THE MARINE OBSERVER

Ship "Hotspur."
Capt. H. Toynbee

Admiral · R · Fitzroy · C.B. R.N.
· 1854 — 1865 ·

Lieut · C · W · Baillie · R.N.
· 1888 — 1899 ·

Captain · H · Toynbee ·
· 1867 — 1888 ·

Captain ·
M · Campbell · Hepworth ·
· C.B. · R.D. · R.N.R. ·
· 1899 — 1919 ·

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NO. 128

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IN CO-OPERATION WITH
VOLUNTARY MARINE OBSERVERS

LONDON

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OCTOBER
1937

CAPTAIN L. A. BROOKE SMITH, R.D., R.N.R., · MARINE SUPERINTENDENT.

· C · H · W ·

The Marine Observer

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

Vol. XIV, 1937

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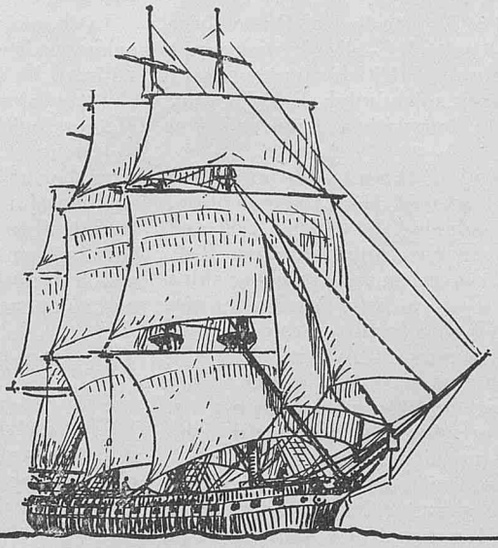

VOL. XIV, No. 128. THE MARINE OBSERVER. OCTOBER 1937.

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WELL DONE, SEAFARERS.

HAVING just returned from my annual visit to the ports, and while the impressions gained among shipping and seamen are fresh in memory, these notes are an endeavour to make plain how well deserved is the signal made in the title above, *Well done, Seafarers.*

At every Merchant Navy Agency to the Meteorological Office there was the same report when I visited it—" set fair "—the British corps of voluntary marine observers and the officers of British supplementary weather reporting ships are doing the work splendidly; and not only with written returns and wireless reports, but with a comprehension which is thoroughly seamanlike.

Then upon enquiring of the Agents and of those of the merchant navy with whom I came in contact, it seemed that the reception, decoding and use of weather reports made by the British Selected Ship service, supplemented by ships upon the Supplementary List, had within the last year become almost general in foreign-going ships of the British merchant navy. In fact, there is little doubt that the work done by the British merchant navy as a result of the contract made by His Britannic Majesty's Government in Article 35 of the Convention for Safety of Life at Sea, has now become a benefit to the service, as well as to the community ashore and the services of the air.

Lest in saying this an exaggerated impression may be given by the words, this is what I have gathered is happening at sea.

A large number of ships decode and use that part of a report which concerns them most. That is to say, a ship receiving a number of routine coded weather reports will select the report of a ship ahead of her, and decode only that figure or group which gives her the information of the elements reported which most concern her. For example, in a region of varying visibility—the visibility.

A large number of ships decode and use several reports from ships on different bearings from them, and visualize the wind circulation from these, sometimes with the aid of the Horn Card or a rough sketch, forecasting the changes which will take place as the ship proceeds.

A steadily increasing number of ships, with steadily increasing skill, make weather charts, occasionally or daily at sea, and forecast the weather by the methods which have been developed by officers at sea, in collaboration with the Marine Division of the Meteorological Office, its branches and agencies, and which are now summarized in a HANDBOOK OF WEATHER, CURRENTS AND ICE FOR SEAMEN.

By doing this work as an aid to navigation and as a matter of routine, which is in harmony with that of the ship, the benefits which it so widely gives are gained with a minimum of inconvenience to shipping and seamen, and with a minimum cost to shipowners and the country.

