
| | Santos. | Lat. 23° 59' 22" S. Long. 46° 18' 18" W. | PPS | | | | |
| | Florianopolis. | Lat. 27° 35' 22" S. Long. 48° 34' 17" W. | PPF | | | | |
| | Junçao. | Lat. 32° 03' 22" S. Long. 52° 08' 13" W. | PPJ | | | | |
| | General Pacheco (Buenos Aires). Comodoro Rivadavia. | Lat. 34° 27' 33" S. Long. 58° 37' 35" W. Lat. 45° 50' 38" S. Long. 67° 28' 17" W. | LPD LOX | | | | |
| Red Sea and Indian Ocean. | Port Sudan. | Lat. 19° 36' 35" N. Long. 37° 13' 28" E. | STP | Prognostic Khartoum. | Weather only, 4 universal groups. | | |
| Persian Gulf. | Basra. | Lat. 30° 32' 39" N. Long. 47° 47' 04" E. | YIB | Meteor. Basrah. | Weather only, 4 universal groups. | | |
| Indian Ocean | Jacobs (Durban). | Lat. 29° 55' 40" S. Long. 30° 58' 50" E. | ZSD | Met. | Weather only, including No. 9 Supplementary Groups. | When settled weather conditions prevail in the Arabian Sea or Bay of Bengal, British "B" Selected Ships are requested to address their reports through these stations to "Obs. Weather" based on 0300 and 1200 G.M.T. observations only; their 0000 or 0600 G.M.T. observations being addressed to C.Q. according to schedule. During unsettled or disturbed weather conditions <i>All reports</i> should be addressed to "Obs. Weather" through these stations. (See Section (35), p. 32 of this number.) | |
| | Algoa Bay (Port Elizabeth). | Lat. 33° 57' 16" S. Long. 25° 35' 30" E. | ZSQ | Met. | | | |
| | Calcutta. | Lat. 22° 33' 31" N. Long. 88° 20' 16" E. | VWC | } Obs. Weather. | | | |
| | Rangoon. | Lat. 16° 45' 57" N. Long. 96° 11' 51" E. | VTR | | | | |
| | Madras. | Lat. 12° 59' 17" N. Long. 80° 10' 56" E. | VWM | | | | |
| | Bombay. | Lat. 19° 04' 55" N. Long. 72° 49' 54" E. | VWB | | | | |
| | Karachi. | Lat. 24° 51' 05" N. Long. 67° 02' 32" E. | VWK | | | | |
| | Matara. | Lat. 6° 01' 07" N. Long. 80° 35' 39" E. | GZP | Weather. | | | |
| | Mombasa. | Lat. 4° 03' 11" S. Long. 39° 39' 49" E. | VPQ | Weather Nairobi. | | | |
| | Dar-es-Salaam. | Lat. 6° 50' 38" S. Long. 39° 17' 24" E. | ZBZ | Weather Nairobi. | | | |
| | Mauritius. | Lat. 20° 23' 41" S. Long. 57° 35' 25" E. | VRS | Observatory Mauritius. | | | Weather only, 4 universal groups and first of No. 6 Supplementary Groups. |
| | Geraldton. | Lat. 28° 47' 15" S. Long. 114° 36' 24" E. | VIN | } Weather Melbourne and Perth | | | Weather only, preferably No. 9 Supplementary Groups. |
| | Esperance. | Lat. 33° 52' 40" S. Long. 121° 53' 34" E. | VIE | | | | |

When east of Long 90° E. but not within 10 miles of the coast.

WIRELESS STATIONS DETAILED TO RECEIVE ROUTINE CODED WEATHER REPORTS FROM
 "B SELECTED SHIPS."

(Continued.)

| Ocean. | Station. | Position. | Call Sign. | Telegraphic address of Meteorological Centre desiring information. | Information desired. | Notes. |
|------------------------------|--|--|--|---|---|--|
| Column No. 1. | No. 2. | No. 3. | No. 4. | No. 5. | No. 6. | No. 7. |
| Indian Ocean and China Sea. | Penaga (Penang). Paya Lebar (Singapore). | Lat. 5° 32' 02" N. Long. 100° 22' 51" E. Lat. 1° 20' 26" N. Long. 103° 53' 20" E. | VPX VPW | Obs. Weather Singapore. | Weather only, preferably No. 9 Supplementary Groups. | |
| North Pacific and China Sea. | Cape d'Aguilar, Hong Kong. | Lat. 22° 12' 39" N. Long. 114° 15' 11" E. | VPS | Royal Observatory. | Weather only, preferably No. 9 Supplementary Groups. | |
| South Pacific. | Auckland. Wellington. Awarua. Chatham Island. Rarotonga. Apia. Suva. Thursday I. Townsville. Brisbane. Melbourne. Adelaide. | Lat. 36° 50' 37" S. Long. 174° 46' 08" E. Lat. 41° 16' 26" S. Long. 174° 45' 55" E. Lat. 46° 30' 27" S. Long. 168° 22' 21" E. Lat. 43° 57' 28" S. Long. 176° 34' 25" W. Lat. 21° 11' 52" S. Long. 159° 48' 52" W. Lat. 13° 49' 46" S. Long. 171° 45' 20" W. Lat. 18° 08' 43" S. Long. 178° 27' 48" E. Lat. 10° 35' 14" S. Long. 142° 12' 37" E. Lat. 19° 16' 09" S. Long. 146° 49' 47" E. Lat. 27° 25' 34" S. Long. 153° 07' 19" E. Lat. 37° 46' 56" S. Long. 144° 52' 09" E. Lat. 34° 51' 14" S. Long. 138° 31' 55" E. | ZLD ZLW ZLB ZLC ZKR ZMA VRP VII VIT VIB VIM VIA | Weather Wellington. Weather Wellington. Weather Wellington. Weather Wellington. Weather Wellington. Weather Wellington. Weather Wellington. Weather Suva. Weather Melbourne and Brisbane Weather Melbourne Weather Melbourne and Adelaide | Weather only, preferably No. 9 Supplementary Groups. Weather in four universal groups, optional supplementary groups. Weather only, preferably No. 9 Supplementary Groups Weather only, preferably No. 9 Supplementary Groups. Weather only, preferably No. 9 Supplementary Groups. Weather only, preferably No. 9 Supplementary Groups. Weather only, preferably No. 9 Supplementary Groups. | See Section (35), p. 32 of this number. When west of Long. 160° E., but not within 100 miles of the coast. When between Long. 90° E. and 160° E., but not within 100 miles of the coast. |

INTERNATIONAL SHIPS' WIRELESS WEATHER TELEGRAPHY CODE.
Adopted by the International Meteorological Organization, 1929 and 1935.

Code and Instructions for Coding Messages.

The International Ships' Wireless Weather Code is a figure code, arranged in groups of five figures.

The first four groups are universal and the remaining groups are in three alternative or supplementary sets of groups. The first figure in the fifth group of message (or first supplementary group) indicates which set of supplementary groups is used.

The first four universal groups should always be used, and the supplementary sets of groups may be omitted, or abbreviated by omitting the last group or groups of the set; that is, the code figure message may be shortened as necessary, but the order of the figures and groups must always be strictly maintained, otherwise the message is not decodable.

If an observation or element is not available, an X (or the appropriate number of Xs) (— ● ● —) should take its place in order to maintain the sequence of figures in the groups.

Having entered synchronized weather observations and particulars of set and drift of current and ice in the Ship's Meteorological Record, Form 911, or the Meteorological Log, Form 915 (specially ruled pages at end of book), the observations should be coded, thus—

First. From the list of wireless stations detailed to receive routine coded weather reports from "Selected Ships," ascertain the number of groups and the supplementary groups desired by the shore meteorological services from ships in the part of the world that the ship is in, remembering that the seventh group can only be given completely by ships having a special barograph; and decide on the information to be sent, not forgetting the desirability of information of the set and drift of current, ice, and navigational obstructions being included in reports intended for "all ships," but not through W/T stations for certain meteorological centres. In such cases, brevity being desirable, only the first four or universal groups should be given in code. This ensures the necessary brevity and information for the meteorological centre, and the necessary information for ships at sea. Do not include information in C.W. reports addressed to meteorological centres which they do not require.

Second. On Form 138, the register for coded "Selected Ships" wireless meteorological reports, in No. 1 column write the address of the Meteorological Centre if your ship is within range of a station detailed in the List in "The Marine Observer," but to "All Ships' Weather" where there is no such station.

Universal Groups.

With the Code Card, Form 138A, from synchronized weather observations entered on Form 911 or 915, code as follows:—

| | KEY LETTERS. |
|--|--------------|
| Column 2.—Code the Day of the Week. Table I ... | Y |
| " 3.—Code the Octant of the Globe. Table II ... | Q |
| " 4.—Code the Latitude by entering the whole degrees (prefixing 0 if necessary to make up two figures); and dividing the minutes by six, neglecting the remainder. Enter the result | LLL |
| " 5.—Code the Longitude by entering the whole degrees (prefixing 0 if necessary to make up two figures, or omitting the initial 1 if Longitude is 100° or over). Divide the minutes by six, neglecting the remainder. Enter the result | lll |
| " 6.—Enter the hours of the Greenwich Mean Time of Observation | GG |
| From the Code Card Form 138A. | |
| " 7.—Code the Direction of the Wind. Table III ... | DD |
| " 8.—Code the Force of the Wind, forces 9 and above are entered as 9, but if 10, 11 or 12, add the words Gale, Storm, or Hurricane at the end of the message. Table V ... | F |
| " 9.—Code the Present Weather. Table VI ... | ww |
| " 10.—Code the corrected barometer reading by entering the two last whole figures if a millibar barometer, or coding, if inches, by Table VIII | PP |

| | KEY LETTERS. |
|--|--------------|
| Column 11.—Enter the Visibility by Scale. Table XII ... | V |
| " 12.—Enter the Air Temperature in whole degrees Fahrenheit, omitting the initial 1, if over 100° | TT |

No. 3 Supplementary Groups.

If these groups have been decided upon, in Column 13 enter "3" as distinguishing number for the remainder of the coded message.

| | KEY LETTERS. |
|--|----------------|
| Column 14.—Code type of Lower Cloud. Table XIII ... | C _L |
| " 15.—Code type of Middle Cloud. Table XIV ... | C _M |
| " 16.—Code type of Upper Cloud. Table XV ... | C _H |
| " 17.—Code the total amount of sky covered. Table XVII | N |
| " 18.—Subtract the lesser from the greater of the Air and Sea Temperatures and code the result with Table XVIII | t _d |
| " 19.—Enter the Swell by Scale. Table XIX ... | K |
| " 20.—Code the True Direction of Swell. Table IV ... | d |
| " 21.—Code the Past Weather. Table VII ... | W |
| " 22.—Code the proportion of sky covered with Lower Cloud. Table XVII | N _L |
| " 23.—Code the course of ship. Table IV | d _s |
| " 24.—Code the speed of the ship. Table XXI ... | f |
| " 25.—Code the characteristic of the Tendency of the Barometer, as shown by barograph Table X | a |
| " 26.—Code the Amount of rise or fall of the Barometer in the last 3 hours. Table XI... | bb |

No. 6. Supplementary Groups.

If these groups have been decided upon, in Column 27 enter "6" as distinguishing number for the remainder of the coded message.

| | KEY LETTERS. |
|--|----------------|
| (column 28.—Enter the Swell by Scale. Table XIX ... | K |
| " 29.—Code the True Direction of the Swell. Table IV | d |
| " 30.—Code the Predominating type of Cloud. Table XVI | C |
| " 31.—Code the total amount of sky covered. Table XVII | N |
| " 32.—Subtract the lesser from the greater of the Air and Sea Temperatures and code the result. Table XVIII | t _d |
| " 33.—Code the Course of the Ship. Table IV ... | d _s |
| " 34.—Code the recorded change of the barometer in the last two, three, or four hours. Table IX | A |
| " 35.—Code the Past Weather. Table VII ... | W |
| " 36.—Code type of Upper Cloud. Table XV ... | C _H |

No. 9. Supplementary Groups.

If these groups have been decided upon, in Column 37 enter "9" as distinguishing number for the remainder of the coded message.

| | KEY LETTERS. |
|--|----------------|
| Column 38.—Enter the Sea and Swell by Douglas Scale. Table XX | SK |
| " 39.—Code the True Direction of the Swell. Table IV | d |
| " 40.—Code the Past Weather. Table VII ... | W |
| " 41.—Code the Predominating type of Cloud. Table XVI | C |
| " 42.—Code the total amount of sky covered. Table XVII | N |
| " 43.—Code the proportion of sky covered with Lower Cloud. Table XVII... .. | N _L |
| " 44.—Code the recorded change of the barometer in the last two, three or four hours. Table IX | A |
| " 45.—Subtract the lesser from the greater of the Air and Sea Temperatures and code the result. Table XVIII | t _d |

For messages which are to be broadcast to **C.Q.** or made to shore services indicated in the list of W/T stations in **THE MARINE OBSERVER** as requiring such information, in Column 46, enter briefly in plain language the set and drift of current experienced, with position from and to, Ice or other navigational obstructions.

On no account should such information be entered in messages for shore services that do not require it.

The ship's call sign should be given in the usual way in sending the report.

In Column 47.—After the message has been despatched enter the

call sign of the station through which it was sent, with wave length, or **C.Q.**, as the case may be.

In Column 48.—After the message is sent enter the exact time (G.M.T.) of despatch.

Be sure that your message is correctly coded, and that you have not duplicated the Supplementary Groups.

Write out the message on the signal pad (Form 139) provided and send to the wireless operator for despatch in accordance with instructions given in World Wide System of Voluntary Selected Ship Routine Wireless Weather Reports, pages 29 to 32, schedule for which is also given on Code Card Form 138A.

CODE TABLES.

Day and Position.

Table 1.

Y.—Day of the Week.

| Code Figure. | Day | Code Figure. |
|--------------|-----------|--------------|
| 1 | Sunday | 5 |
| 2 | Monday | 6 |
| 3 | Tuesday | 7 |
| 4 | Wednesday | |
| | Thursday | |
| | Friday | |
| | Saturday | |

Table II.

Q.—Octant of the Globe.

| Longitude. | Code Figure. |
|-----------------------|--------------|
| 0° W. — 90° W.... | 0 |
| 90° W. — 180° W.... | 1 |
| 180° E. — 90° E. | 2 |
| 90° E. — 0° E. | 3 |
| 0° W. — 90° W.... | 5 |
| 90° W. — 180° W.... | 6 |
| 180° E. — 90° E. | 7 |
| 90° E. — 0° E. | 8 |

Compass.

Table III.

DD.—Compass Table for Wind Direction to points.

| True Direction. | Code Figures. | True Direction. | Code Figures. |
|-----------------|---------------|-----------------|---------------|
| Calm ... | 00 | S. by W. ... | 17 |
| N. by E. ... | 01 | S.S.W. ... | 18 |
| N.N.E. ... | 02 | S.W. by S. ... | 19 |
| N.E. by N. ... | 03 | S.W. ... | 20 |
| N.E. ... | 04 | S.W. by W. ... | 21 |
| N.E. by E. ... | 05 | W.S.W. ... | 22 |
| E.N.E. ... | 06 | W. by S. ... | 23 |
| E. by N. ... | 07 | W. ... | 24 |
| E. ... | 08 | W. by N. ... | 25 |
| E. by S. ... | 09 | W.N.W. ... | 26 |
| E.S.E. ... | 10 | N.W. by W. ... | 27 |
| S.E. by E. ... | 11 | N.W. ... | 28 |
| S.E. ... | 12 | N.W. by N. ... | 29 |
| S.E. by S. ... | 13 | N.N.W. ... | 30 |
| S.S.E. ... | 14 | N. by W. ... | 31 |
| S. by E. ... | 15 | N. ... | 32 |
| S. ... | 16 | | |

Table IV.

d and d_s.—Compass Table to Half Cardinal Points.

| True Direction. | Code Figure. |
|----------------------------------|--------------|
| No Sea or Swell; or Ship hove to | 0 |
| N.E. | 1 |
| E. | 2 |
| S.E. | 3 |
| S. | 4 |
| S.W. | 5 |
| W. | 6 |
| N.W. | 7 |
| N. | 8 |
| No observation or no information | 9 |

Wind.

Table V.

F.—Wind Force, Beaufort Scale.

| Beaufort Number. | Code Figure. |
|---------------------------|--------------|
| Nought. Calm ... | 0 |
| One. Light airs ... | 1 |
| Two. Light breeze ... | 2 |
| Three. Gentle breeze ... | 3 |
| Four. Moderate breeze ... | 4 |
| Five. Fresh breeze ... | 5 |
| Six. Strong breeze ... | 6 |
| Seven. Moderate gale ... | 7 |
| Eight. Fresh gale ... | 8 |
| Nine. Strong gale ... | 9 |
| Ten. Whole gale ... | 9 Gale* |
| Eleven. Storm ... | 9 Storm* |
| Twelve. Hurricane ... | 9 Hurricane* |

* These words to be written at end of weather message.

Weather.

Table VI.

ww.—Present Weather. (Abridged for British Ships.)

| Code Figures. |
|---------------|
| 00 |
| 01 |
| 02 |
| 03 |
| 05 |
| 07 |
| 08 |
| 10 |
| 11 |
| 13 |
| 14 |
| 15 |
| 16 |
| 19 |
| 20 |
| 30 |
| 40 |
| 41 |
| 42 |
| 49 |
| 50 |
| 57 |
| 58 |
| 59 |
| 60 |
| 67 |
| 68 |
| 69 |
| 70 |
| 80 |
| 88 |
| 89 |
| 90 |

Preference should be given to the largest number of this code which applies to the weather at the position of the ship at the time of observation.

Table VII.

| W.—Past Weather. | Code Figure. |
|--|--------------|
| Fair (clear or slightly clouded) | 0 |
| Variable sky | 1 |
| Mainly overcast | 2 |
| Sandstorm or duststorm, or storm of drifting snow | 3 |
| Fog or thick dust haze (visibility less than five cables) | 4 |
| Drizzle | 5 |
| Rain | 6 |
| Snow or sleet | 7 |
| Showers | 8 |
| Thunderstorm | 9 |

Barometer.

Table VIII.

P.P.—Code Table for corrected barometer readings in millibars and inches.