The success of the first experimental trial trans-North Atlantic flights carried out by the Imperial Airways flying-boat *Caledonia* and the Pan American Airways flying-boat *Clipper III* on 5th–6th July was contributed to very materially by the 25 British Selected Ships and Supplementary Weather Reporting Ships who, following the usual procedure, reported weather to Weather London in the Eastern North Atlantic.

Not only did these reports provide those at the airport at Foynes in Ireland with information of the winds and weather prevailing over the North Atlantic through or over which the flying-boats would pass, and thus enable special " forecasts " to be made for the captains of the flying-boats before they set out, but these ships in reporting weather in the Selected Ship system in ordinary routine actually provided the officers in charge of the W/T stations at Portishead, Valentia and Malin Head and through them the flying-boat control station at Foynes with the information of their position which it required, in case of either of the flying-boats being in distress. These ships' reports also provided Foynes with just the information which the captains of the flying-boats desired, so that they would know the whereabouts of ships and from which they could obtain bearings by D/F, thereby giving them foreknowledge and confidence.

The Meteorological Office is thankful not only to commanders, officers and wireless operators of the 25 ships in the North Atlantic who reported weather to London on this occasion, but also to the whole corps of voluntary marine observers for their continuous service in all parts of the world; to the commanders, officers and W/T operators for the useful work they perform in extending the service of Selected Ships as occasion demands, and to the merchant navy generally for the manner in which it has overcome the many difficulties attendant upon the modernization of the marine meteorological service.

In thanking the Merchant Navy, the Meteorological Office wishes to acknowledge its indebtedness to the shipowners for the facilities afforded by them in permitting the personnel of their ships to work in this voluntary system with the guidance of the Marine Division of the Meteorological Office, its branches and agencies.

It is most gratifying to see at the ports the change which has come over the outlook of the Merchant Navy during the last year, and possibly the cheerful spirit which now prevails is very largely due to improved trade and to the confidence which has been promoted by the knowledge that in the near future long service will meet its just return in a pension, which in itself must go far in the future to remove blocks in promotion, and so enhance efficiency and contentment.

The Distribution of British Regular Voluntary Observing Ships.

The distribution of British Regular Observing Ships upon the different trade routes and in the different oceans is indicated on the chart of the world, page 129, and in the Table below.

The figures over the different trade routes and in the table give a fair estimation of the number of observing ships which are at the present time using the routes and the oceans indicated.

The shipping intelligence of Lloyd's now gives such up-to-date information of the movements of shipping that we are able to estimate the distribution of the voluntary observing fleet over the oceans at any time and to form a very good idea of what it will be in the near future.

Consequently by aid of similar charts kept up to date at each of the Port Meteorological Offices, the Port Meteorological Officers and Merchant Navy Agents are enabled to know how best to adjust the distribution of observing ships by recruitment and relief in trades where the proportionate numbers are insufficient or excessive.

During the past year, the work of Selected Ships in reporting weather by wireless telegraphy to all ships and the Meteorological Centres has been greatly augmented by Supplementary Weather Reporting Ships.

At present there are no less than 217 British ships on the Supplementary List whose commanders have undertaken to carry on, with routine wireless weather reports where and when there are not selected ships to do so and the number is growing steadily.

The distribution of these Supplementary Weather Reporting Ships is not shown, since the Agents endeavour to add to the Supplementary List ships which are sailing on routes where Selected Ships are insufficient at all times for providing an adequate service.

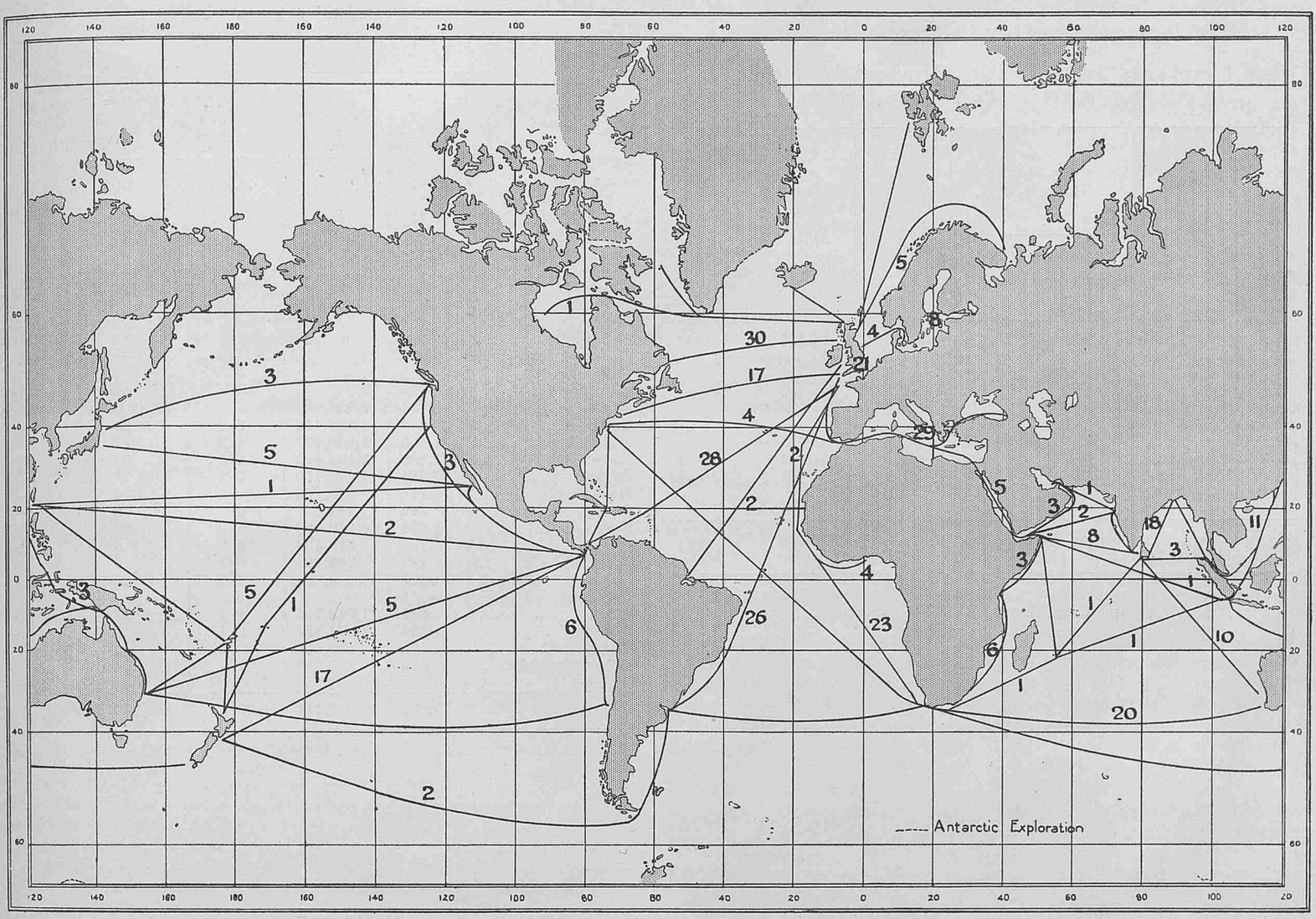
To-day, 19th July, 1937, the number of British regular voluntary observing ships in the Fleet List, and the oceans which they traverse, with the numbers of those which are detailed as Selected Ships, are shown in the following table.

Oceanic Distribution of the Voluntary Observing Fleet

19TH JULY, 1937.

Ocean.	Form 911.	M.L.	Total.	Selected Ships.
North Atlantic, including Home Waters and the Baltic	147	7	154	116
South Atlantic	48	1	49	43
North Indian	40	1	41	34
South Indian	42	0	42	37
North Pacific	14	11	25	18
South Pacific	32	7	39	33
Arctic	1	0	1	0
Antarctic	0	0	0	0
Stationary Ships and Stations ...	—	—	5	0
Totals	324	27	356	281

Chart of the World Indicating the Number of British Observing Ships Using the Different Trade Routes.



351 Foreign-going British observing ships indicated on routes.
5 Stations and observing ships engaged in home waters not indicated.
Total 356

The method of indicating the number of ships using the different routes this year differs from that of previous years. These numbers are compiled from the latest *movement* reported and not from written returns received as hitherto.

Tonnage.