(Adapted for British Ships.)

| Mb. | In. | Code Figs. | Mb. | In. | Code Figs. | Mb. | In. | Code Figs. | Mb. | In. | Code Figs. |
|-----|-------|------------|-----|-------|------------|------|-------|------------|------|-------|------------|
| 925 | 27.32 | 25 | 960 | 28.35 | 60 | 995 | 29.38 | 95 | 1025 | 30.27 | 25 |
| 926 | 27.35 | 26 | 961 | 28.38 | 61 | 996 | 29.41 | 96 | 1026 | 30.30 | 26 |
| 927 | 27.38 | 27 | 962 | 28.41 | 62 | 997 | 29.44 | 97 | 1027 | 30.33 | 27 |
| 928 | 27.41 | 28 | 963 | 28.44 | 63 | 998 | 29.47 | 98 | 1028 | 30.36 | 28 |
| 929 | 27.44 | 29 | 964 | 28.47 | 64 | 999 | 29.50 | 99 | 1029 | 30.39 | 29 |
| 930 | 27.46 | 30 | 965 | 28.50 | 65 | 1000 | 29.53 | 00 | 1030 | 30.42 | 30 |
| 931 | 27.49 | 31 | 966 | 28.53 | 66 | 1001 | 29.56 | 01 | 1031 | 30.45 | 31 |
| 932 | 27.52 | 32 | 967 | 28.56 | 67 | 1002 | 29.59 | 02 | 1032 | 30.48 | 32 |
| 933 | 27.55 | 33 | 968 | 28.59 | 68 | 1003 | 29.62 | 03 | 1033 | 30.51 | 33 |
| 934 | 27.58 | 34 | 969 | 28.62 | 69 | 1004 | 29.65 | 04 | 1034 | 30.53 | 34 |
| 935 | 27.61 | 35 | 970 | 28.65 | 70 | 1005 | 29.68 | 05 | 1035 | 30.56 | 35 |
| 936 | 27.64 | 36 | 971 | 28.67 | 71 | 1006 | 29.71 | 06 | 1036 | 30.59 | 36 |
| 937 | 27.67 | 37 | 972 | 28.70 | 72 | 1007 | 29.74 | 07 | 1037 | 30.62 | 37 |
| 938 | 27.70 | 38 | 973 | 28.73 | 73 | 1008 | 29.77 | 08 | 1038 | 30.65 | 38 |
| 939 | 27.73 | 39 | 974 | 28.76 | 74 | 1009 | 29.80 | 09 | 1039 | 30.68 | 39 |
| 940 | 27.76 | 40 | 975 | 28.79 | 75 | 1010 | 29.83 | 10 | 1040 | 30.71 | 40 |
| 941 | 27.79 | 41 | 976 | 28.82 | 76 | 1011 | 29.86 | 11 | 1041 | 30.74 | 41 |
| 942 | 27.82 | 42 | 977 | 28.85 | 77 | 1012 | 29.89 | 12 | 1042 | 30.77 | 42 |
| 943 | 27.85 | 43 | 978 | 28.88 | 78 | 1013 | 29.92 | 13 | 1043 | 30.80 | 43 |
| 944 | 27.88 | 44 | 979 | 28.91 | 79 | 1014 | 29.94 | 14 | 1044 | 30.83 | 44 |
| 945 | 27.91 | 45 | 980 | 28.94 | 80 | 1015 | 29.97 | 15 | 1045 | 30.86 | 45 |
| 946 | 27.94 | 46 | 981 | 28.97 | 81 | 1016 | 30.00 | 16 | 1046 | 30.89 | 46 |
| 947 | 27.97 | 47 | 982 | 29.00 | 82 | 1017 | 30.03 | 17 | 1047 | 30.92 | 47 |
| 948 | 28.00 | 48 | 983 | 29.03 | 83 | 1018 | 30.06 | 18 | 1048 | 30.95 | 48 |
| 949 | 28.03 | 49 | 984 | 29.06 | 84 | 1019 | 30.09 | 19 | 1049 | 30.98 | 49 |
| 950 | 28.05 | 50 | 985 | 29.09 | 85 | 1020 | 30.12 | 20 | 1050 | 31.01 | 50 |
| 951 | 28.08 | 51 | 986 | 29.12 | 86 | 1021 | 30.15 | 21 | 1051 | 31.04 | 51 |
| 952 | 28.11 | 52 | 987 | 29.15 | 87 | 1022 | 30.18 | 22 | 1052 | 31.07 | 52 |
| 953 | 28.14 | 53 | 988 | 29.18 | 88 | 1023 | 30.21 | 23 | 1053 | 31.10 | 53 |
| 954 | 28.17 | 54 | 989 | 29.21 | 89 | 1024 | 30.24 | 24 | 1054 | 31.13 | 54 |
| 955 | 28.20 | 55 | 990 | 29.24 | 90 | | | | | | |
| 956 | 28.23 | 56 | 991 | 29.26 | 91 | | | | | | |
| 957 | 28.26 | 57 | 992 | 29.29 | 92 | | | | | | |
| 958 | 28.29 | 58 | 993 | 29.32 | 93 | | | | | | |
| 959 | 28.32 | 59 | 994 | 29.35 | 94 | | | | | | |

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

Table IX.

A—Change of Barometer in last 2, 3 or 4 hours.
(Adapted for British Ships.)

(The change in 3 hours should be given if possible.)

| | In 2 hours. | In 3 hours. | In 4 hours. | Code Figure. |
|--|---------------------------|---------------------------|---------------------------|--------------|
| Barometer steady —Has not risen or fallen more than | 0.3 mb. (.01 in.) | 0.5 mb. (.01 in.) | 0.7 mb. (.02 in.) | 0 |
| Barometer rising slowly —Has risen. | 0.7–1.0 mb. (.02–.03 in.) | 1.0–1.5 mb. (.03–.05 in.) | 1.3–2.0 mb. (.04–.06 in.) | 1 |
| Barometer rising —Has risen | 1.4–2.4 mb. (.05–.07 in.) | 2.0–3.5 mb. (.06–.10 in.) | 2.8–4.8 mb. (.08–.14 in.) | 2 |
| Barometer rising quickly —Has risen. | 2.6–4.0 mb. (.08–.12 in.) | 4.0–6.0 mb. (.12–.18 in.) | 5.2–8.0 mb. (.15–.24 in.) | 3 |
| Barometer rising very rapidly —Has risen. | over 4.0 mb. (.12 in.) | over 6.0 mb. (.18 in.) | over 8.0 mb. (.24 in.) | 4 |
| Barometer falling slowly —Has fallen. | 0.7–1.0 mb. (.02–.03 in.) | 1.0–1.5 mb. (.03–.05 in.) | 1.3–2.0 mb. (.04–.06 in.) | 5 |
| Barometer falling —Has fallen. | 1.4–2.4 mb. (.05–.07 in.) | 2.0–3.5 mb. (.06–.10 in.) | 2.8–4.8 mb. (.08–.14 in.) | 6 |
| Barometer falling quickly —Has fallen. | 2.6–4.0 mb. (.08–.12 in.) | 4.0–6.0 mb. (.12–.18 in.) | 5.2–8.0 mb. (.15–.24 in.) | 7 |
| Barometer falling very rapidly —Has fallen. | over 4.0 mb. (.12 in.) | over 6.0 mb. (.18 in.) | over 8.0 mb. (.24 in.) | 8 |

Barograph.

Table X.

a—Characteristic of changes of the Barometer in the last three hours.

(Adapted for British Ships.)

| Net result, Barometer same or higher. | Description of Changes. | Code Figure. |
|---------------------------------------|---|--------------|
| Net result, Barometer same or higher. | Barometer rising at first, then falling by a smaller or like amount | 0 |
| | Barometer rising at first, then steady or rising less quickly... .. | 1 |
| | Barometer unsteady, but generally rising or stationary | 2 |
| | Barometer steady or rising | 3 |
| Net result, Barometer lower. | Barometer falling or steady at first, then rising by the same or larger amount | 4 |
| | Barometer rising, at an increasing rate | 5 |
| Net result, Barometer lower. | Barometer falling at first, then rising by a smaller amount | 5 |
| | Barometer falling at first, then steady or falling less quickly | 6 |
| | Barometer unsteady, but falling | 7 |
| | Barometer falling | 8 |
| Net result, Barometer lower. | Barometer steady or rising at first, then falling by a larger amount | 9 |
| | Barometer falling, at an increasing rate | 9 |

NOTE.—These changes can generally only be given by ships which have special barographs on board.

For illustration of these characteristic changes and guidance see MARINE OBSERVERS' HANDBOOK.

Table XI.

bb.—Amount of Rise or Fall of the Barometer in the last three hours.

(Adapted for British Ships.)

| Amount of Rise or Fall. | | Code Figs. | Amount of Rise or Fall. | | Code Figs. | Amount of Rise or Fall. | | Code Figs. | Amount of Rise or Fall. | | Code Figs. |
|-------------------------|---------|------------|-------------------------|---------|------------|-------------------------|---------|------------|-------------------------|---------|------------|
| Mbs. | Inches. | |
| 0.2 | .01 | 01 | 4.6 | .14 | 23 | 9.0 | .27 | 45 | 13.4 | .40 | 67 |
| 0.4 | .01 | 02 | 4.8 | .14 | 24 | 9.2 | .28 | 46 | 13.6 | .41 | 68 |
| 0.6 | .02 | 03 | 5.0 | .15 | 25 | 9.4 | .28 | 47 | 13.8 | .41 | 69 |
| 0.8 | .02 | 04 | 5.2 | .16 | 26 | 9.6 | .29 | 48 | 14.0 | .42 | 70 |
| 1.0 | .03 | 05 | 5.4 | .16 | 27 | 9.8 | .29 | 49 | 14.2 | .43 | 71 |
| 1.2 | .04 | 06 | 5.6 | .17 | 28 | 10.0 | .30 | 50 | 14.4 | .43 | 72 |
| 1.4 | .04 | 07 | 5.8 | .17 | 29 | 10.2 | .31 | 51 | 14.6 | .44 | 73 |
| 1.6 | .05 | 08 | 6.0 | .18 | 30 | 10.4 | .31 | 52 | 14.8 | .44 | 74 |
| 1.8 | .05 | 09 | 6.2 | .19 | 31 | 10.6 | .32 | 53 | 15.0 | .45 | 75 |
| 2.0 | .06 | 10 | 6.4 | .19 | 32 | 10.8 | .32 | 54 | 15.2 | .46 | 76 |
| 2.2 | .07 | 11 | 6.6 | .20 | 33 | 11.0 | .33 | 55 | 15.4 | .46 | 77 |
| 2.4 | .07 | 12 | 6.8 | .20 | 34 | 11.2 | .34 | 56 | 15.6 | .47 | 78 |
| 2.6 | .08 | 13 | 7.0 | .21 | 35 | 11.4 | .34 | 57 | 15.8 | .47 | 79 |
| 2.8 | .08 | 14 | 7.2 | .22 | 36 | 11.6 | .35 | 58 | 16.0 | .48 | 80 |
| 3.0 | .09 | 15 | 7.4 | .22 | 37 | 11.8 | .35 | 59 | 16.2 | .49 | 81 |
| 3.2 | .10 | 16 | 7.6 | .23 | 38 | 12.0 | .36 | 60 | 16.4 | .49 | 82 |
| 3.4 | .10 | 17 | 7.8 | .23 | 39 | 12.2 | .37 | 61 | 16.6 | .50 | 83 |
| 3.6 | .11 | 18 | 8.0 | .24 | 40 | 12.4 | .37 | 62 | 16.8 | .50 | 84 |
| 3.8 | .11 | 19 | 8.2 | .25 | 41 | 12.6 | .38 | 63 | 17.0 | .51 | 85 |
| 4.0 | .12 | 20 | 8.4 | .25 | 42 | 12.8 | .38 | 64 | 17.2 | .52 | 86 |
| 4.2 | .13 | 21 | 8.6 | .26 | 43 | 13.0 | .39 | 65 | 17.4 | .52 | 87 |
| 4.4 | .13 | 22 | 8.8 | .26 | 44 | 13.2 | .40 | 66 | | | |

Visibility.

Table XII.

V.—Visibility.

| Description of Visibility. | Code Figure. |
|--|--------------|
| Dense fog. Objects not visible at 50 yards. | 0 |
| Thick fog. Objects not visible at 1 cable | 1 |
| Fog. Objects not visible at 2 cables | 2 |
| Moderate fog. Objects not visible at ½ mile (nautical) | 3 |
| Mist or haze, or very poor visibility. Objects not visible at 1 mile (nautical) | 4 |
| Poor visibility. Objects not visible at 2 miles (nautical) | 5 |
| Moderate visibility. Objects not visible at 5 miles (nautical) | 6 |
| Good visibility. Objects not visible at 10 miles (nautical) | 7 |
| Very good visibility. Objects not visible at 30 miles (nautical) | 8 |
| Excellent visibility. Objects visible more than 30 miles | 9 |

Clouds.

Table XIII.

C_L.—Form of Low Cloud.
Form of Cloud.

| Form of Cloud. | Code Figure. |
|--|--------------|
| No low clouds | 0 |
| Cumulus of fine weather | 1 |
| Cumulus (Large, without anvil) | 2 |
| Cumulonimbus | 3 |
| Stratocumulus (spread from Cumulus) | 4 |
| Stratus or Stratocumulus (in layer) | 5 |
| Scud | 6 |
| Cumulus and Stratocumulus of fine weather | 7 |
| Cumulus, large (or Cumulonimbus) and Stratocumulus | 8 |
| Cumulus, large (or Cumulonimbus) and Scud | 9 |

Table XIV.

C_M.—Form of Middle Cloud.
Form of Cloud.

| Form of Cloud. | Code Figure. |
|--|--------------|
| No middle cloud | 0 |
| Altostratus, typical thin | 1 |
| Altostratus, typical thick (Sun or Moon invisible), or Nimbostratus | 2 |
| Alto cumulus or high Stratocumulus, single layer | 3 |
| Alto cumulus, in bands, decreasing | 4 |
| Alto cumulus, in bands, increasing | 5 |
| Alto cumulus, spread out from Cumulus | 6 |
| Alto cumulus with Altostratus; or Altostratus with parts resembling Alto cumulus | 7 |
| Alto cumulus Castellatus (Alto cumulus in ragged fragments) | 8 |
| Alto cumulus in several layers, generally with fibrous veils and chaotic appearance of sky | 9 |

Table XV.

C_H.—Form of Upper Cloud (Cirrus Cloud).
Form of Cloud.

| Form of Cloud. | Code Figure. |
|---|--------------|
| No upper clouds (cirrus type) | 0 |
| Cirrus, fine, not increasing; scarce | 1 |
| Cirrus, fine, not increasing; plentiful, but not a continuous layer | 2 |
| Cirrus, anvil | 3 |
| Cirrus, fine, increasing | 4 |
| Cirrus or Cirrostratus increasing, below 45° altitude | 5 |
| Cirrus or Cirrostratus increasing, and reaching above 45° altitude | 6 |
| Cirrostratus veil covering whole sky | 7 |
| Cirrostratus, not increasing, and not covering whole sky | 8 |
| Cirrocumulus predominating, and a little Cirrus | 9 |

Table XVI.

C.—Predominating Form of Cloud.
Form of Cloud.

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

Table XVII.

N. and (N_L).—Amount of Cloud.
Proportion of Sky covered, in tenths.

| Proportion of Sky covered, in tenths. | Code Figure. |
|--|--------------|
| 0 | 0 |
| Less than 1 | 1 |
| 1 | 2 |
| 2 to 3 | 3 |
| 4 to 6 | 4 |
| 7 to 8 | 5 |
| 9 | 6 |
| More than 9, but with openings | 7 |
| 10, completely covered | 8 |
| Sky obscured by fog, duststorm or other phenomenon | 9 |

Temperatures.

Table XVIII.

t_a.—Difference between Air and Sea Surface Temperature.

| Air Temperature higher than Sea Temperature. | Code Figure. |
|--|--------------|
| More than 9° Fahrenheit | 0 |
| 6° to 9° | 1 |
| 3° to 6° | 2 |
| 1° to 3° | 3 |
| 0° to 1° | 4 |
| Air Temperature lower than Sea Temperature. | |
| 0° to 1° Fahrenheit | 5 |
| 1° to 3° | 6 |
| 3° to 6° | 7 |
| 6° to 9° | 8 |
| More than 9° | 9 |

Swell.

Table XIX.

K.—Swell.

| K.—Swell. | Code Figure. |
|------------------------------------|--------------|
| No swell | 0 |
| Low swell, short or average length | 1 |
| Low swell, long | 2 |
| Moderate swell, short | 3 |
| Moderate swell, average length | 4 |
| Moderate swell, long | 5 |
| Heavy swell, short | 6 |
| Heavy swell, average length | 7 |
| Heavy swell, long | 8 |
| Confused swell | 9 |

Douglas Sea and Swell Scale.

Table XX.

SK.—Sea and Swell.

| SEA. | SWELL. | | | | | | | | | |
|---------------|----------------|------------------------|------------|-------------|---------------|------------|-------------|---------------|------------|----------------|
| | 0 No Swell. | Low. | | Moderate. | | | Heavy. | | | 9 Confused. |
| | | 1 Short or Average. | 2 Long. | 3 Short. | 4 Average. | 5 Long. | 6 Short. | 7 Average. | 8 Long. | |
| 0 Calm | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 |
| 1 Smooth | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 2 Slight | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 3 Moderate | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| 4 Rough | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 |
| 5 Very rough | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 |
| 6 High | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 |
| 7 Very high | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 |
| 8 Precipitous | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 |
| 9 Confused | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 |

Speed.

Table XXI.

f.—Speed of Ship.

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

PERSONNEL.

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

RETIREMENTS.

Captain J. H. Lawson, commander of the R.M.S. *Apapa*, has retired from active service after 44 years afloat, 39 of which were spent in the service of Elder Dempster & Co.

Commencing his sea career in 1894 he served his time in the Barque *Drumcraig* belonging to Messrs. Gillison and Chadwick of Liverpool. On obtaining his second mate's certificate in 1899 he entered the service of Elder Dempster & Co. as a fourth officer, and, rising through the different grades, was promoted to command in 1904, his first ship being the *Andoni*. Since then he has commanded several units of the Elder Dempster Fleet, his last ship being the *Apapa*, to which he was transferred in 1935, having previously commanded the *Adda* for five years.

Captain Anthony Purvis, Commodore of Royal Mail Lines Ltd. and Commander of the R.M.S. *Asturias* has retired after nearly 45 years at sea.

After serving seven years in sailing ships Captain PURVIS joined the Royal Mail Steam Packet Company as a junior officer in 1902. He obtained rapid promotion through the different grades and was appointed to his first command, the *Arno*, in 1908. Since then he has commanded several ships of the Company's fleet operating on the West Indies, Canadian, and South American routes.

J. H.

J. H.

 OBITUARY.

Mr. Edward Allen. The death of MR. EDWARD ALLEN, Chief Officer of the S.S. *Jamaica Planter*, which took place on board his ship at Copenhagen on November 24th last, is noted with deep regret.