At present the total number of Selected Ships of all nations agreed upon is 1,000; and the tonnage of steam and motor vessels of over 100 tons is used for calculating the number of Selected Ships which each nation party to the Convention should maintain.

Lloyd's Register of Shipping for 1937–38 is just published, and in accordance with our usual custom we reproduce, with three additional columns, the revised table on next page.

Although the total tonnage registered in the ports of Great Britain and Northern Ireland rose during the past year from 17,182,857 tons to 17,436,207 tons, the percentage proportion of the total world's tonnage has fallen from 28·1 per cent. to 27·9 per cent.

Decreases of their proportion of the world's tonnage have also been suffered by the United States, five thousandths; France, three thousandths; Spain, two thousandths; Canada, India and Ceylon, Denmark and Sweden, each one thousandth.

The following countries' proportion of the world's tonnage has increased :—Belgium, Finland, Greece, Holland, Italy and Panama, each one thousandth; China and Germany, each two thousandths; Japan and Norway, each three thousandths.

The number of British Selected Ships is accordingly being reduced from 281 to a total of 279.

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

(Vessels over 100 tons, Lloyd's Register Book, 1937–38)

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, 1937)
	Number.	Gross Tons.			
Great Britain and Ireland.	6,903	17,436,207	27·9	279	148
Australia and New Zealand.	525	652,809	1·0	10	—
Canada (excluding Lakes).	624	826,718	1·3	13	19
Hong Kong ...	110	294,046	0·5	5	—
India and Ceylon...	171	220,932	0·3	3	1
South Africa and Other Colonies*.	578	536,700	0·9	9	3
British Empire Total.	8,911	19,967,412	31·9	319	171
America (United States)(excluding Lakes).	2,517	9,439,950	15·1	151	249
Argentine	290	293,335	0·5	5	4
Belgium	200	420,454	0·7	7	8
Brazil	286	472,599	0·8	8	11
Chile	90	137,786	0·2	2	—
China	288	599,986	1·0	10	—
Denmark	691	1,117,512	1·8	18	22
Finland	343	505,914	0·8	8	—
France	1,295	2,843,688	4·6	46	15
Germany	2,185	3,927,916	6·3	63	35
Greece	613	1,855,435	3·0	30	—
Holland	1,406	2,630,802	4·2	42	16
Italy	1,109	3,174,089	5·1	51	156
Japan	2,564	4,475,110	7·2	72	341
Jugo-Slavia ...	176	378,763	0·6	6	—
Latvia	89	184,057	0·3	3	—
Norway	1,899	4,346,782	6·9	69	14
Panama	103	512,358	0·8	8	14
Portugal	199	243,291	0·4	4	13
Russia (Soviet Union).	667	1,253,824	2·0	20	11
Spain	821	1,043,715	1·7	17	13
Sweden	1,238	1,494,432	2·4	24	3
Turkey	173	195,148	0·3	3	—
Other Countries ...	678	885,053	1·4	14	29
Total ...	28,831	62,399,411	100·0	1,000	1,125

* Including Dominion of Newfoundland.

VOLUME XIV.

This number completes Volume XIV save for the two Supplements which will be published for November and December.

We thank most heartily all who have contributed to the success of The Marine Observer, not only those who have written on shore and afloat and whose contributions have been published, but also the many who have contributed by their work in supplying data and remarks which, though not published, have been used or are being used for compilations and so forth.

For all who wish to preserve Volume XIV, a binding cover may be purchased from H.M. Stationery Office.

The Marine Observer is so designed that each year it may be bound into a neat and handy volume.