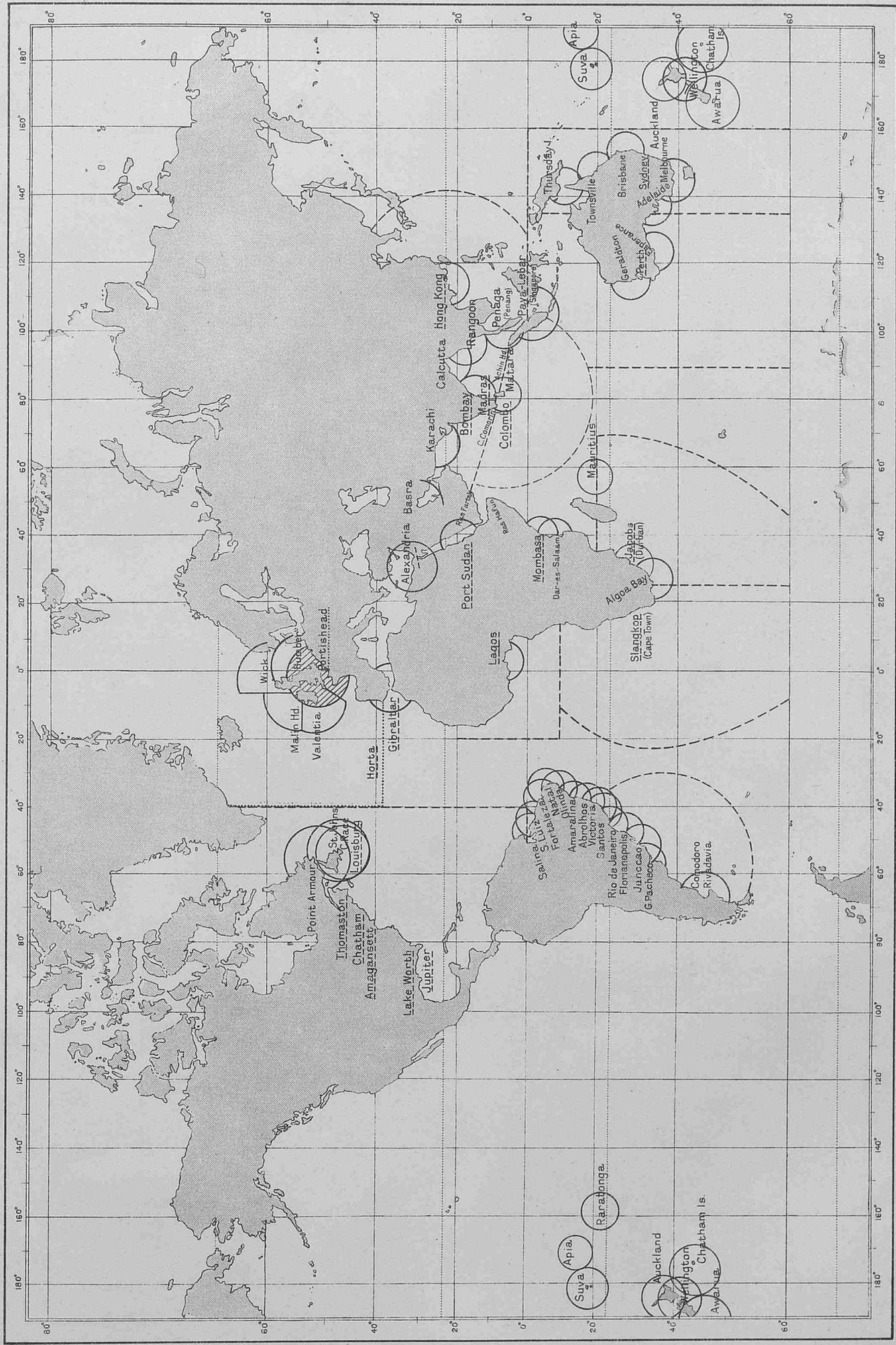
On completing his training in H.M.S. *Worcester*, MR. ALLEN served his apprenticeship as a cadet in the service of the Peninsular and Oriental Steam Navigation Company. In 1929 he joined the Hadley Steam Ship Company as 3rd Officer, since when he has served as 2nd Officer and Chief Officer in various of the Company's ships.

From his earliest days as a cadet MR. ALLEN took a keen interest in Marine Meteorology, making a practice throughout his career of utilising synoptic meteorology as an aid to navigation.

J. H.

SHIPS' WIRELESS WEATHER SIGNALS. CHART OF THE WORLD.

Stations for Reception of Routine Wireless Weather Reports from "Selected Ships."



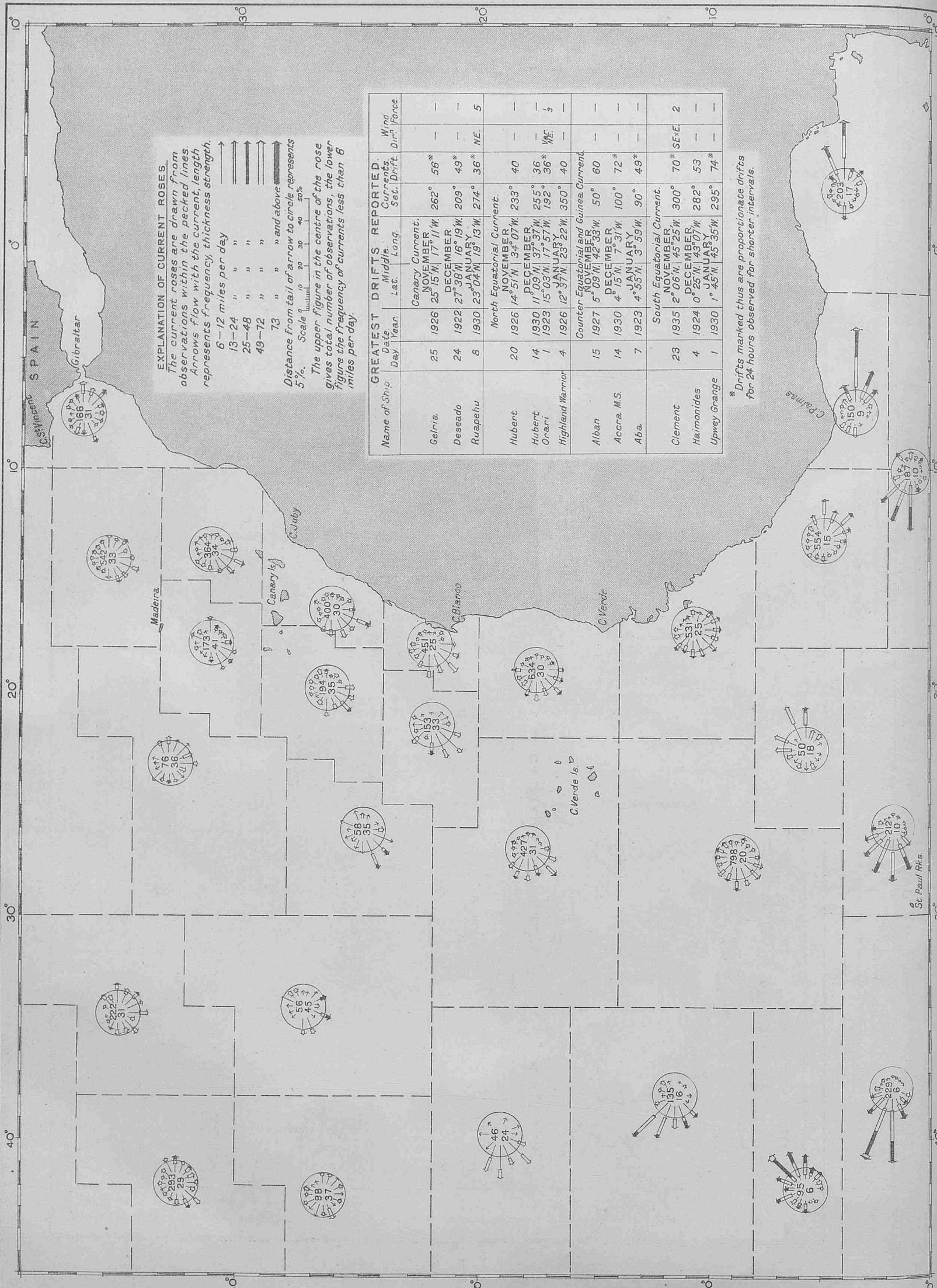
The dotted line indicates the area in which British 'A' Selected Ships report under control to Portishead.

A pecked line indicates the reporting area round stations in other countries to which British 'A' Selected Ships should report. The names of such stations being underlined with a pecked line

The small shaded areas round stations detailed to receive reports from 'A Selected Ships' indicate where these ships should not report on account of congestion.

The full circles indicate the areas round islands and coast stations which are detailed to receive 'B Selected Ships' reports made to C.Q. on 600 metres.

CURRENTS IN THE NORTH ATLANTIC, SOUTHEASTERN PORTION
 NOVEMBER, DECEMBER and JANUARY. Observations of ships regularly observing for the British Meteorological Office, 1910-1938.

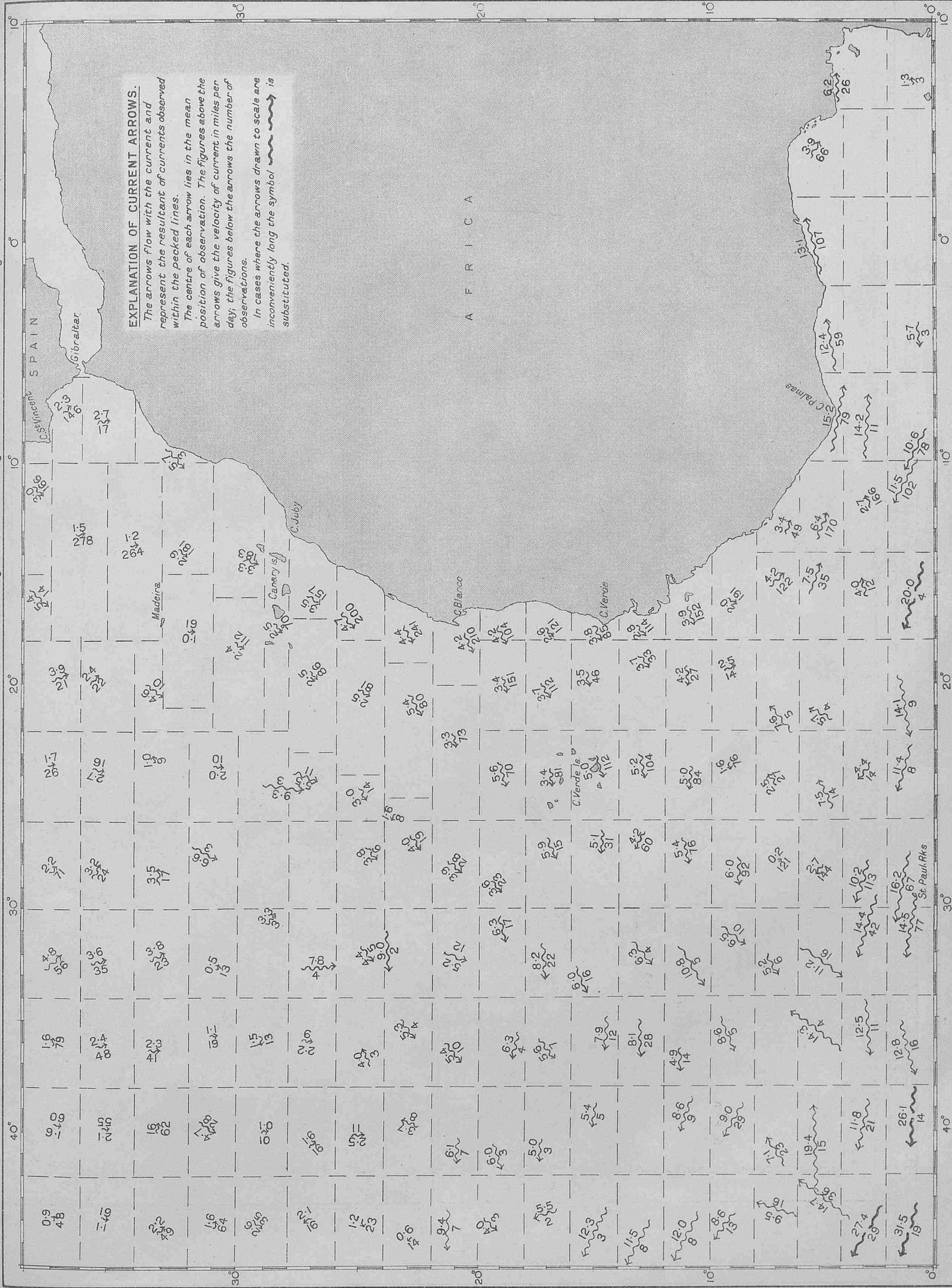


EXPLANATION OF CURRENT ROSES.
 The current roses are drawn from observations within the pecked lines. Arrows flow with the current, length represents frequency, thickness strength. 6-12 miles per day
 13-24 " " "
 25-48 " " "
 49-72 " " "
 73 " " and above
 Distance from tail of arrow to circle represents 5%. Scale 10 20 30 40 50%
 The upper figure in the centre of the rose gives total number of observations, the lower figure the frequency of currents less than 6 miles per day.

| Name of Ship | Date | Middle | | Wind |
|------------------|--|-----------|-----------|----------------|
| | | Lat. | Long. | |
| Gelnia | 25 | 25° 15' N | 17° 11' W | 56* |
| | Canary Current. | | | |
| | 24 | 27° 38' N | 16° 19' W | 209° 49* |
| Ruapehu | 8 | 23° 04' N | 19° 13' W | 274° 36* NE. |
| | North Equatorial Current. | | | |
| Hubert | 20 | 14° 51' N | 34° 07' W | 233° 40 |
| | NOVEMBER | | | |
| Hubert | 14 | 11° 09' N | 37° 37' W | 255° 36 |
| | DECEMBER | | | |
| Orani | 1 | 15° 03' N | 17° 57' W | 192° 36 |
| | JANUARY | | | |
| Highland Warrior | 4 | 12° 37' N | 23° 22' W | 350° 40 |
| | Counter Equatorial and Guinea Current. | | | |
| Alban | 15 | 5° 09' N | 42° 33' W | 50° 60 |
| | NOVEMBER | | | |
| Accra M.S. | 14 | 4° 15' N | 7° 31' W | 100° 72* |
| | DECEMBER | | | |
| Aba. | 7 | 4° 55' N | 3° 59' W | 90° 49* |
| | JANUARY | | | |
| Clement | 23 | 2° 06' N | 45° 25' W | 300° 70* SE-E. |
| | NOVEMBER | | | |
| | 4 | 0° 25' N | 43° 07' W | 282° 53 |
| Halmonides | 1 | 1° 45' N | 45° 35' W | 295° 74* |
| | JANUARY | | | |
| Upwey Grange | | | | |

* Drifts marked thus are proportionate drifts for 24 hours observed for shorter intervals.

CURRENTS IN THE NORTH ATLANTIC, SOUTHEASTERN PORTION
NOVEMBER, DECEMBER and JANUARY. Observations of ships regularly observing for the British Meteorological Office, 1910-1938.



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.
 In cases where the arrows drawn to scale are inconveniently long the symbol  is substituted.

A F R I C A

SPAIN

Gibraltar

Madeira

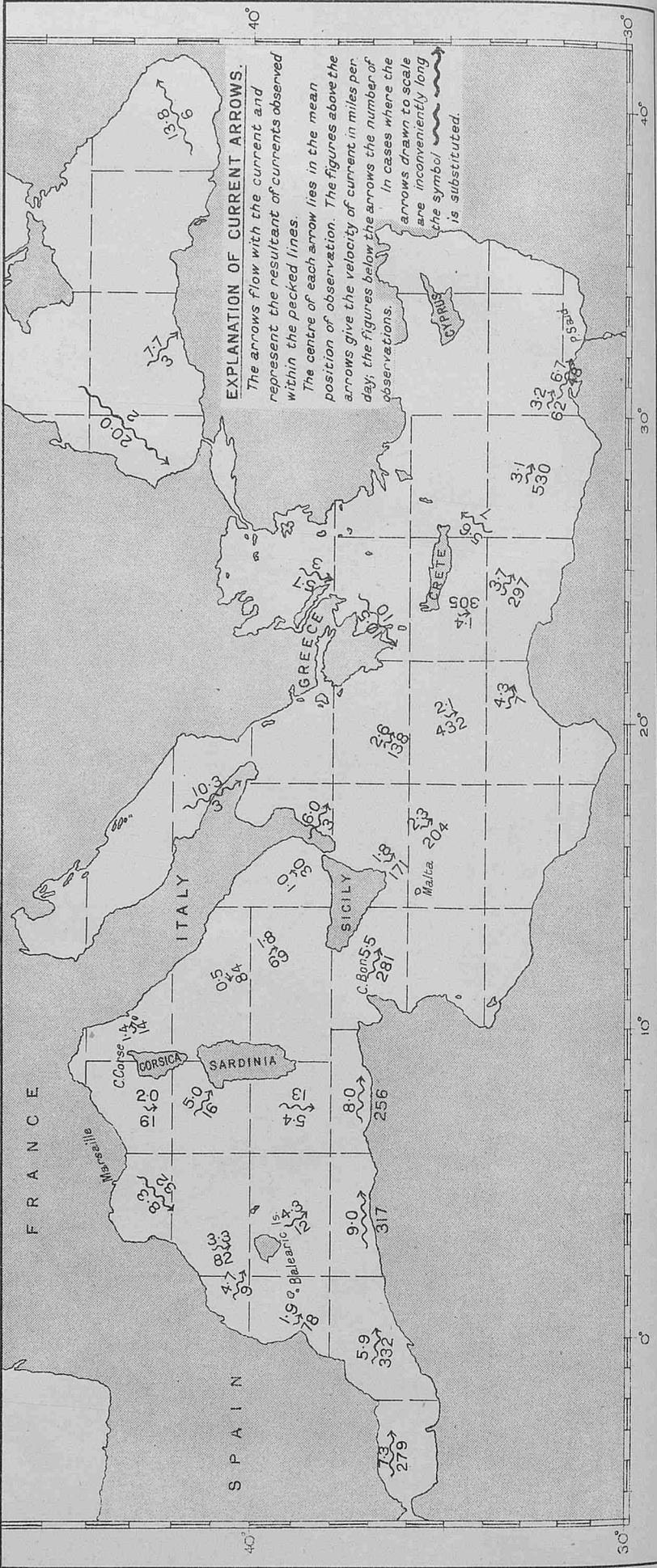
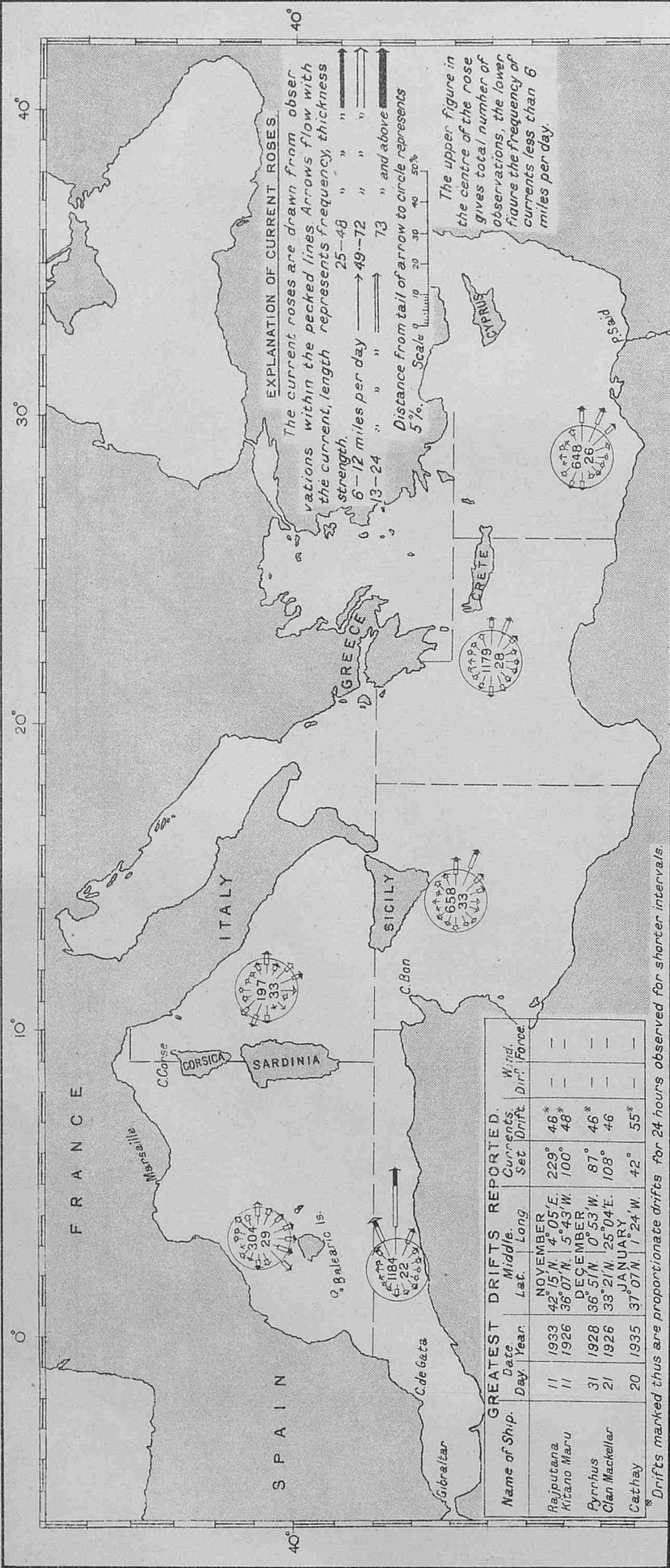
Canary Is.