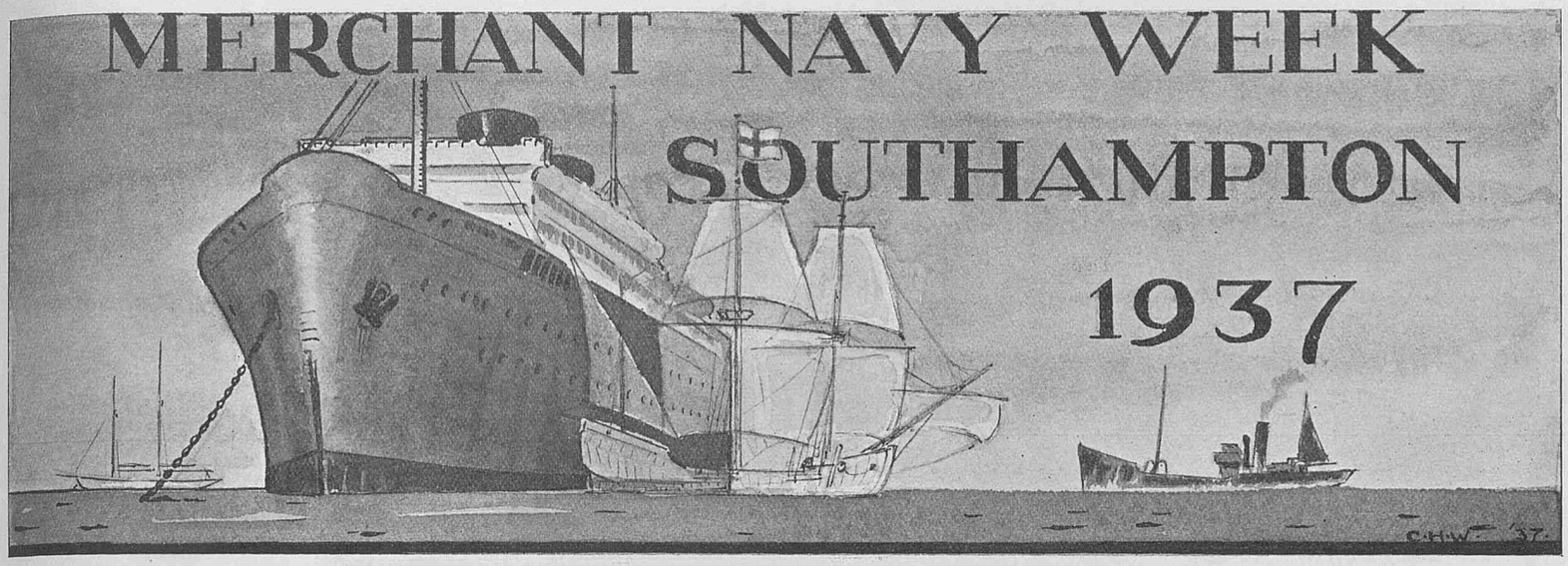
It is recommended that from each number, the cover, advertisement pages, fleet list and North Atlantic Ice Chart, all containing information which is not permanent, or will be repeated, should be removed.

When these have been removed, there will remain pages numbered in sequence throughout each number, also pages unnumbered containing lithographic charts which follow the numbered pages in the quarterly numbers.

These should be placed in the volume cover, and bound.

Marine Superintendent.

London,
19th July, 1937.



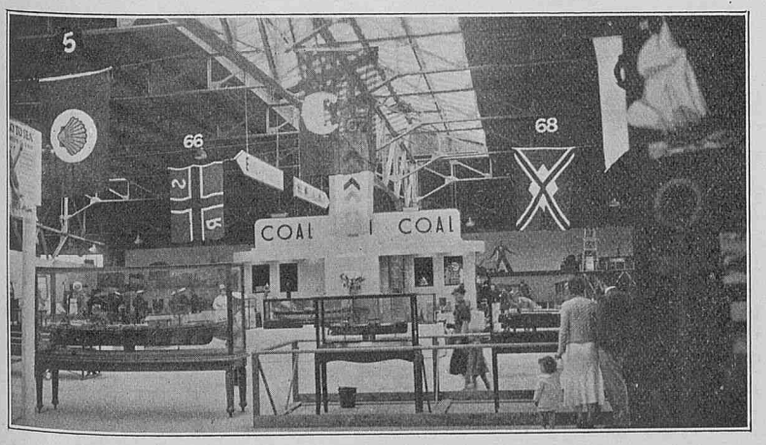
By Captain Sir Benjamin Chave, K.B.E.