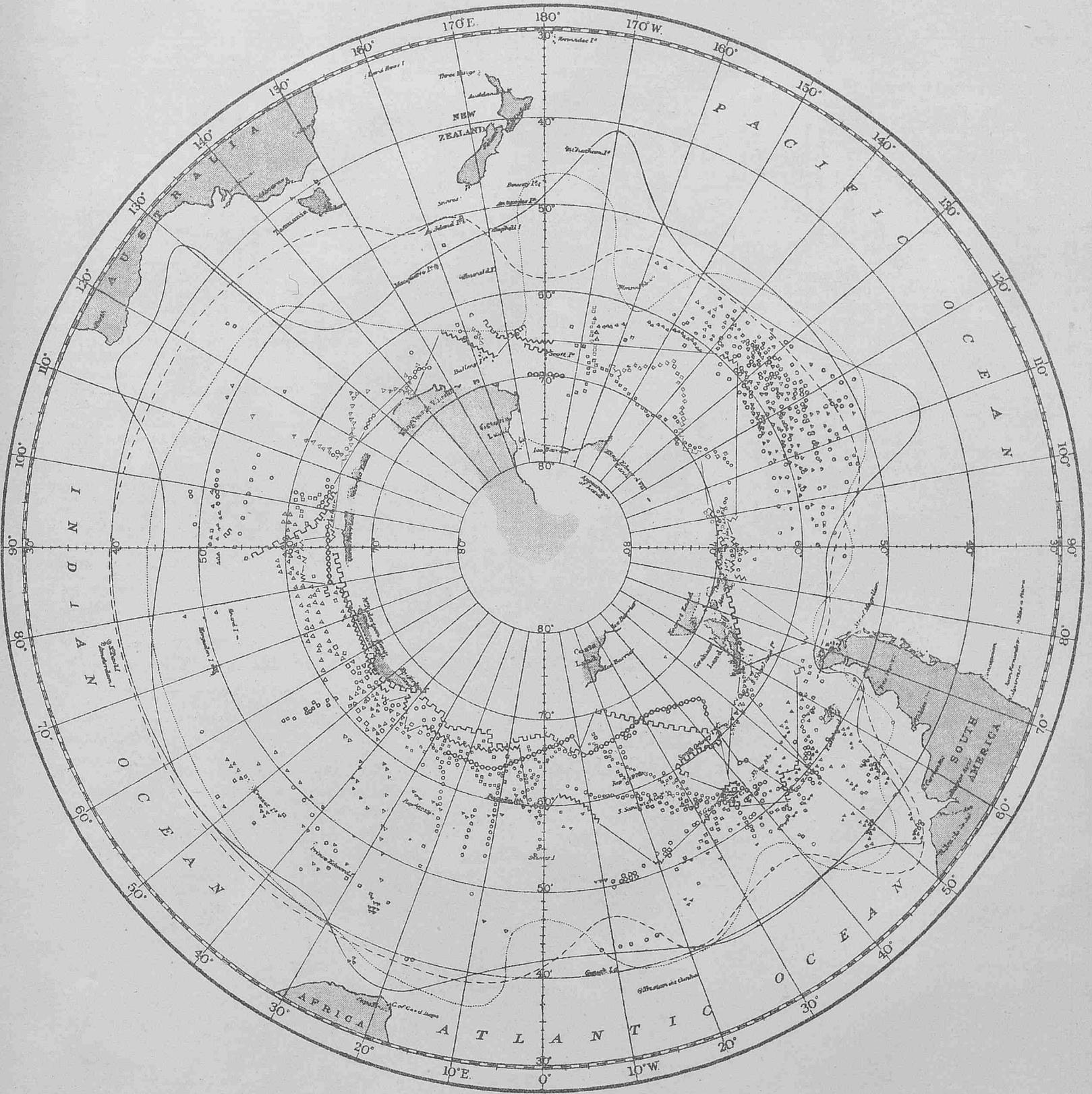
C. Juby

C. Blanco

C. Verde

NOVEMBER, DECEMBER and JANUARY. Observations of ships regularly observing for the British Meteorological Office, 1910-1938.





**ICE CHART OF THE SOUTHERN HEMISPHERE,
JANUARY, FEBRUARY and MARCH.**
EXPLANATION.

The symbols used to distinguish the ice of each of the three months are as follows:-

| | | | | |
|----------|---|--------------------------|---|---|
| | | <i>Bergs, 1902-1938.</i> | <i>Position of northernmost pack ice actually observed 1885-1938.</i> | <i>Extreme limit of all ice, 1772-1938.</i> |
| January. | △ | | ~~~~~ | --- |
| February | □ | | ~~~~~ | --- |
| March | ○ | | ~~~~~ | --- |

NOTE - The symbols for pack ice are joined by hair line where desirable.

The coast line of the Antarctic continent as shown on this chart is not completely corrected to accord with the latest survey information. It is intended in a later volume of The Marine Observer, after the Admiralty Ice chart of the Southern Hemisphere N° 1241 has been revised, to again publish this chart in The Marine Observer with coast lines as complete as possible and to bring the ice information up to date annually.

MARINE METEOROLOGY.

Co-operation of Shipowners, Masters and Mates.

Captains and Officers of ships registered in Great Britain and Northern Ireland, who wish to co-operate regularly with the Meteorological Office should apply to the appropriate Port Meteorological Officer or Agent, a list of whom, with addresses, is given below.

In accordance with the International Convention for Safety of Life at Sea, the Meteorological Office arranges for certain "Selected Ships" to take meteorological observations at specified hours, and to transmit such observations by wireless telegraphy, for the benefit of other ships and the various meteorological services.

Arrangements are also made for a limited number of ships to keep meteorological logs in certain trades for the purpose of completing the meteorological survey of the oceans.

Ships regularly performing these voluntary duties are known as Observing Ships; the whole as the Voluntary Observing Fleet; and the commanders and officers of these ships as the Corps of Voluntary Marine Observers.

At present the observing fleet is limited to a number not exceeding 360 observing ships. The number of British "Selected Ships" is determined upon the British proportion of world tonnage, on the assumption that there should be a total of 1,000 "Selected Ships" of all nations.

The observing fleet list indicating which are "Selected Ships," with the names of commanders, officers, and other particulars, is published in THE MARINE OBSERVER and kept up to date monthly.

The Organization of Voluntary Meteorological Observation at sea is described in Chapter VII of THE MARINE OBSERVER'S HANDBOOK, sixth edition.

THE QUARTERLY MARINE OBSERVER or MONTHLY SUPPLEMENT is sent regularly to the captain of every observing ship, for the information and guidance of his observing officers, and the wireless operators. The Captains of observing ships are also supplied on request with charts, and atlases, according to trade, if available, as meteorological equipment.

To ensure the accuracy of data collected for the purpose of research and for weather forecasting, ashore and afloat, and to provide a pattern which may be copied with advantage to all concerned for general use in merchant ships, sufficient tested instruments are lent by the Meteorological Office to the Captains of observing ships.

The commanders of observing ships keeping the meteorological log are requested to return it (accompanied by Form 138 in the case of "Selected Ships") through the appropriate Port Meteorological Officer or Agent at intervals of not more than five months.

Commanders of observing ships keeping Forms 911 are requested to return them (accompanied by Form 138 in the case of "Selected Ships") by post direct to the Meteorological Office, London, at the end of each voyage, or at intervals of not more than two months.

These forms have the address and "On His Majesty's Service" printed upon them, and should be folded for posting accordingly.

The Port Meteorological Officers and Merchant Navy Agents inspect instruments in Meteorological log ships half-yearly, and in other observing ships quarterly, when possible; and they will replace as necessary any gear lent by the Meteorological Office. These officers will also check the accuracy of barometers, etc., in observing ships, but marine observers should themselves frequently check by comparison.

The work of the British observing fleet, that of the observing fleets of other nations party to the Convention for Safety of Life at Sea, together with Weather Shipping Bulletins and Gale and Hurricane Warnings conforming to the International Convention for Safety of Life at Sea, provide the necessary information for shipping. Thus a world wide service for all shipping, at the minimum cost to national funds, is provided. Shipowners are asked to facilitate this voluntary work which is done by the commanders and officers of their ships.

Shipowners will greatly assist by facilitating the forwarding of postal matter from the Air Ministry addressed to the Captains of ships.

The masters of all British ships fitted with wireless telegraphy are asked to assist in this service in aid of navigation by making routine wireless weather reports in accordance with the Selected Ship scheme where and when there are not Selected Ships carrying out the service.

With a view to stimulating this supplementary service of making weather reports in the Selected Ship service when and where there are not Selected Ships, a supplementary list of British Weather Reporting Ships is being made.

Only British ships suitably fitted with wireless telegraphy, and who have been visited by the Merchant Navy Agents to the Meteorological Office, and whose masters have then undertaken to perform this service, are included in this list, which is not published, but which is sent for information to stations working a roll call.

The masters of all British ships are advised to procure the pamphlet M.O. 329, DECODE FOR USE WITH THE INTERNATIONAL CODE FOR WIRELESS WEATHER MESSAGES FROM SHIPS, published and sold by H.M. Stationery Office, through any bookseller, price 6d.

M.O. 379, a HANDBOOK OF WEATHER, CURRENTS, AND ICE FOR SEAMEN, gives guidance in weather forecasting, also published by H.M. Stationery Office, price 4s. 0d.

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

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(Telephone No. : Albert Dock 2659. Telegraphic Address : Barometric Aldock, London.)

MERSEY Commander M. CRESSWELL, R.N.R., Port Meteorological Officer, Dock Office, Liverpool.
(Telephone No. : Bank 8959. Telegraphic Address : Meteorite, Liverpool.)

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CLYDE Captain W. HENDERSON, 80, Buchanan Street, Glasgow, C.1. (Telephone No. : Central 3775.)

FORTH Captain G. MORE, Chief Dock Master's Office, Leith. (Telephone No. : Leith 35481.)

HUMBER W. H. CARR, Esq., Master Mariner, Ferensway Chambers, Ferensway, Hull. (Telephone No. : Hull 16063.)

SOUTHAMPTON Captain Sir BENJAMIN CHAVE, K.B.E. Room 35, Royal Mail House.

TYNE Captain F. B. WEST, Customs House Chambers, Quayside, Newcastle upon Tyne, 1. (Telephone No. : Newcastle 23203.)

DERELICTS AND FLOATING WRECKAGE.

| Date. | Position. | | Description. | Date. | Position. | | Description. |
|------------------------|---------------------------|------------|---|--------------------------------|-----------|------------|---|
| | Latitude. | Longitude. | | | Latitude. | Longitude. | |
| NORTH SEA | | | | ENGLISH CHANNEL—(cont.) | | | |
| 1.12.38 | 56°54'N. | 1°51'E. | Drifting logs. 40 ft. long, 1½ ft. thick. | 13.12.38 | 50°15'N. | 0°56'W. | Red conical buoy, with ring, 4 on side. |
| 2.12.38 | 54°25'N. | 6°05'E. | Wrecked barge ("Cetus"). | 13.12.38 | 49°16'N. | 4°04'W. | Red conical buoy. |
| 2.12.38 | 10 miles W. Hornum, Sylt. | | Dredger-barge adrift. | GULF OF MEXICO | | | |
| 8.12.38 | 52°58'N. | 1°35'E. | Floating mast. | 1.12.38 | 28°08'N. | 94°31'W. | Derelict fishing schooner, <i>Mayflower</i> . |
| ENGLISH CHANNEL | | | | NORTH ATLANTIC | | | |
| 10.12.38 | 50°08'N. | 2°49'W. | Red cylindrical buoy. | 1.12.38 | 49°40'N. | 47°57'W. | <i>Allan F. Rose</i> , abandoned, on fire. |
| 11.12.38 | 48°33'N. | 5°15'W. | Red conical buoy. | 2.12.38 | 29°02'N. | 78°02'W. | Heavy spar and timbers. |
| 13.12.38 | 49°54'N. | 4°29'W. | Can buoy. | 5.12.38 | 23°30'N. | 50°29'W. | Buoy |

CHART OF THE WESTERN NORTH ATLANTIC.

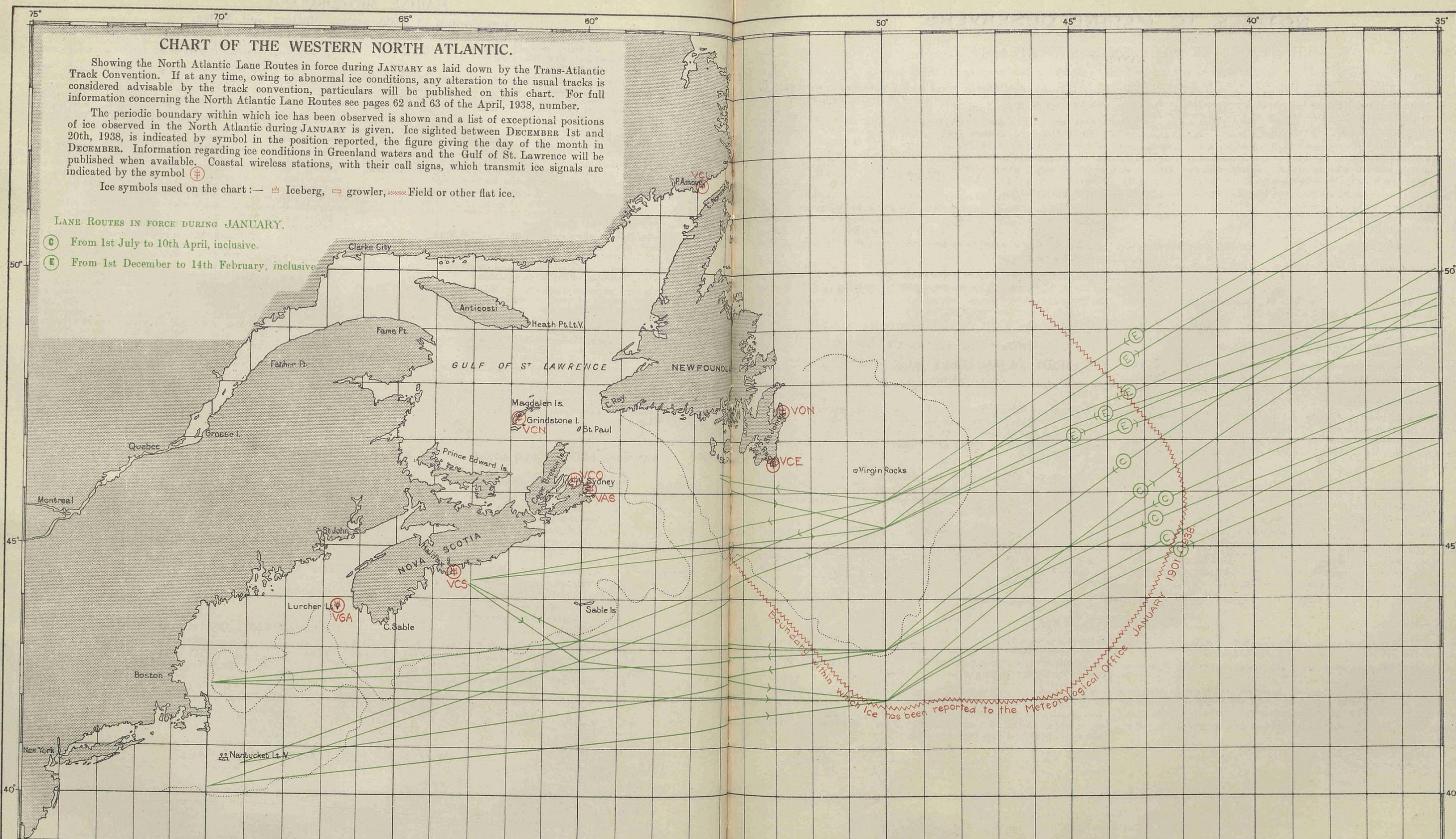
Showing the North Atlantic Lane Routes in force during JANUARY as laid down by the Trans-Atlantic Track Convention. If at any time, owing to abnormal ice conditions, any alteration to the usual tracks is considered advisable by the track convention, particulars will be published on this chart. For full information concerning the North Atlantic Lane Routes see pages 62 and 63 of the April, 1938, number.

The periodic boundary within which ice has been observed is shown and a list of exceptional positions of ice observed in the North Atlantic during JANUARY is given. Ice sighted between DECEMBER 1st and 20th, 1938, is indicated by symbol in the position reported, the figure giving the day of the month in DECEMBER. Information regarding ice conditions in Greenland waters and the Gulf of St. Lawrence will be published when available. Coastal wireless stations, with their call signs, which transmit ice signals are indicated by the symbol ⊕.

Ice symbols used on the chart: — Iceberg, — growler, — Field or other flat ice.

LANE ROUTES IN FORCE DURING JANUARY.

- Ⓢ From 1st July to 10th April, inclusive.
- Ⓣ From 1st December to 14th February, inclusive.



EXCEPTIONAL POSITIONS OF ICE.

| Date. | Ship or Source of Report. | Position. | | Remarks. |
|---------------|---------------------------|-----------|----------|--|
| | | Lat. | Long. | |
| Jan. 14, 1836 | H.M.S. Cove | 60°53'N. | 5°50'W. | 2 bergs. |
| " 9, 1913 | S.S. Oriflamme | 48°37'N. | 34°42'W. | Berg. 40 ft. high, 400 ft. long. |
| " 27, 1916 | S.S. Rio Verde | 33°34'N. | 70°32'W. | Hummock 2 ft. high, 30 ft. in circumference. |

NOTICES TO MARINE OBSERVERS.

NOTICE.

Particular attention is invited to "World Wide System of Voluntary Selected Ships Routine Wireless Telegraphy" revised and brought up to date on pages 29 to 41 of this number of the "Marine Observer", including the lists of stations detailed to receive weather reports from "A" and "B" Selected Ships.

The practice of routine broadcasting of coded weather reports to C.Q. by British Selected Ships when out of range of the appointed coast stations being now firmly established, greater attention is being paid by the Marine Division of the Meteorological Office, its branches and agencies, to weather reports being addressed direct to the appropriate meteorological centres through the appointed shore stations, and the scheme has been revised with this end in view.

These reports are also intended to be intercepted by ships as desired.

The Service of British Selected Ships is being greatly extended by British Supplementary Weather Reporting Ships, who are supplied by the Meteorological Office with full instructions for assisting in the work where and when necessary. The lists of stations detailed to receive

weather reports from Selected Ships are also published in the Admiralty List of W.T. Signals for the information of all British Shipping.

Captains of British Selected Ships are asked to ensure that the "Marine Observer" is made readily available not only to the observing officers but also to the wireless operators, for it is absolutely essential for the success of the work that they should be familiar with the details of the system of communication for the Selected Ship Service and the stations which are published in the "Marine Observer" to work with British Selected Ships.

Directors of Meteorological Services are also asked to ensure that all the necessary information contained in the "Marine Observer" is brought to the notice of those operating the Wireless stations which have been detailed, at their request, to receive weather reports addressed to their meteorological centres.

Mutual familiarity with this system by those concerned both afloat and ashore is essential to maintain smooth working and to increase efficiency.

POSTAL ARRANGEMENTS.

The quarterly numbers of the MARINE OBSERVER are published on the last Wednesdays of December, March, June and September, while the monthly supplements are published on the last Wednesday of the intervening months.

If captains of observing ships will forward to the Meteorological Office the particulars required hereunder, endeavour will be made as far as mails permit to post the latest number or supplement with appropriate forms for observational work 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 or Supplement will be addressed to the Commanding Officer, S.S....., c/o the owners, and captains are requested to make their own arrangements for forwarding.

DESPATCH OF INFORMATION

REQUIRED IMMEDIATELY FOR THE CONDUCT OF THE WORK AT SEA.

Shipowners, Marine Superintendents and all concerned in the despatch of mails to Ships abroad are asked to kindly facilitate the despatch and delivery of postal matter received at their offices from the Meteorological Office and Air Ministry Publication Depot to their Ships abroad.

This matter addressed to the Commanders of Ships contains information which is required for the Conduct of Marine Meteorological Work at Sea and is most effective if received by the Commanders at the earliest possible date.

Much of the information referred to is published in the MARINE OBSERVER and Supplements, and is of a seasonal nature. This journal also contains advice to Regular Observing Ships which enables them to perform voluntary service by Wireless Communication for the benefit of all shipping.

ICE OBSERVATION.

Drifting ice, derelicts, and other floating dangers to navigation are reported by all the means of communication at the disposal of the master.

See Appendix III, pages 106 to 108 of the MARINE OBSERVER'S HANDBOOK, Sixth Edition.

It is also desirable that more detailed information than can be given in a TTT wireless message should be available to the Meteorological Office for the purpose of research, and for the Admiralty Charts and Sailing Directions.

Marine observers will greatly assist by noting the conditions of ice, either drifting or fast.

For this purpose Form 912 is supplied direct to all regular observing ships using regions where ice may be encountered and this Form may be supplied to the Captain of any British ship on application to the Port Meteorological Officers and Merchant Navy Agents.

Regular observing ships using the Trans-North Atlantic tracks are requested to send in these Forms, not only when ice is encountered, but also when they have passed through the ice region during the ice season without encountering ice, in which case a "nil" report; since it is desirable as far as possible to determine when tracks have been clear of ice.

THE MARINE OBSERVER

| Name of Vessel. | Captain. | Observing Officers. | Senior Wireless Operator. | Meteoro-logical Instrument Equip-ment. | Owners. | Logs, Registers, or Records Contributed. 7.9.38 to 3.12.38. | Date Last Return Received. |
|---|--|--|---------------------------|--|--|---|---------------------------------|
| 120 †† <i>Apapa</i> , M.S. | E. Vaughan Davies | L. Collings, E. G. Beesley, T. Stedman. | J. Rea | M.-S. | Elder Dempster Lines, Ltd. | Fms. 911 & 138 2.9.38 to 25.11.38 | 29.11.38 |
| 017 †† <i>Aquitania</i> | J. C. Townley, R.D., Capt., R.N.R. | R. W. Pickersgill, W. T. Fitzgerald, L. Rand. | J. N. Cragg | S. | Cunard White Star, Ltd. | " " 25.8.38 to 19.9.38 | 21.9.38 |
| 201 †† <i>Arandora Star</i> | E. W. Moulton | J. A. Elliott, W. H. Evans | S. T. Williams | " | Blue Star Line, Ltd. | " " 4.9.38 to 23.9.38 | 26.9.38 |
| 248 *† <i>Arava</i> | T. V. Roberts, R.D., Capt., R.N.R. | D. Hewett, J. Farrow, W. Dickson. | G. W. Bailey | M. | Shaw, Savill & Albion Co., Ltd. | " " 22.5.38 to 22.6.38 | 25.6.38 |
| *† <i>Arctic Ranger</i> , S.T. | J. W. Hamling | J. W. Hamling | J. Anderson | S. | Boyd Line, Ltd. | " " 2.11.38 to 14.11.38 | 17.11.38 |
| 114 *† <i>Ariguani</i> | R. A. Thorburn, R.D., Commr., R.N.R. | B. R. Coe, J. Hughes, G. Gracie. | B. M. Evans | " | Elders & Fyffes, Ltd. | " " 16.8.38 to 23.10.38 | 28.10.38 |
| 092 †† <i>Arundel Castle</i> | C. E. Ayles, R.D., Commr. R.N.R. | E. S. Flist | W. A. Brown | " | Union-Castle Mail S.S. Co., Ltd. | " " 23.7.38 to 10.11.38 | 12.11.38 |
| 233 †† <i>Ascania</i> | G. E. Barton, R.D., Lt. Commr. R.N.R. | H. L. De Legh, J. A. S. Halcrow, H. L. Pryse. | J. W. Haynes | " | Cunard White Star, Ltd. | " " 12.9.38 to 26.11.38 | 28.11.38 |
| 013 †† <i>Asturias</i> | A. Purvis | R. Tedman, R. Finch, C. Webster. | T. Bradfield | " | Royal Mail Lines, Ltd. | " " 7.9.38 to 9.10.38 | 14.10.38 |
| 091 †† <i>Athenia</i> | W. Rennie | A. M. Mackinnon, L. Napier, J. R. Henderson. | D. Don | " | Donaldson Atlantic Line. | " " 11.7.37 to 24.9.37 | 26.11.37 |
| 028 †† <i>Athlone Castle</i> , M.S. | E. S. Vincent, R.D., Commr. R.N.R. | S. Thompson, F. MacIver | J. Hodgson | " | Union-Castle Mail S.S. Co., Ltd. | " " 21.8.38 to 5.10.38 | 11.10.38 |
| 208 *† <i>Aurania</i> | R. J. Finlow, R.D., Capt. R.N.R. | J. T. Jones, J. Owen, — Walker. | S. K. Alston | " | Cunard White Star, Ltd. | { Fm. 912 5.9.38 to 18.11.38 Fms. 911 & 138 21.8.38 to 4.11.38 | 21.11.38 21.11.38 8.11.38 |
| 103 *† <i>Ausonia</i> | C. H. Bate, R.D., Capt. R.N.R. | J. D. Armstrong, A. H. Young, W. D. Smith. | S. A. Arnold | " | " " | " " 21.8.38 to 4.11.38 | 8.11.38 |
| 046 *† <i>Australia Star</i> , M.S. | J. Fisher | J. Davis, C. Munday, J. Gallienne. | J. St. C. Smart | M.-S. | Blue Star Line, Ltd. | " " 20.8.38 to 20.9.38 | 23.9.38 |
| 133 †† <i>Avelona Star</i> | G. E. Hopper | P. Clark, E. McCormack, A. E. Willis | A. Shippam | " | " " | " " 17.8.38 to 3.10.38 | 3.11.38 |
| 045 †† <i>Avila Star</i> | R. J. Thomas | S. Ranson, S. Wickers, G. Nedden. | H. Varley | " | " " | " " 21.8.38 to 12.10.38 | 15.10.38 |
| 068 †† <i>Balmoral Castle</i> | W. S. Colbourne, O.B.E., R.D., Commr. R.N.R. | M. A. Bulley, J. F. Oakley | J. Summers | S. | Union-Castle Mail S.S. Co., Ltd. | " " 30.7.38 to 17.9.38 | 23.9.38 |
| 110 *† <i>Balmoralwood</i> | O. Stoker - Johnson, D.S.C. | K. D. Castling, R. L. Lidgate, R. Coates. | W. B. Charlton | " | Constantine Steamships, Ltd. | " " 19.8.38 to 16.9.38 | 8.10.38 |
| 209 *† <i>Bassano</i> | A. H. Best | H. K. Tadmam, J. E. Stott, S. G. Poskitt. | C. G. O'Keefe | " | Ellerman's Wilson Line, Ltd. | { Fm. 912 10.9.38 to 5.11.38 Fms. 911 & 138 10.9.38 to 5.11.38 | 9.11.38 9.11.38 11.11.38 |
| 180 *† <i>Beaverbrae</i> | E. J. Jones | E. H. Smith, F. Stell, R. Walgate. | T. A. Evans | M.-S. | Canadian Pacific Steamships, Ltd. | { Fm. 912 20.8.38 to 19.11.38 Fms. 911 & 138 20.8.38 to 10.9.38 | 23.11.38 13.9.38 |
| 130 *† <i>Beaverburn</i> | A. S. Phillips | P. Locke, D. E. T. Newell, D. Ewing. | S. J. Taylor | " | " " | " " 20.8.38 to 10.9.38 | 13.9.38 |
| 138 *† <i>Beaverdale</i> | A. Rothwell | B. R. Russell, J. Shearer, S. F. Allen, A. M. Lindsay. | J. Ormiston | " | " " | Fms. 911 & 138 28.8.38 to 26.11.38 | 1.12.38 |
| 232 *† <i>Beaverford</i> | H. Pettigrew | N. Scallan, F. W. Roberts, E. M. Moir. | J. J. Fraser | " | " " | { Fm. 912 4.9.38 to 28.10.38 Fm. 911 4.9.38 to 23.9.38 | 2.11.38 27.9.38 |
| *† <i>Benarty</i> | J. Watt | A. Ramsay, F. Tait, N. Crowe | W. D. Brodie | M. | W. Thomson & Co. | Fm. 911 27.9.38 to 23.10.38 | 28.11.38 |
| *† <i>Benledi</i> | J. H. Patterson | " " | " " | " " | " " | " " | " " |
| *† <i>Benmohr</i> | J. C. Sinclair | A. Griffiths, G. W. Patterson, J. Brown. | " " | M.L. | " " | Fm. 915 28.3.38 to 7.8.38 | 15.8.38 |
| 111 *† <i>Benwyvis</i> | H. J. Small | W. M. Marshall, W. P. Gollan, N. Fraser. | D. H. Walker | M. | " " | Fms. 911 & 138 1.8.38 to 2.11.38 | 7.11.38 |
| 145 *† <i>Berwickshire</i> | W. R. Roberts | H. W. Chadd, G. Stronach, C. Harrison. | W. G. Peddie | S. | Turnbull, Martin & Co., Ltd. | " " 14.9.38 to 30.9.38 | 10.10.38 |
| 007 *† <i>Bradfyne</i> | M. O'Neill | H. F. Thomas, P. Evans, S. Hewitt. | J. N. Collins | " | Sir Wm. Reardon Smith & Partners, Ltd. | " " 28.1.38 to 26.5.38 | 7.9.38 |
| *† <i>Brighton</i> | B. Shaw | H. Smith | A. H. Jones | " | Southern Ry. ... | " " 2.8.38 to 18.11.38 | 21.11.38 |
| *† <i>Brisbane Star</i> , M.S. | F. N. Riley | M. B. N. Tallack, C. Horton, G. Goodman. | " " | M.-S. | Blue Star Line | " " 5.7.38 to 14.10.38 | 18.10.38 |
| 189 †† <i>Britannic</i> , M.S. | A. T. Brown | J. F. Drake, B. L. Butcher, L. G. Toone. | F. Clarke | S. | Cunard White Star, Ltd. | { Fm. 912 22.8.38 to 7.11.38 Fms. 911 & 138 19.8.38 to 12.9.38 | 9.11.38 13.9.38 7.11.38 |
| 106 *† <i>British Colonel</i> (tank) | E. Miller | H. E. Wick, W. Forsyth, A. G. Max. | J. W. Ryder | M. | British Tanker Co., Ltd. | Fms. 911 & 138 3.7.38 to 18.10.38 | 7.11.38 |
| 038 *† <i>British Corporal</i> (tank) | J. Cunningham | S. Wilkinson, H. G. Wood, C. T. Forster. | E. C. Hutchings | " | " " | " " 4.9.38 to 29.10.38 | 4.11.38 |
| 153 *† <i>British Endurance</i> , M.S. (tank) | R. O. Putt | M. Hutchinson, J. D. Johnston | R. B. Reid | " | " " | " " 22.8.38 to 13.11.38 | 23.11.38 |
| 054 *† <i>British General</i> (tank) | W. D. Jeffries | D. M. H. Walker, R. C. Flamstead, N. Clarke. | W. Gillies | " | " " | " " 21.8.38 to 1.11.38 | 10.11.38 |
| *† <i>British Grenadier</i> (tank) | J. A. Ferrier | E. J. Simpson, D. L. O. Smith, C. H. Humphries. | T. Gledhill | " | " " | " " 2.3.38 to 28.5.38 | 2.6.38 |
| *† <i>British Gunner</i> (tank) | C. W. G. Stook | R. Reid, R. Jary, A. D. R. Macdonald. | F. V. Harford | " | " " | Fm. 911 11.8.38 to 27.10.38 | 28.11.38 |
| 257 *† <i>British Hussar</i> (tank) | F. O. Armstrong | R. L. Campbell, G. R. Mackillican, B. W. Hope. | R. Mortimer | " | " " | Fms. 911 & 138 16.9.38 to 29.10.38 | 10.11.38 |
| 076 *† <i>British Officer</i> (tank) | R. H. Guswell | R. M. Anderson, D. C. Barton, K. Johnson. | W. E. Saunders | " | " " | " " 31.7.38 to 15.11.38 | 24.11.38 |
| *† <i>British Power</i> (tank) | E. G. Dobson | R. Robinson | " " | " " | " " | Fm. 911 28.8.38 to 17.10.38 | 24.10.38 |
| *† <i>British Premier</i> (tank) | B. M. Naylor | P. Taylor, W. H. Sharp, D. L. Smith. | F. J. Park | " | " " | Fms. 911 & 138 16.8.38 to 31.10.38 | 24.11.38 |
| *† <i>British Resolution</i> , M.S. (tank) | H. J. Were | A. G. Davidson, W. Graham, J. Weddle. | L. G. Sparks | " | " " | Fm. 911 8.7.38 to 4.11.38 | 11.11.38 |
| 225 *† <i>British Statesman</i> (tank) | J. H. Sloan | F. E. Jones, B. Samuel, P. Thomson. | J. H. S. Macdonald | " | " " | Fms. 911 & 138 11.8.38 to 25.10.38 | 1.11.38 |
| 273 *† <i>British Strength</i> , M.S. (tank) | C. Gally | J. M. Templeton, S. A. Caws, T. W. Coffley. | J. Cunningham | " | " " | Fm. 911 25.7.38 to 18.10.38 | 26.11.38 |
| *† <i>British Workman</i> (tank) | S. D. Bumstead | R. T. Hedley | J. M. Mullin | " | " " | Fms. 911 & 138 13.8.38 to 10.11.38 | 28.11.38 |
| 219 *† <i>Buteshire</i> | S. Y. Strange | R. McAdam, W. J. Jones, F. J. Meyrick, J. B. Sparkes. | W. W. Whewell | S. | Houston Line | " " 28.8.38 to 14.9.38 | 20.9.38 |
| 200 *† <i>Cairnesk</i> | E. A. Organ | S. W. Parks, R. Preston, A. L. Swapp. | F. A. Munday | " | Cairns, Noble & Co., Ltd. | { Fm. 912 4.9.38 to 15.11.38 Fms. 911 & 138 4.9.38 to 17.11.38 | 24.11.38 24.11.38 |
| 241 *† <i>Cairnngen</i> | A. W. Melling | F. W. Fairley, J. Henderson, E. A. Organ. | R. A. Penny | " | " " | { Fm. 912 24.8.38 to 31.10.38 Fms. 911 & 138 24.8.38 to 31.10.38 | 1.11.38 1.11.38 |
| 112 *† <i>Cairnross</i> | T. J. Baker | D. Easson, A. J. Dunn, F. Usher. | H. Jardine | " | " " | { Fm. 912 18.9.38 to 29.11.38 Fms. 911 & 138 18.9.38 to 28.11.38 | 1.12.38 1.12.38 |
| 075 *† <i>Cairnvalona</i> | A. C. Dickson | R. Armstrong, A. Molinoux, E. Cairns. | J. Sargent | " | " " | { Fm. 912 18.9.38 to 29.11.38 Fms. 911 & 138 14.8.38 to 23.10.38 | 27.10.38 27.10.38 |
| 031 †† <i>Caledonia</i> | A. Collie | J. Simpson, H. L. P. King, J. Baxter. | J. F. Reid | " | Anchor Line, Ltd. | Fm. 912 14.8.38 to 23.10.38 Fms. 911 & 138 28.8.38 to 10.11.38 | 27.10.38 16.11.38 |