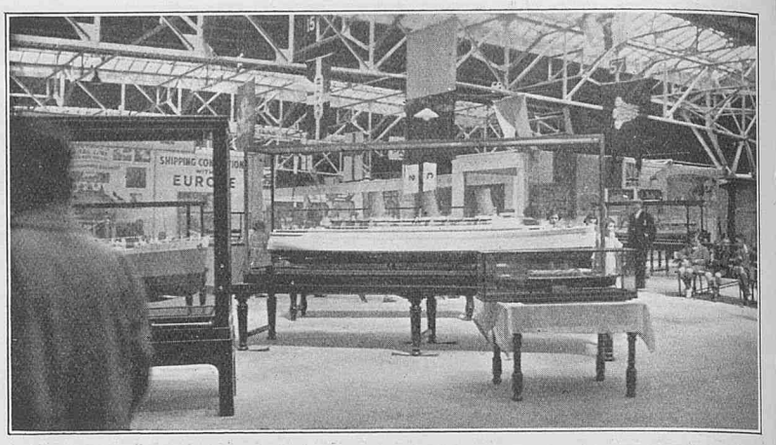
This outstanding event for the Merchant Navy will always redound to the credit of its originator—one of our Chaplains—the Reverend Keith E. Collins of the Missions to Seamen.

About six years ago when he was stationed at Swansea he organized a Maritime Exhibition lasting three days which had such success that the Funds of the Mission benefited by about £1,500. Since then he has been to Rotterdam for a term and now at Southampton he has inaugurated this great Exhibition which filled all visitors with interest and delight. After his idea was mooted it grew to such proportions as to necessitate qualified help, and the Chairman, Captain Paul Miller, and his Committee secured the services of Mr. Harold Gibson, M.C., who has had previous experience in organizing public functions.

The Southern Railway and all the Shipping Companies embraced the proposals with enthusiasm. The Southern Railway offered Shed No. 107 and part of Shed No. 108, both quite new, constructed in the latest manner and covering an area greater than Olympia, situated at the Western end of the New Docks. This offer was gratefully accepted.

The Lords of the Admiralty were most helpful and sympathetic and showed such practical interest as to lend their huge chart of the Ocean Trade Routes of the World and to detail H.M.S. *Revenge* and H.M.S. *Southampton* to berth alongside the quay during the Week for inspection by visitors.





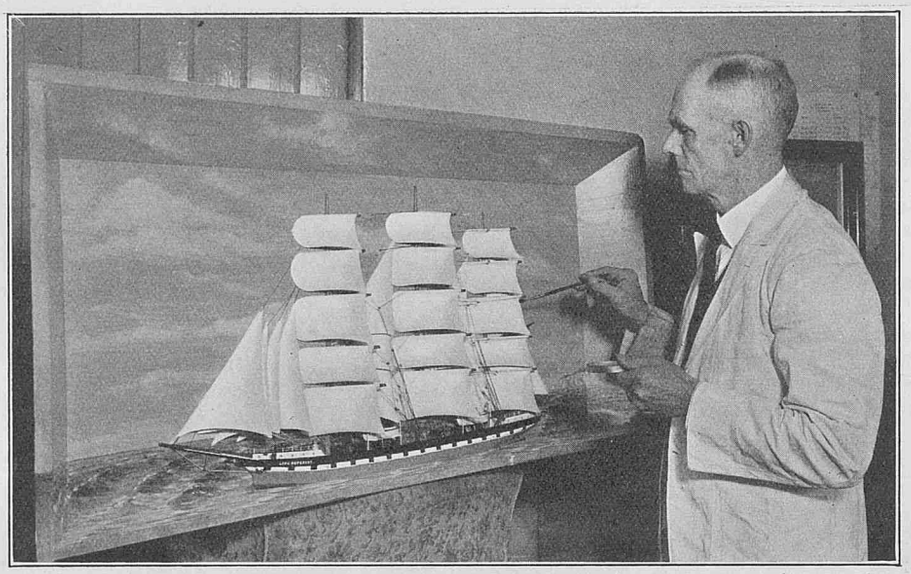


Photo by Canadian Pacific Steamships Ltd.

Ocean Liners were also opened to inspection, including *Queen Mary*, *Aquitania*, *Empress of Britain*, *Asturias* and *Warwick Castle*, together with some yachts and other types of vessels.