FLEET LIST

| Name of Vessel. | Captain. | Observing Officers. | Senior Wireless Operator. | Meteoro-logical Instrument Equip-ment. | Owners. | Logs, Registers, or Records Contributed. 7. 9. 38 to 3.12.38 | Date Last Return Received. |
|--|---|---|---------------------------|--|------------------------------------|---|----------------------------|
| *† <i>Cambrria</i> ... | A. Marsh ... | F. G. J. Manning ... | J. Pritchard ... | S. | L.M. & S. Rly. ... | Fms. 911 & 138 1.8.38 to 5.11.38 | 14.11.38 |
| 223 *† <i>Cambridge</i> ... | A. Angell ... | G. E. Mason, T. Norris, J. Lodge. | P. McConnach ... | " | Federal S.N. Co., Ld. | " " 3.1.38 to 24.5.38 | 1.6.38 |
| 042 †† <i>Cameronia</i> ... | G. B. Kelly ... | J. D. Mackenzie, J. L. Gibson, R. F. Caldwell. | W. C. M. Ness ... | " | Anchor Line, Ld. | { Fm. 912 " 11.9.38 to 26.10.38 | 29.10.38 |
| 252 *† <i>Camito</i> ... | R. J. Bostock ... | R. Philpott ... | R. E. Blizzard ... | " | Elders & Fyffes, Ld. | Fms. 911 & 138 9.8.38 to 26.11.38 | 30.11.38 |
| 037 †† <i>Canton</i> ... | H. M. Jack ... | " " " " " " | " " " " " " | M. S. | P. & O. S.N. Co. | " " " " " " | " |
| 117 *† <i>Cape of Good Hope</i> M.S. | A. T. McGlashan ... | J. S. Binnie P. A. Wallace, A. W. J. Justen. | S. E. Cowling ... | S. | Lyle Shipping Co., Ld. | Fms. 911 & 138 27.3.38 to 7.11.38 | 16.11.38 |
| 188 †† <i>Capetown Castle</i> , M.S. | A. Barron ... | A. O. Wilkins... .. | H. Oliver ... | " | Union Castle Mail S.S. Co. Ld. | " " 3.9.38 to 20.10.38 | 1.11.38 |
| 266 †† <i>Carinthia</i> ... | A. C. Greig, O.B.E., R.D. Capt., R.N.R.... | W. E. Warwick, J. C. Boyce, W. L. Cox. | R. M. Shore ... | " | Cunard White Star, Ld. | " " 19.9.38 to 20.9.38 | 27.10.38 |
| 264 †† <i>Carnarvon Castle</i> , M.S. | A. H. Blackman ... | C. F. J. Finch ... | A. G. Blors ... | " | Union Castle Mail S.S. Co., Ld. | " " 11.9.38 to 26.10.38 | 3.11.38 |
| 155 †† <i>Carthage</i> ... | H. Williams ... | P. M. Jones, A. E. Clay, A. A. Terry. | F. Rose ... | M.-S. | P. & O. S.N. Co. | " " 31.7.38 to 2.11.38 | 5.11.38 |
| 184 †† <i>Cathay</i> ... | H. R. Rhodes ... | M. A. Trenfield, T. A. Sergeant, E. G. Hopkins. | E. L. Boyce ... | " | " " " | " " 23.7.38 to 27.10.38 | 31.10.38 |
| 127 *† <i>Cavina</i> ... | W. T. Forrester, O.B.E. | W. E. A. Duff ... | A. N. Taylor ... | S. | Elders & Fyffes, Ld. | " " 26.7.38 to 5.11.38 | 29.11.38 |
| *† <i>Celtic Monarch</i> ... | G. C. Winchester ... | " " " " " " | " " " " " " | M.L. | Monarch S.S. Co. Ld. | " " " " " " | " |
| 011 †† <i>Ceramic</i> ... | H. C. Elford ... | G. F. Cresswell, W. J. Stranger J. W. Paine. | W. M. Ross ... | S. | Shaw, Savill & Albion Co., Ld. | Fms. 911 & 138 17.1.38 to 4.5.38 | 9.5.38 |
| 029 *† <i>Cheshire</i> , M.S. ... | C. Fountain ... | A. N. Williamson, J. B. Quinn, A. D. Quayle. | F. W. Greaves ... | " | Bibby Bros. & Co. | " " 23.9.38 to 21.10.38 | 14.11.38 |
| 067 *† <i>Chinese Prince</i> , M.S. | W. Finch, W. Irvine ... | A. H. Kent, E. J. Roberts, D. G. P. Tait. | D. T. de Witt ... | M.L. | Furness Lines Ld. | Fm. 915 13.4.38 to 20.7.38 | 5.9.38 |
| 192 †† <i>Chitral</i> ... | W. E. L. S. Pockock ... | J. W. Hamilton, R. H. Turner, F. Collison. | W. B. Goodsell ... | M.-S. | P. & O. S.N. Co. | Fms. 911 & 138 17.7.38 to 19.10.38 | 26.10.38 |
| 051 *† <i>City of Auckland</i> | H. G. Jenkins, O.B.E. | J. C. Stivey, R. G. Jones, T. V. Birkett. | H. Davies ... | S. | Ellerman Lines, Ld. | " " 8.10.38 to 15.11.38 | 24.11.38 |
| 135 *† <i>City of Barcelona</i> | E. J. Myles ... | R. A. Jones, H. G. Williams, A. M. Bowman. | R. F. Gardner ... | M. | " " " | " " 7.8.38 to 13.11.38 | 16.11.38 |
| 265 *† <i>City of Baroda</i> | G. P. M. O'Halloran ... | D. M. Williams, R. S. Steel. | W. Gainer ... | S. | " " " | " " 12.9.38 to 17.11.38 | 24.11.38 |
| 057 †† <i>City of Benares</i> ... | A. Lee ... | H. H. Asher, T. G. Spilman, S. J. Findlay. | A. Fairweather ... | M.-S. | " " " | " " 2.9.38 to 6.11.38 | 17.11.38 |
| *† <i>City of Bombay</i> ... | O. Cheverton Brown ... | G. Jackson ... | " " " " " " | M. | " " " | " " 18.7.38 to 28.9.38 | 4.10.38 |
| 158 *† <i>City of Cairo</i> ... | A. J. Phillip ... | F. Nuttall, H. N. Jones, C. G. Parry. | G. S. Creighton ... | " | " " " | " " 10.10.38 to 6.11.38 | 13.11.38 |
| 215 *† <i>City of Canberra</i> | H. R. Jackson ... | A. Travis, J. Sapp ... | C. Kerrage ... | " | " " " | " " 4.9.38 to 3.10.38 | 14.11.38 |
| 033 *† <i>City of Canton</i> ... | E. Scrymgeour... .. | R. W. Tyrrell, W. E. Fletcher, E. Routledge. | P. J. Hanley ... | " | " " " | " " 3.8.38 to 2.9.38 | 8.9.38 |
| 157 *† <i>City of Delhi</i> ... | F. W. Penberthy ... | W. Nimmo, T. Lovell, T. Hendry. | T. A. Walker ... | S. | " " " | " " 6.7.38 to 12.10.38 | 25.10.38 |
| 030 *† <i>City of Dieppe</i> | W. J. Merchant ... | E. A. Chapman, J. Mitchell, S. Brown. | L. J. Long ... | " | " " " | " " 2.8.38 to 27.11.38 | 3.12.38 |
| *† <i>City of Edinburgh</i> | H. Cartwright ... | " " " " " " | " " " " " " | M. | " " " | " " " " " " | " |
| 049 *† <i>City of Evansville</i> | F. McKay ... | G. Stewart, T. G. Mathias, R. H. Broadbent. | J. A. Angove ... | " | " " " | Fms. 911 & 138 30.8.38 to 5.11.38 | 9.11.38 |
| 220 †† <i>City of Exeter</i> ... | D. L. Lloyd ... | P. C. Wilson, R. S. Webber, V. H. Lewis. | L. Hugo ... | S. | " " " | " " 2.5.38 to 10.7.38 | 20.8.38 |
| 089 *† <i>City of Hereford</i> | R. A. Grove ... | W. G. Stobbs, N. Williams, I. M. McBeath. | G. Goodman ... | M. | " " " | " " 7.7.38 to 11.9.38 | 17.8.38 |
| 237 †† <i>City of London</i> ... | R. P. Longstaff ... | W. G. McCulloch, M. Winter, A. K. Gillespie. | O. A. Read ... | S. | " " " | " " 19.9.38 to 27.11.38 | 2.12.38 |
| 256 *† <i>City of Lyons</i> ... | T. Cooper ... | R. L. Pallister, A. Spence, K. Gregory. | G. Webb ... | M. | " " " | " " 22.9.38 to 30.9.38 | 18.10.38 |
| 066 †† <i>City of Nagpur</i> ... | N. McNeil, O.B.E. ... | N. Groundwater, R. Browne, J. Walker. | A. E. Dowe ... | S. | " " " | " " 19.6.38 to 1.9.38 | 3.9.38 |
| 074 †† <i>City of Paris</i> ... | L. Nicol ... | W. G. Stubbs, A. J. Barnett, C. Clark. | G. Fenton ... | " | " " " | " " 14.12.37 to 13.2.38 | 21.2.38 |
| 271 *† <i>City of Roubaix</i> | H. Spencer, D.S.C. ... | S. G. Hyder, A. H. G. Jones, P. R. Winship. | V. H. Davis ... | M. | " " " | " " 6.6.38 to 10.7.38 | 14.7.38 |
| 272 *† <i>City of Singapore</i> | T. R. Watkins ... | E. E. Mason, L. E. Brook, T. V. Selley. | L. J. Delany ... | " | " " " | " " 10.6.38 to 5.10.38 | 12.10.38 |
| 035 *† <i>City of Sydney</i> ... | E. M. Robertson ... | R. M. Hall, W. V. Highton... | M. M. Burke ... | " | " " " | " " 31.7.38 to 11.10.38 | 18.10.38 |
| 167 *† <i>City of Tokio</i> ... | G. Burton ... | J. H. Aldridge ... | C. L. Laurence... .. | S. | " " " | " " 31.7.38 to 14.9.38 | 20.9.38 |
| 136 *† <i>City of Winchester</i> | W. S. Coughlan ... | H. Laird, W. Scott-Craig, H. Lewis. | J. O. Brien ... | " | " " " | " " 22.8.38 to 31.8.38 | 17.9.38 |
| 125 *† <i>City of Windsor</i> | E. E. Bulkeley ... | G. D. B. Davies, N. Bradley, L. E. Smith. | F. Duggan ... | " | " " " | " " 11.9.38 to 12.11.38 | 17.11.38 |
| 027 *† <i>Clan Farquhar</i> ... | C. E. O'Byrne ... | J. H. Holman, J. Brown, J. S. Caldo, J. Woodall. | A. MacLennan ... | M. | Clan Line Steamers, Ld. | " " 25.8.38 to 17.10.38 | 20.10.38 |
| 050 *† <i>Clan Macalister</i> | R. W. Mackie... .. | P. Philip, E. G. G. Mobbs, K. Banks, G. S. Willis. | C. J. Andrews ... | S. | " " " | " " 3.8.38 to 20.8.38 | 12.9.38 |
| 222 *† <i>Clan Macdougall</i> , M.S. | C. C. Parfitt ... | F. Lionnet ... | H. A. Croft ... | " | " " " | " " 6.9.38 to 2.10.38 | 11.11.38 |
| 101 *† <i>Clan Macfarlane</i> | H. Andrews ... | F. H. Leigh, R. L. Smallbone, C. Rodgers. | " " " " " " | " | " " " | " " 24.5.38 to 10.8.38 | 16.8.38 |
| 118 *† <i>Clan Macindoe</i> ... | A. G. Macpherson ... | C. McKinnon, A. T. May ... | J. S. Lyon ... | " | " " " | " " 21.8.38 to 7.10.38 | 29.10.38 |
| 082 *† <i>Clan Macnair</i> ... | R. J. W. Bennet ... | R. W. Crawford, T. O. Marr, J. M. Reynolds. | R. F. W. Bafton ... | " | " " " | " " 13.9.38 to 19.9.38 | 18.10.38 |
| 255 *† <i>Clan Macneil</i> ... | H. E. G. Scott Smith, O.B.E., R.D., Lieut.- Commr. R.N.R. | J. C. Matheson, D. Devall, H. Whitehead. | W. Hayes ... | " | " " " | " " 28.6.38 to 10.9.38 | 26.11.38 |
| 001 *† <i>Clan Macphee</i> ... | H. C. Simpson ... | R. C. Steel, T. Gillies, R. Lumsden. | W. Scott ... | " | " " " | " " 16.10.38 to 25.10.38 | 3.11.38 |
| 168 *† <i>Clan Mactaggart</i> | F. W. Last ... | N. F. Stewart, W. R. William- son, J. P. Dumbley. | J. G. Wood ... | " | " " " | " " 18.4.38 to 13.10.38 | 31.10.38 |
| 261 *† <i>Clan Mactavish</i> | R. P. Galer, R.D., Capt. R.N.R. | A. Clark, S. R. Woods, J. E. Clayton, A. Brading. | A. M. Forbes ... | " | " " " | " " 23.8.38 to 13.10.38 | 21.10.38 |
| 002 *† <i>Clan Macwhirter</i> | E. E. Arthur ... | W. P. Creak, A. Woodall, R. G. Bagnell. | D. Lamb ... | " | " " " | " " 28.10.38 to 18.11.38 | 30.11.38 |
| 109 *† <i>Clan Morrison</i> ... | B. A. Hardinge ... | M. J. Lewis, K. W. Davies, F. B. Fairweather. | C. Ashcroft ... | " | " " " | " " 7.9.38 to 18.9.38 | 10.11.38 |
| 214 *† <i>Clement</i> ... | R. B. Furneaux ... | T. E. Williams, C. Smethurst H. Sapsworth... | T. P. Jones ... | " | Booth S.S. Co., Ld. | " " 5.9.38 to 25.10.38 | 18.11.38 |