The Great Hall of the Exhibition was most impressive, divided into sections representing how the seaman: (1) Clothes you, (2) Feeds you, (3) Warms you, (4) Houses you, (5) Protects you, (6) Transports you, (7) Recreates you by Ocean Cruising. All these seven sections were full of interesting exhibits and one encountered models of ships, monsters and miniatures, at every turn. Among these was the Michelham working model of *Empress of Britain*, which has attained a speed of 26 knots controlled by wireless. Another interesting exhibit was Captain H. KENDALL'S hand-made half model of the ship *Lake Superior*, shown in photo. This ship was the forerunner of the Canadian Pacific Steamship Company's present fleet of which the *Empress of Britain* is the flagship.

Trevessa's famous lifeboat and one of her crew to tell the story of their 23 days' sail of 1,700 miles, occupied a special position. The Royal National Lifeboat Institution, Lloyd's, Ocean Cables, Post Office, Training Ships and other organizations were represented. There was a Cinema, a Dancing Pavilion, a Restaurant and Milk Bars, while Deck Tennis and other shipboard games could be played. Displays of drill and exercises by boys and girls from schools and orphanages connected with seafarers took place daily, and each afternoon a nautical lecture was given by some eminent man in a specially constructed Theatre. Every evening the Liners were floodlit and the Warships illuminated, whilst on the opening and closing nights firework displays made a beautiful show over the water.

On the Sunday more than 10,000 persons attended a waterside Service at which the Bishop of Winchester preached, the proceedings being broadcast by the B.B.C.

Mr. JOHN MASEFIELD, our Poet Laureate, contributed a special Lyric for the Week :—

> " They dare all weathers in all climes and seas
> In every kind of ship, the risks they run
> Are all the greatest underneath the sun
> Their Fortune is as flinty as their bread.
>
> Some truces Nature grants them, never peace;
> The work they do is hourly undone
> By them we make our money and are fed,
> Let England, doing justice, honour these."

We seamen know how true are these words. The lifeboat of the *Trevessa* and one member of her crew testify to the opening line and I recall that Captain FOSTER of *Trevessa* was saved by me (when commanding *Alnwick Castle*) after his ship *Trevose* was torpedoed. Next day *Alnwick Castle* herself was torpedoed and FOSTER (then the Mate) escaped in one of *Alnwick's* boats, though his Captain was lost in another one. March, 1917, in North Atlantic was sparing in the " truces Nature grants them " and there seemed to be " never peace." The past few winters in North Atlantic have seen in too many cases how " the work they do is hourly undone," seldom does a seaman live to tell of the undoing. Another ship is posted missing.

An important announcement on behalf of the Government was made on Friday, 23rd July, by the Right Hon. D. Euan Wallace, M.C., M.P., Parliamentary Secretary to Overseas Trade Department. Speaking from the Bridge, built in the Great Hall, he described the plans of the Government to establish Training Centres at seven of our principal ports, at which instructions will be given to Officers and Men in the use of guns and other defensive measures in case of need. These Merchant Navy Defence Courses will at first be held at London, Liverpool, Southampton, Glasgow, South Shields, Hull and Cardiff. They are to be short, occupying only five full working days, open to all Masters and Navigating Officers and—in certain subjects—to Chief Engineers. The Admiralty are selecting Naval Officers on the Active List of the rank of Lieutenant-Commander to carry out the courses.

On the concluding day of the Week the new Commander-in-Chief, Portsmouth, Admiral the Earl of Cork and Orrery, in a speech from the Bridge in the Great Hall, called attention to the grave shortage in the numbers of Merchant Ships. He then declared that during the four years of our last War 3,400 Merchant Ships were destroyed, roughly 1,000 more ocean-going ships than we possess to-day! Also he remarked that " when it is said the Navy is for the protection of the Merchant Navy, do not run away with the idea that the Merchant Navy is not a fighting Service. It is—and always has been—*the backbone of our maritime strength*. During the Great War 16,000 Merchant Seamen lost their lives when serving in our Merchant Ships, a higher percentage of loss of life than occurred in the Royal Navy. In addition, the Merchant Navy supplied many thousands of Officers and Seamen for service in the Fleet." He concluded by saying : " The two Navies are complementary to each other. If either is not adequate for its function in War we shall be defeated and enslaved. Let us see to it, therefore, that we do all in our power to maintain British sea supremacy."