THE MARINE OBSERVER

| Name of Vessel. | Captain. | Observing Officers | Senior Wireless Operator. | Meteorological Instrument Equipment. | Owners. | Logs, Registers, or Records Contributed. 7.9.38 to 3.12.38 | Date Last Return Received. |
|--------------------------------|--|--|---------------------------|--------------------------------------|----------------------------------|---|---------------------------------|
| 041 *† Clydebank, M.S. | W. Broome | C. W. Hayercraft, E. W. Dibble, J. R. Mahon. | A. J. Lamont ... | S. | A. Weir & Co. ... | Fms. 911 & 138 1.9.38 to 23.9.38 | 28.11.38 |
| 084 *† Clydefield, M.S. (tank) | D. A. Law | M. H. Hooker, H. Humphries, S. H. Platt. | W. J. Fergusson | " | Hunting & Son, Ld. | " " 13.8.38 to 26.11.38 | 1.12.38 |
| 016 *† Comliebank, M.S. | V. Harper | H. S. Brown, F. W. Moore, J. S. Soutar. | C. R. H. Jarmy | " | A. Weir & Co. ... | " " 7.8.38 to 4.9.38 | 17.10.38 |
| Como | E. S. Green | ... | ... | M.L. | Ellerman's Wilson Line | ... | ... |
| 185 †† Comorin ... | C. W. Cartwright, D.S.C. | P. C. Reid, E. J. Spurling, D. A. W. Bell. | E. Howard ... | M.-S. | P. & O. S.N. Co. | Fms. 911 & 138 7.8.38 to 9.11.38 | 11.11.38 |
| 069 *† Consuelo ... | J. L. Sibree, R.D., Capt., R.N.R. | G. K. Brooke, J. B. Dunkley, F. Ellison. | J. Greer ... | S. | Ellerman's Wilson Line, Ld. | { Fm. 911 24.8.38 to 22.10.38 Fm. 912 24.8.38 to 22.10.38 | 3.11.38 3.11.38 |
| 198 *† Contractor ... | H. Collins | R. E. Harvey, W. H. Allen, R. Ledger. | W. Briereton ... | M.-S. | T. & J. Harrison | Fms. 911 & 138 29.6.38 to 16.9.38 | 28.9.38 |
| 258 †† Corfu | J. K. Chaplin, R.D., Capt., R.N.R. | C. W. Pierce, H. V. Williamson, H. J. M. Perry, R. A. Perry. | R. V. McCreath | " | P. & O. S.N. Co. | " " 3.7.38 to 6.10.38 | 11.10.38 |
| *† Corrientes ... | ... | ... | ... | S. | Donaldson Line | ... | ... |
| 191 *† Crispin | S. N. White, R.D., Capt., R.N.R. | A. A. Gerrard, S. Pollock, G. G. Roberts. | J. Moran ... | " | Tooth S.S. Co., Ld. | Fms. 911 & 138 9.9.38 to 2.11.38 | 12.11.38 |
| 036 *† Cumberland ... | E. A. Burton | D. C. M. Campbell, D. H. Chadwick, L. G. Hollis. | E. D. Slater ... | " | Federal S.N. Co., Ld. | " " 10.4.38 to 21.8.38 | 27.8.38 |
| 274 *† Custodian ... | D. A. McCallum ... | ... | D. J. Murphy ... | M. | T. & J. Harrison | " " 23.8.38 to 10.11.38 | 24.11.38 |
| 240 *† Dalrym | D. J. Jones | N. Halliday, J. Thompson ... | W. L. T. Ellison | S. | Campbell Bros. & Co. | { Fm. 912 16.9.38 to 24.9.38 Fms. 911 & 138 13.8.38 to 27.11.38 | 26.11.38 18.10.38 3.12.38 |
| 219 *† Dearne | T. H. Woodhead ... | R. Wise, G. W. Thompson, C. B. Allen ... | R. D. Akers ... | " | L.M. & S. Rly. ... | " " 13.8.38 to 27.11.38 | 3.12.38 |
| 194 *† Dreebank | A. S. Reed | A. A. Abel | R. McGowan ... | " | A. Weir & Co. ... | " " 3.7.38 to 4.11.38 | 18.11.38 |
| 204 †† Derbyshire, M.S. | G. L. English | A. Bharrel, G. Mordaunt, R. Jameson. | D. McLellan ... | " | Bibby Bros. & Co. | " " 3.7.38 to 23.9.38 | 26.9.38 |
| *† Deucalion, M.S. | W. Beswick, D.S.C., Commr., R.N.R. | A. B. Guppy, Johnston, Holden. | N. F. Brearley ... | " | A. Holt & Co. ... | Fm. 911 25.8.38 to 10.11.38 | 14.11.38 |
| 061 *† Devon | H. Goater | H. C. Turner, H. Watkins, D. Bunn, G. Usher. | H. Ridgeway ... | M. | British India S.N. Co., Ld. | Fms. 911 & 138 17.7.38 to 14.9.38 | 24.10.38 |
| *† Diplomat | J. J. Egerton | J. H. Lowe | G. J. W. Williams | " | T. & J. Harrison | " " 16.5.38 to 17.8.38 | 27.8.38 |
| 072 *† Director | M. G. O'Brien | J. Tooth, G. T. Crispin, O. W. Lewis. | W. Williams ... | " | " | " " 8.8.38 to 8.10.38 | 18.10.38 |
| 115 *† Discovery II, R.R.S. | L. C. Hill, O.B.E., Lieut., R.N.R. | H. Kirkwood, D. D. Bone, M. G. Mackendrick. | A. E. Morris ... | M.L. | Discovery Committee. | { Fm. 915 8.2.38 to 4.5.38 Fm. 912 8.2.38 to 4.5.38 | 8.6.38 8.6.38 |
| 096 *† Don | C. E. Tree | J. Blackburn | J. Orifill ... | S. | Associated Humber Lines. | Fms. 911 & 138 9.7.38 to 5.11.38 | 9.11.38 |
| 058 *† Dorset, M.S. ... | C. Matthews | J. Cree, J. Knott, H. Allingham. | A. Stenning ... | M. | Federal S.N. Co., Ld. | " " 22.8.38 to 20.9.38 | 21.11.38 |
| 142 †† Duchess of Atholl | W. B. Coyle, R.D., Commr., R.N.R. | W. Stanley, E. Glennie, A. D. Morrison. | E. Murphy ... | M.-S. | Canadian Pacific Steamships, Ld. | { Fm. 912 11.9.38 to 25.11.38 Fms. 911 & 138 6.11.38 to 25.11.38 | 30.11.38 30.11.38 |
| 152 †† Duchess of Bedford. | A. R. Meikle, R.D., Capt., R.N.R. | E. J. Oatridge, D. Dunn, L. Davies. | A. O'Sullivan ... | " | " | { Fm. 912 21.8.38 to 3.11.38 Fms. 911 & 138 2.9.38 to 30.11.38 | 7.11.38 3.12.38 |
| 151 †† Duchess of Richmond. | H. A. Moore, R.D., Capt., R.N.R. | T. E. Sargent, N. Duck, C. Belton. | I. F. Yorston ... | " | " | { Fm. 912 2.9.38 to 13.10.38 Fms. 911 & 138 4.9.38 to 17.11.38 | 15.10.38 19.11.38 |
| 143 †† Duchess of York | C. Richardson | R. V. Burns, W. Ascroft, W. Roberts. | J. W. Potts ... | " | " | { Fm. 912 30.10.38 to 17.11.38 Fms. 911 & 138 20.8.38 to 9.10.38 | 19.11.38 15.10.38 |
| *† Duke of Argyll ... | J. W. Richmond ... | W. Bleakley, S. Goren ... | A. N. Davies ... | S. | L.M. & S. Rly. ... | Fms. 911 & 138 5.8.38 to 29.11.38 | 2.12.38 |
| *† Duke of Lancaster | E. B. Sergeant ... | W. Cole, W. N. Greenwood ... | G. Pilling ... | " | " | " " 2.8.38 to 13.11.38 | 17.11.38 |
| *† Duke of Rothesay | F. C. Raven | A. E. Willmott, J. Abram ... | P. P. Williams ... | " | Union-Castle Mail S.S. Co., Ld. | " " 28.8.38 to 9.10.38 | 1.11.38 |
| 098 †† Dunbar Castle, M.S. | A. E. Castle | R. H. Payne, G. W. Laurenson, H. Close. | R. W. D. Benbow | M. | Blue Star Line, Ld. | Fm. 911 4.5.38 to 29.7.38 | 6.8.38 |
| *† Dunedin Star, M.S. | G. Owen, R.D., Commr., R.N.R. | P. H. Hunt, J. J. Miller, K. M. Watling. | R. Brew ... | S. | Union-Castle Mail S.S. Co., Ld. | Fms. 911 & 138 27.8.38 to 16.10.38 | 19.10.38 |
| 193 †† Dunmottar Castle, M.S. | R. W. Goodacre, R.D., Commr., R.N.R. | G. E. Stephenson, J. F. Coleman. | G. J. Owen ... | " | " | " " 9.9.38 to 22.11.38 | 3.12.38 |
| 043 †† Dunvegan Castle, M.S. | S. F. Newdigate ... | C. W. Armstrong | F. Shaw ... | M.-S. | Federal S.N. Co., Ld. | " " 31.5.38 to 2.10.38 | 12.10.38 |
| 064 *† Durham, M.S. ... | C. R. Pilcher | A. Kirk, J. F. Clement, E. Porter. | E. Shaw ... | M.-S. | Federal S.N. Co., Ld. | " " 31.5.38 to 2.10.38 | 12.10.38 |
| *† Eastern Coast ... | W. Quirk | R. E. Holt, P. A. Johnson ... | N. C. Forsinot ... | M.L. | Coast Lines, Ld. | Fm. 915 1.1.37 to 26.7.37 | 30.9.37 |
| 077 †† Edinburgh Castle | E. H. Thornton, R.D., Capt., R.N.R. | D. Robertson, W. F. Palmer | F. A. Mott ... | S. | Union-Castle Mail S.S. Co., Ld. | Fms. 911 & 138 13.8.38 to 2.10.38 | 5.10.38 |
| 107 *† El Argentino, M.S. | F. Ellis, D.S.C. ... | H. Neale Sherwell, R. Rushton, J. A. Everett. | G. Potts ... | M. | Furness Lines ... | " " 10.9.38 to 22.11.38 | 26.11.38 |
| 034 †† Empress of Britain. | C. H. Sapsworth ... | R. J. Barlow, W. S. Main, B. Ford. | A. Nesbitt ... | " | Canadian Pacific Steamships, Ld. | { Fms. 911 & 138 4.9.38 to 10.11.38 Fm. 912 4.9.38 to 10.11.38 | 12.11.38 12.11.38 |
| 119 †† Erin | J. R. Matthews ... | R. De Gruchy, M. N. Faichney, V. Hill. | W. J. Burnett ... | " | Erin S.S. Co., Ld. | Fms. 911 & 138 18.8.38 to 29.10.38 | 2.11.38 |
| 010 *† Eros (t-e) | R. N. Shore | J. T. C. Vignurs, H. T. Green, H. E. Lascelles. | F. W. Ward ... | M. | Federal S.N. Co., Ld. | " " 15.9.38 to 26.11.38 | 1.12.38 |
| 169 *† Essex, M.S. | F. N. Wyatt | H. P. Williamson, I. R. Griffiths, B. H. C. Crowhurst. | ... | " | " | " " 23.5.38 to 14.9.38 | 22.9.38 |
| 199 *† Ettrickbank ... | T. Watkins | D. Campbell | ... | S. | A. Weir & Co., Ld. | Fm. 911 22.4.38 to 7.7.38 | 23.7.38 |
| *† Explorer | D. C. Sandison ... | T. R. Ness, J. Craig | ... | M.L. | Scottish Fishery Board | Fm. 915 3.3.38 to 9.7.38 | 20.7.38 |
| *† Explorer | A. J. Meek | A. J. Turner, W. E. Williams | W. G. Haris ... | M. | T. & J. Harrison | Fm. 911 16.7.38 to 14.10.38 | 20.10.38 |
| *† Fordsdale | D. Christie | E. Warren | ... | " | Shaw, Savill & Albion | " " 11.8.38 to 14.9.38 | 26.10.38 |
| 239 *† Foulbank, M.S. | H. J. Smith | E. E. Thomas, J. Hart ... | R. O'Shea ... | S. | A. Weir & Co. ... | Fms. 911 & 138 21.8.38 to 5.11.38 | 24.11.38 |
| 173 †† Franconia | G. R. Dolphin, R.D., Commr., R.N.R. | R. Price, F. Foster, J. Evans | S. W. Brown ... | " | Cunard White Star, Ld. | " " 27.8.38 to 30.9.38 | 22.10.38 |
| *† Geddington Court | G. Blacklock | W. Newman | L. W. Jameson | " | United British S.S. Co., Ld. | " " 5.9.38 to 19.11.38 | 23.11.38 |
| 186 †† Georgic, M.S. ... | E. Edkin, O.B.E., R.D., Capt., R.N.R. | N. E. R. Potter, N. Kingscote, W. K. Hunter. | A. Schofield ... | " | Cunard White Star Co., Ld. | " " 18.8.38 to 11.11.38 | 16.11.38 |
| *† Gitano | D. H. Casson | P. R. Legg, J. W. Stevens, S. H. Bennett. | G. H. Rutherford | " | Ellerman's Wilson Line. | " " 13.8.38 to 24.9.38 | 17.11.38 |
| 234 *† Glaucus | E. W. Berry | A. Letty, E. W. Casson, J. C. Thomas, F. Howe. | J. F. Denson ... | " | A. Holt & Co. ... | " " 10.6.38 to 4.9.38 | 15.9.38 |
| 026 *† Glenbank, M.S. ... | J. Macdonald | W. J. H. Pearce, D. S. Morrison, T. M. Williamson. | A. C. Chamberlain | " | A. Weir & Co. ... | " " 24.9.38 to 21.10.38 | 5.11.38 |
| 203 †† Gretafield (tank) | E. Derricks | J. M. Waters, D. Dallas, J. M. Davidson. | J. Taylor ... | " | Hunting & Son ... | " " 19.9.38 to 10.11.38 | 19.11.38 |
| 218 *† Harmonides ... | H. Evans | J. K. Gorrie, J. L. Jones ... | C. Ford ... | " | Houston Line, Ld. | " " 20.5.38 to 27.6.38 | 1.7.38 |
| 171 *† Hertford | T. J. C. Tuckett ... | R. W. Corn, R. T. Birkin, R. G. Hollingdale. | E. Saunders ... | " | Federal S.N. Co., Ld. | " " 25.7.38 to 20.10.38 | 31.10.38 |
| *† Hibernia | J. R. Bulmer, M.B.E., ... | W. E. Meade | D. T. Rockey ... | " | L.M. & S. Railway | " " 18.7.38 to 14.11.38 | 19.11.38 |
| 182 †† Highland Brigade, M.S. | R. G. Clayton, D.S.C., R.D., Capt., R.N.R. | F. J. Swallow, T. Fraser, J. Phillips, G. B. Grey. | E. A. Reynolds ... | M.-S. | Royal Mail Lines, Ld. | " " 18.7.38 to 14.11.38 | 19.11.38 |

FLEET LIST

| Name of Vessel. | Captain. | Observing Officers. | Senior Wireless Operator. | Meteorological Instrument Equipment. | Owners. | Logs, Registers, or Records Contributed. 7.9.38 to 3.12.38. | Date Last Return Received. |
|---|---|--|---------------------------|--------------------------------------|--|---|---------------------------------|
| 116 †† <i>Highland Chieftain</i> , M.S. | C. E. Rathkins, R.D., Capt. R.N.R. | D. H. New, Q. Ballardce, F. A. Attenbrow. | T. Desboro ... | M.-S. | Royal Mail Lines, Ld. | Fms. 911 & 138 29.8.38 to 18.10.38 | 21.10.38 |
| 099 †† <i>Highland Monarch</i> , M.S. | S. Weller ... | W. B. Avison, R. Wood, J. Shillitoe. | E. F. Weather- head. | " | " " " | " " 18.8.38 to 2.10.38 | 7.10.38 |
| 230 †† <i>Highland Patriot</i> , M.S. | R. H. Robinson ... | J. Ross, G. E. Leech, J. Green | M. Carpenter ... | " | " " " | " " 4.8.38 to 13.9.38 | 23.9.38 |
| 250 †† <i>Highland Princess</i> , M.S. | A. R. Murley ... | S. M. Phillips, S. S. Grant, J. A. Weekes, J. Jones. | L. P. Thayne ... | " | " " " | " " 14.9.38 to 28.10.38 | 17.11.38 |
| *† <i>Hopecrown</i> , M.S. | R. W. D. Gilbertson ... | W. A. Hall, J. Aylwin, W. Georgeson. | ... | S. | A. Stott & Co., Ld. | Fm. 911 14.7.38 to 15.9.38 | 8.10.38 |
| *† <i>Hopepeak</i> , M.S. | J. Hardy ... | J. Marshall, R. Atkinson, E. G. Painter. | W. L. Cowan ... | " | " " " | " " 16.7.38 to 18.10.38 | 25.10.38 |
| *† <i>Hopestar</i> ... | J. Steward ... | W. A. Watson ... | ... | " | " " " | " " 12.8.38 to 19.9.38 | 20.9.38 |
| 178 *† <i>Imperial Star</i> M.S. | D. R. Macfarlane ... | H. H. Arton, R. M. Thorne, R. Laycock. | C. North ... | M. | Blue Star Line, Ld. | Fms. 911 & 138 16.5.38 to 19.8.38 | 23.9.38 |
| 260 *† <i>Inanda</i> ... | J. T. Ling ... | B. H. Band, E. P. Simmons, D. N. Mathews. | E. J. Cook ... | M.-S. | T. & J. Harrison | " " 13.8.38 to 15.11.38 | 30.11.38 |
| *† <i>Inkosi</i> ... | W. H. Gibbings ... | F. G. La Hive, D. Kerr, V. Harrison. | T. Fleetwood ... | " | " " " | " " 11.9.38 to 16.10.38 | 26.10.38 |
| 144 *† <i>Inverbank</i> , M.S. | A. C. Loads ... | F. H. Cummings, L. C. Smith, J. W. Beveridge. | J. T. Jupp ... | S. | A. Weir & Co. ... | " " 17.2.38 to 26.3.38 | 25.4.38 |
| *† <i>Isle of Guernsey</i> | F. W. Hodges, R.D. Comdr. R.N.R. | G. Pearce ... | T. Stubbs ... | " | Southern Rly. ... | " " 10.6.38 to 25.10.38 | 29.11.38 |
| *† <i>Isle of Jersey</i> ... | H. H. Golding ... | C. E. Purley, C. E. Abbey, H. Wellow. | T. D. Baron ... | " | " " " | " " 20.7.38 to 31.10.38 | 2.11.38 |
| *† <i>Isle of Sark</i> ... | R. J. Large ... | G. Pearce, H. F. Bremely ... | A. Weselby ... | " | " " " | " " 29.8.38 to 21.9.38 | 28.9.38 |
| 269 *† <i>Ixion</i> ... | R. C. Sturrock ... | E. Jacques, H. S. Clark, J. G. Sibley. | F. C. Wall ... | M.L. | A. Holt & Co. ... | Fm. 915 6.6.38 to 8.9.38 | 16.11.38 |
| 226 *† <i>Javanese Prince</i> , M.S. | C. S. Smith ... | N. Gale, J. T. Gray, C. J. P. Martin, C. N. Clare. | T. V. Goodman ... | " | Furness Lines ... | " " 13.5.38 to 20.8.38 | 18.10.38 |
| 206 *† <i>Karamea</i> , M.S. | E. T. Grayston, D.S.C., R.D., Commr., R.N.R. | R. L. M. Owen, W. Hill, A. Chandler. | D. G. Read ... | S. | Shaw Savill & Albion Co., Ld. | Fms. 911 & 138 19.6.38 to 10.10.38 | 12.10.38 |
| *† <i>Kelso</i> ... | T. Cooper ... | G. W. Revel, S. Wilkinson ... | W. Hughes ... | " | Ellermans Wilson Line, Ld. | " " 28.10.38 to 23.11.38 | 28.11.38 |
| 262 *† <i>Kemmendine</i> ... | W. C. C. Plage ... | P. McCabe, W. D. Tulloch, J. S. Grassick. | W. Clark ... | M. | P. Henderson & Co., Ld. | " " 12.6.38 to 24.8.38 | 31.8.38 |
| 190 *† <i>Kenbane Head</i> ... | J. R. Moore ... | W. J. Leinster, J. Green, W. A. Haddock. | A. McCartney ... | S. | G. Heyn & Sons | { " " 2.9.38 to 27.11.38 Fm. 912 2.9.38 to 12.9.38 Fms. 911 & 138 1.9.38 to 4.11.38 | 30.11.38 5.10.38 10.11.38 |
| *† <i>Kingston Cyanite</i> S.T. | A. R. Cornish ... | ... | H. McNamara ... | " | Kingston Steam Trawling Co. Ltd. | " " 11.9.38 to 26.11.38 | 29.11.38 |
| 147 †† <i>Laconia</i> ... | W. C. Battle, D.S.C., R.D., Capt., R.N.R. | C. S. Paling, R. Conway, J. G. Bradley. | W. M. McArdley ... | " | Cunard White Star, Ld. | " " 8.8.38 to 19.10.38 | 29.10.38 |
| 267 *† <i>Lassell</i> , M.S. ... | G. Scott ... | S. Dickinson, T. J. Sweeney, C. E. Legg. | T. T. Allen ... | " | Lampart & Holt Line, Ld. | " " 16.4.38 to 7.9.38 | 13.9.38 |
| 083 *† <i>Lautaro</i> , M.S. ... | C. Stowe ... | S. Armitage ... | A. T. Smith ... | M. | Pacific S.N. Co. ... | " " 1.8.38 to 14.9.38 | 11.10.38 |
| 251 *† <i>Levernbank</i> , M.S. | H. A. Jones ... | D. Robertson, D. Harrison ... | P. L. O'Byrne ... | S. | A. Weir & Co. ... | " " 17.5.38 to 10.10.38 | 19.10.38 |
| 093 †† <i>Llandaff Castle</i> ... | S. F. Newdgate, R.D., Capt. R.N.R. | W. Anson, S. J. Clutterbuck, J. A. Sowdon, P. H. Grieves. | E. H. Pitt ... | " | Union-Castle Mail S.S. Co., Ld. | " " 10.7.38 to 14.9.38 | 21.9.38 |
| 094 †† <i>Llandoverly Castle</i> | F. A. Smyth, R.D., Lt.-Commr., R.N.R. | J. Tait ... | F. S. Santillo ... | " | " " " | " " 4.7.38 to 31.8.38 | 5.9.38 |
| 097 †† <i>Llanigibby Castle</i> , M.S. | E. Spradbrow ... | W. V. L. Burne ... | R. Batchelor ... | " | " " " | " " 3.9.38 to 8.11.38 | 12.11.38 |
| 216 †† <i>Llanstephan Castle</i> | R. Harris ... | A. J. Trout ... | E. A. Shaw ... | " | " " " | " " ... | ... |
| *† <i>Lochavon</i> , M.S. | F. Cook ... | ... | ... | M. | Royal Mail Lines, Ld. | " " ... | ... |
| 137 *† <i>Logician</i> ... | W. Jones ... | W. S. Eustance, G. H. Howard, D. V. Jones. | E. G. Carver ... | " | T. & J. Harrison | Fms. 911 & 138 10.7.38 to 21.9.38 | 27.9.38 |
| *† <i>Lord Austin</i> , S.T. | G. Arnason ... | ... | ... | S. | Pickering & Hal- dane Steam Fish- ing Co., Ld. | " " ... | ... |
| 268 *† <i>Loriga</i> M.S. ... | A. C. Taylor ... | A. Eccleston, G. D. W. Hutchinson, A. G. Muir. | F. T. Adams ... | M. | Pacific S.N. Co. Ld. | Fms. 911 & 138 27.3.38 to 28.4.38 | 8.5.38 |
| 008 *† <i>Losada</i> , M.S. ... | J. V. Langford ... | J. H. Allenby ... | W. J. Nolan ... | " | " " " | " " 23.8.38 to 8.9.38 | 20.9.38 |
| 062 *† <i>Mahia</i> ... | W. T. Thompson ... | D. Ashley, J. Jackson, A. E. Smith. | T. Murphy ... | S. | Shaw, Savill & Albion Co., Ld. | " " 3.3.38 to 6.7.38 | 26.7.38 |
| 140 *† <i>Mahratta</i> ... | W. Hill ... | G. J. Nuttall, A. G. Gorham | B. L. Smith ... | M. | T. & J. Brockle- bank, Ld. | " " 7.10.38 to 28.10.38 | 11.11.38 |
| 014 *† <i>Mahronda</i> ... | A. Anderson ... | V. H. Froebel, J. B. Newman, H. Fosbrooke. | W. H. Ritch ... | " | " " " | " " 24.8.38 to 2.11.38 | 10.11.38 |
| 015 *† <i>Mahsud</i> ... | D. Ison ... | P. D. McKenzie, H. Simpson, M. R. Melville. | R. Burton ... | " | " " " | " " 21.5.38 to 13.8.38 | 20.8.38 |
| 018 *† <i>Makalla</i> ... | J. Greenall ... | L. J. Unsworth, H. Gillespie, P. Bathurst. | H. C. Norman ... | " | " " " | " " 31.8.38 to 28.9.38 | 5.10.38 |
| 236 *† <i>Malayan Prince</i> , M.S. | J. Smith ... | J. A. Reeves, J. Baird, J. A. Taylor. | J. S. Sharpe ... | M.L. | Furness Lines ... | Fm. 915 26.3.38 to 23.6.38 | 23.8.38 |
| 195 †† <i>Maloja</i> ... | R. C. Dene ... | P. V. James, L. J. Brown, A. G. Stansfield. | A. Babbage ... | M.-S. | P. & O. S.N. Co. | Fms. 911 & 138 22.8.38 to 23.11.38 | 26.11.38 |
| 009 *† <i>Manchester Brigade</i> | T. Makin ... | G. S. Jones, F. Downing, N. Lane. | C. B. Morton ... | S. | Manchester Liners Ld. | " " 7.8.38 to 10.11.38 | 14.11.38 |
| 060 *† <i>Manchester Citizen</i> | G. M. Mitchell ... | W. E. Quirek, W. E. Todd, A. A. Meyer. | C. A. White ... | " | " " " | " " 20.8.38 to 31.10.38 | 3.11.38 |
| 179 *† <i>Manchester Commerce</i> | J. E. Riley ... | A. Hutton, W. H. Downing, M. Barnes. | J. E. Skillicorn ... | " | " " " | " " 6.8.38 to 28.11.38 | 2.12.38 |
| 187 *† <i>Manchester Division</i> | E. E. Bonnard ... | A. Starmer, M. E. Bewley, W. W. King. | L. Green ... | " | " " " | " " 29.4.38 to 19.8.38 | 31.8.38 |
| 253 *† <i>Manchester Producer</i> | G. S. Ronald ... | J. L. McLaren, W. Hine, L. A. Muir. | W. D. MacDougall ... | " | " " " | " " 11.9.38 to 21.10.38 | 25.10.38 |
| 197 *† <i>Manchester Regiment</i> | E. W. Raper ... | G. B. Harrington, F. L. Osborne, M. G. Stevens. | W. H. Critchley ... | " | " " " | " " 28.8.38 to 13.11.38 | 17.11.38 |
| 146 *† <i>Mandasor</i> ... | A. G. Dixon, R.D., Capt. R.N.R. | D. M. Edwards ... | J. Duffy ... | M.-S. | T. & J. Brockle- bank, Ld. | " " 17.8.38 to 12.9.38 | 21.9.38 |
| 213 *† <i>Mashobra</i> ... | P. Taylor ... | H. J. Wright, R. L. Bidmead, W. E. Delaney. | R. L. Salway ... | " | British India S.N. Co., Ld. | " " 26.6.38 to 13.9.38 | 18.11.38 |
| 235 †† <i>Mataroa</i> ... | W. H. Hartman ... | R. Grant, F. J. Patterson, — Robertson. | J. P. Carey ... | S. | Shaw, Savill & Albion Co., Ld. | " " 4.9.38 to 6.10.38 | 18.11.38 |

FLEET LIST

| Name of Vessel. | Captain. | Observing Officers. | Senior Wireless Operator. | Meteoro-logical Instrument Equip-ment. | Owners. | Logs, Registers, or Records Contributed. 7.9.38 to 3.12.38. | Date Last Return Received. |
|----------------------------------|--|---|---------------------------|--|---------------------------------------|---|-------------------------------|
| 177 *† Port Wellington | H. Jeffrey | K. D. Morgan, R. G. Russell, R. A. Wight. | R. D. Waterhouse | S. | Port Line Ld. | Fms. 911 & 138 4.3.38 to 1.7.38 | 16.8.38 |
| 003 *† Port Wyndham, M.S. | W. J. Enright, E.D., Capt., R.N.R. | L. B. Philpott, L. J. Brice, P. Stansbury. | R. Colbourne | " | " " " | { Fm. 912 10.5.38 to 2.8.38 Fms. 911 & 138 1.7.38 to 30.8.38 | 9.8.38 25.7.38 3.12.38 |
| *† Prague | C. Baxter | R. H. Wright, F. Woods | A. C. Potter | " | L. & N.E. Rly. | 4.9.38 to 30.11.38 | 26.10.38 |
| 063 *† Queen City | J. C. Cornwell | D. Williams, K. Germany. | F. Constable | " | Sir Wm. Reardon Smith & Partners, Ld. | " " 18.7.38 to 8.10.38 | |
| 263 †† Queen Mary | G. Gibbons, R.D., Capt., R.N.R. | E. A. G. Davies, H. V. Clarke, G. T. Marr. | A. H. Farman | " | Cunard White Star, Ld. | { Fm. 912 1.9.38 to 22.11.38 Fms. 911 & 138 16.6.38 to 24.7.38 | 25.11.38 21.11.38 |
| 165 *† Radnorshire, M.S. | T. G. Nivison | D. L. Wright, T. R. Walker, J. Fry. | I. T. Davies | " | A. Holt & Co. | 7.9.38 to 10.11.38 | |
| 205 †† Rajputana | W. L. Pope, R.D., Capt., R.N.R. | M. F. Shute, Dunkley, Farmiloe. | J. A. Skinner | M.-S. | P. & O. S.N. Co. | " " 15.8.38 to 16.11.38 | 18.11.38 |
| 228 †† Ranchi | J. A. Smith | H. Toon, R. S. Kerridge, D. S. Charles. | W. Stevenson | " | " " " | " " 8.5.38 to 10.8.38 | 15.8.38 |
| 224 †† Rangitane, M.S. | H. L. Upton | H. J. Brownings, J. R. Vincent, C. D. Pool. | N. J. Hallet | " | New Zealand Shipping Co., Ld. | " " 7.3.38 to 12.6.38 | 30.6.38 |
| 217 †† Rangitata, M.S. | E. Holland | R. E. Walker, D. M. Hannah, H. Hill. | H. R. Dedman | " | " " " | " " 25.6.38 to 26.9.38 | 14.10.38 |
| 105 †† Rangitiki, M.S. | H. Barnett | I. B. Rose, L. W. Fulcher, J. D. Bennett. | L. Horn | " | " " " | " " 29.5.38 to 29.8.38 | 6.9.38 |
| 207 †† Ranpura | L. J. Edwards, R.D., Commr., R.N.R. | E. T. Griffith. | J. R. C. Johnson | " | P. & O. S.N. Co. | " " 5.6.38 to 23.8.38 | 27.8.38 |
| 071 †† Rawalpindi | M. G. Praper, R.D., Commr., R.N.R. | L. A. Hill, A. P. Godfrey, C. C. Gardner, A. D. Seabrook. | S. W. Sharp | " | " " " | " " 29.8.38 to 15.10.38 | 14.11.38 |
| 247 *† Recorder | W. Baird | L. Seddon, G. H. Jolly, J. Downing. | A. H. Williams | M. | T. & J. Harrison | " " 24.5.38 to 25.7.38 | 2.8.38 |
| 132 *† Reina del Pacifico, M.S. | A. Ridyard, O.B.E. | H. Matthews, G. H. Rice, J. P. Edwards, F. J. Leicester. | J. B. Stone | M.-S. | Pacific S.N. Co. | " " 28.8.38 to 19.10.38 | 24.10.38 |
| 276 †† Remuera | E. B. Lamb | R. S. Warren, F. J. Jones, J. P. Fyfe. | J. B. Stockman | S. | New Zealand Shipping Co., Ld. | " " 29.4.38 to 9.8.38 | 18.8.38 |
| †† Rimutaka | C. B. Lamb | " " " | S. C. Baldwin | M.-S. | Anglo - American Oil Co., Ld. | " " 8.8.38 to 19.11.38 | 23.11.38 |
| 139 *† Robert F. Hand (tank). | J. A. Collie | F. J. Hewlett, G. Robson | " | " | Yorkshire Steam Fishing Co., Ld. | { Fm. 912 30.9.38 to 31.10.38 Fms. 911 & 138 30.9.38 to 6.11.38 | 8.11.38 8.11.38 28.7.38 |
| *† Rocketflower, S. T. | L. D. Romyn | L. D. Romyn | A. Rhodes | " | New Zealand Shipping Co., Ld. | " " 30.4.38 to 24.7.38 | |
| 032 †† Rotorua | A. E. Lettington, D.S.C. | R. H. Chapman, C. A. T. Shallcross, A. P. Allingham. | E. G. Stride | M. | Hall Bros. | Fm. 911 21.7.38 to 26.8.38 | 8.9.38 |
| *† Royal Sceptre | J. L. Williams | C. P. Bridgewood, M. Dodds | R. Waylett | S. | New Zealand Shipping Co., Ld. | Fms. 911 & 138 4.7.38 to 7.11.38 | 12.11.38 |
| 231 *† Ruahine | G. Kinnell | K. A. Vasey, C. W. Roberts, D. B. Brittain. | W. Fordham | " | Thos. Hamling & Co. Ld. | { Fms. 911 & 138 22.8.38 to 25.11.38 Fm. 912 22.8.38 to 28.11.38 | 29.11.38 29.11.38 |
| *† St. Cathan, S.T. | J. H. Ellis | J. H. Ellis | M. E. Sandell | " | G.W. Railway | Fms. 911 & 138 27.9.38 to 1.11.38 | 2.11.38 |
| *† St. Helier | R. Pitman | G. Cartwright | R. Littell | " | " " " | " " 1.9.38 to 24.9.38 | 27.9.38 |
| *† St. Julien | L. Richardson | E. Hawyard, B. E. Williams | H. B. Dyer | " | " " " | " " 23.7.38 to 11.8.38 | 3.9.38 |
| *† St. Patrick | H. C. Bond | T. T. Sheehan, K. Nicholson, R. Youd. | R. A. J. Owlett | " | Cunard White Star, Ld. | " " 29.8.38 to 12.11.38 | 17.11.38 |
| 100 †† Samaria | J. McRostie | " " " | " | " | Eagle Oil & Shipping Co., Ld. | Fm. 911 12.9.38 to 6.11.38 | 17.11.38 |
| *† San Adolfo, M.S. (tank) | A. Hulbert | F. White, W. Macleod, E. McCreadie. | A. Julius | M.-S. | " " " | Fms. 911 & 138 5.8.38 to 17.11.38 | 23.11.38 |
| 108 *† San Alberto, M.S. (tank) | C. Vidot | E. D. Gillespie, H. Shotton, J. Shaw. | R. S. Evans | M. | " " " | Fm. 911 8.7.38 to 30.11.38 | 3.12.38 |
| *† San Alvaro, M.S. (tank) | F. A. Kennett | J. A. Whyborn, D. B. Young | W. H. Rees | M.-S. | " " " | Fms. 911 & 138 11.9.38 to 16.11.38 | 3.12.38 |
| 073 *† San Arcadio, M.S. (tank) | S. Perry | A. P. Shaw, G. W. Clark, L. Mays. | G. W. Watson | M. | " " " | " " 8.9.38 to 27.10.38 | 7.11.38 |
| 159 †† San Casimiro, M.S. (tank) | A. E. Gumbleton | C. H. Emmerson, E. A. Holloway, J. Thomson. | J. E. Jeanes | " | " " " | Fm. 911 24.7.38 to 31.10.38 | 4.11.38 |
| *† San Cirilo | F. S. Bailey | G. A. Davies, H. Craig, H. J. McKilligan. | D. I. Jones | M.-S. | " " " | Fms. 911 & 138 4.7.38 to 16.9.38 | 23.9.38 |
| *† Scotia | A. W. Bateman | A. C. Borthwick | J. H. Rockey | S. | L.M. & S. Railway | { Fm. 912 4.9.38 to 18.11.38 Fms. 911 & 138 4.9.38 to 18.11.38 | 28.11.38 28.11.38 |
| 170 †† Scythia | J. G. Bisset, R.D., Commr., R.N.R. | P. A. Read, H. Morgan, H. G. Hayward. | A. F. Porter | " | Cunard White Star, Ld. | Fms. 911 & 138 31.7.38 to 6.10.38 | 12.10.38 |
| 211 *† Shropshire, M.S. | R. S. Evans, O.B.E. | A. E. Young, G. Washington, W. Collins. | G. C. Talbot | " | Bibby Bros. & Co. | Fm. 915 14.3.38 to 22.4.38 | 9.6.38 |
| 121 *† Siamese Prince, M.S. | E. Hardcastle | R. Jones, E. A. Parfitt, C. Blakey, G. Lindsay. | A. Frazer | M.L. | Furness Lines | " " 29.3.38 to 5.7.38 | 3.9.38 |
| *† Silversandal | J. Harrison Leask | R. W. Cherry, A. Boniwell, T. H. Whiston, R. Fielding. | " | " | S. & J. Thompson, Ld. | " " 2.2.38 to 6.7.38 | 4.10.38 |
| *† Silverwalnut, M.S. | J. Smith | A. Nicolson, H. J. Pursey, J. Eccleston. | D. H. Walker | " | " " " | " " " | " |
| Silvio | A. W. Calvert | " " " | " | " | Ellerman's Wason Line, Ld. | " " " | " |
| 141 *† Somerset | N. Rice | C. C. Wilson, H. C. R. Dell, R. M. Roberts. | A. G. Peeling | S. | Federal S.N. Co., Ld. | Fms. 911 & 138 12.6.38 to 25.10.38 | 29.10.38 |
| 052 *† Spero | W. A. Dossor | W. S. Hepton, J. R. Atkinson | B. R. Davy | " | Ellerman's Wilson Line, Ld. | " " 3.9.38 to 20.11.38 | 22.11.38 |
| 176 *† Staffordshire, M.S. | W. Logan Foster | G. Mordant, A. A. Mackenzie, D. Depledge. | F. G. Blinco | " | Bibby Bros. & Co. | " " 14.8.38 to 20.10.38 | 4.11.38 |
| 134 †† Stirling Castle, M.S. | H. R. Northwood | E. Triggs | G. Scurr | " | Union-Castle Mail S.S. Co., Ld. | " " 16.7.38 to 3.11.38 | 5.11.38 |
| 020 *† Stirlingshire, M.S. | A. Mackinlay | A. M. Kennedy, H. Lockyer, A. J. Thompson. | W. D. Gooderidge | " | Turnbull, Martin & Co., Ld. | " " 20.7.38 to 13.9.38 | 2.11.38 |
| 047 *† Stockport | H. S. Brown | A. Dobbs | J. P. Edmunds | " | Associated Humber Lines. | " " 7.8.38 to 6.11.38 | 8.11.38 |
| 270 †† Strathaird (t-e) | J. M. M. Tickell | G. R. Peters, E. S. May, R. E. Simmons. | A. Morris | M.-S. | P. & O. S.N. Co. | " " 10.7.38 to 12.10.38 | 5.10.38 |
| 210 †† Strathallan | J. H. Biggs, R.D., Commr., R.N.R. | A. McHattie, R. H. Danger, R. E. Tucker, J. C. Langdon. | W. Banbury | " | " " " | " " 19.3.38 to 3.9.38 | 6.9.38 |
| 238 †† Stratheden | R. Harrison, D.S.O., R.D., Capt., R.N.R. | J. A. Mason, E. A. Hamilton, K. A. Walker. | H. S. Home | " | " " " | " " 3.9.38 to 16.10.38 | 29.11.38 |
| 039 †† Strathmore | F. E. French, R.D., Capt., R.N.R. | B. H. Pollitt, C. S. I. Shiach, P. W. Austin, P. L. Watson. | S. W. Mitchell | " | " " " | " " 12.6.38 to 15.9.38 | 20.9.38 |
| 059 †† Strathnaver (t-e) | E. P. Lyndon, R.D., Lt.-Commr., R.N.R. | S. E. Edmundson, N. W. Leach, C. Stokes. | P. R. Hobbs | " | " " " | " " 11.9.38 to 16.10.38 | 19.10.38 |
| 229 †† Tactician | A. L. Peterkin | T. Davies, L. Harriman, R. Myles. | R. Williams | M. | T. & J. Harrison | " " 8.8.38 to 1.10.38 | 12.10.38 |
| *† Talhybius | B. R. Stewart | " " " | " | " | A. Holt & Co. | " " " | " |
| 021 †† Tamuroa | W. Dawson | G. Hawley, G. A. Simmers, A. Anderson. | P. Maloney | M.-S. | Shaw Savill & Albion Co., Ld. | Fms. 911 & 138 7.8.38 to 15.11.38 | 21.11.38 |
| *† Taranaki, M.S. | W. G. West | " " " | " | " | " " " | " " " | " |

| Name of Vessel. | Captain. | Observing Officers. | Senior Wireless Operator. | Meteorological Instrumental Equipment. | Owners. | Logs, Registers, or Records Contributed. 7.9.38 to 3.12.38. | Date Last Return Received. |
|--|--|---|----------------------------|--|----------------------------------|---|----------------------------|
| *† <i>Temple Moat</i> ... | A. W. Clinton ... | A. Smith ... | ... | S. | Lambert Bros., Ltd. | Fms. 911 & 138 31.8.38 to 8.10.38 | 28.10.38 |
| 048 †† <i>Themistocles</i> ... | C. Wood, D.S.C. ... | R. F. Hamilton, J. H. Lindhardt, J. K. Downs. | V. Murphy ... | M.-S. | Shaw, Savill & Albion Co., Ltd. | " " 9.5.38 to 1.9.38 | 5.9.38 |
| *† <i>Thistleglen</i> ... | G. A. Whitfield, O.B.E. | L. H. Williams, G. Dobson, R. S. Collins. | W. A. C. Churchman. | M. | Allan, Black & Co. | Fm. 911 25.8.38 to 5.10.38 | 10.10.38 |
| 161 *† <i>Titan</i> ... | P. J. Pycraft ... | R. Brown, A. Pope, R. H. Carruthers. | H. James ... | S. | A. Holt & Co. ... | Fms. 911 & 138 23.7.38 to 10.10.38 | 19.10.38 |
| 242 *† <i>Tongariro</i> ... | P. B. Clarke, D.S.C. ... | J. S. Hough, P. A. Block, R. A. C. Henderson. | J. F. McNeill ... | " | New Zealand Shipping Co., Ltd. | " " 8.3.38 to 1.7.38 | 5.7.38 |
| *† <i>Toir Head</i> ... | D. M. Heddles ... | C. W. Harper, A. Montgomery | L. C. Jeffcott ... | " | Ulster S.S. Co. ... | " " 24.8.38 to 5.11.38 | 17.11.38 |
| 025 †† <i>Transylvania</i> ... | D. W. Bone ... | R. L. Robertson, A. Colquhoun, D. Lindsay. | J. McDonald ... | " | Anchor Line, Ltd. | Fms. 912 24.8.38 to 1.9.38 | 27.9.38 |
| *† <i>Tribesman</i> ... | T. J. Lacey ... | ... | ... | M. | Harrison Line ... | Fms. 911 & 138 4.9.38 to 17.11.38 | 19.11.38 |
| *† <i>Tyndareus</i> ... | D. Hey ... | ... | ... | M.L. | A. Holt & Co., Ltd. | " " " " " " | " |
| 221 †† <i>Tynefield, M.S. (tank)</i> | L. B. Carr ... | R. Lowes, A. D. Lombard, W. C. Muir. | G. Binch ... | S. | Hunting & Son, Ltd. | Fms. 911 & 138 17.8.38 to 28.10.38 | 2.11.38 |
| *† <i>Umtali</i> ... | W. Edwards ... | C. E. Otley ... | ... | " | Bullard King Co. | Fm. 911 11.9.38 to 1.10.38 | 19.10.38 |
| 088 *† <i>Vandyck</i> ... | P. Symons ... | D. L. Woods, G. E. R. Rawsthorne, R. L. Callagan. | N. J. Ryan ... | " | Lampport & Holt, Ltd. | Fms. 911 & 138 14.8.38 to 6.10.38 | 10.10.38 |
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