It is estimated 150,000 people visited the Exhibition but this conservative estimate may be increased when the final accounting is complete. There is already talk of repeating Merchant Navy Week next year in the Port of London.

I am indebted to Captain E. W. O'Connor for photographs illustrating the interior of the exhibition.

The Marine Observers' Log

October, November and December.

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.

CURRENTS.

West Coast of South America.

THE following notes relating to currents on the West Coast of South America have been compiled from remarks received from H.M.S. *Ajax*, Captain C. S. THOMSON, R.N., through the Hydrographer of the Navy.

(*a*) Between Panama and the Equator the set to the southward is less than $\frac{1}{4}$ knot in August and September.

(*b*) Between the Equator and Latitude 42° S., in September, October and November, there is a northerly set of average strength 0.4 knot with southerly wind, force 3. With southerly wind, force 6, the northerly set increases to 0.7 knot.

When more than 10 miles from the coast, this northerly set inclines to the westward in these months, carrying a vessel further to seaward. When less than 10 miles from the coast the northerly set inclines to the eastward toward the land. This is particularly noticeable off the coast of Peru.

(*c*) From about Latitude 42° S. to 47½° S., in December, there is an easterly set, increasing toward the south to an average strength of 0.5 knot in the Gulf of Penas.

(*d*) From the Gulf of Penas southward to the entrance to Trinidad Channel (Latitude 50° S.) there is a south-easterly set in December of strength 0.8 knot, with wind north-west, force 5, an average condition.

(*e*) Nothing was learnt of seasonal variations of current, which do not appear to take place except in so far as wind variations take their effect.

H.M.S. *Ajax* made current observations from August to December, 1936. Information obtained from merchant ships working on the coast and from Chilean naval officers tended to confirm the observations summarized above.

The principal outside sources of information for the details obtained by *Ajax* were as follows :—

(1) Vessels of the Pacific Steam Navigation Company.
(2) Vessels of the Grace Line Company.
(3) Vessels of the Imperial Oil Company.
(4) Hydrographic Department, Chilean Navy, Valparaiso.

Conversation with local pilots and foreign naval officers in Buenaventura, Guayaquil, Talara, Callao (Naval School), Iquique, Antofagasta, Valparaiso, Puerto Montt and Magallanes was also of assistance in obtaining information on the subject of currents.

CHANGE OF SEA TEMPERATURE.

South Indian Ocean.

THE following is an extract from the Meteorological Record of M.S. *Taranaki*. Captain W. G. WEST. Liverpool to Fremantle.

8th December, 1937, at noon A.T.S. (0849 G.M.T.), it was observed that the sea-surface temperature had fallen 10° F., from 65° F. to 55° F., since 8 a.m., whilst the air temperature had fallen from 63° F. to 60° F. In the engine-room it was observed that the below-surface temperature fell from 66° F. to 54° F. at 9.15 a.m., temperatures thereafter fluctuating for remainder of forenoon watch.

At 1.15 p.m. A.T.S. the wind, which had been N.W., force 5 to 6, with overcast and hazy weather, suddenly dropped and came away from S.S.E., force 3, accompanied by rain and a fall in the air temperature of 5° ; thereafter slowly veering to S.S.W. and becoming variable, until at 4 p.m. it had become steady at W.N.W., force 4 to 5, with overcast sky and misty weather but with the horizon very clear between south and west. At 4 p.m., air temperature 55° F., sea 56° F.. Barometer 29.56 in., having fallen .05 in. since noon. Course 103°, speed $14\frac{3}{4}$ knots. At 8 p.m., air 55° F., sea 63° F. At midnight, sea 63° F.

Position of Ship : Latitude 39° 53′ S., Longitude 45° 55′ E.

9th December. Temperature at 4 a.m., air 59° F., sea 63° F.; at 8 a.m., air 65° F., sea 53° F.; at noon, air 58° F., sea 48° F.

Position of Ship at noon : Latitude 40° 58′ S., Longitude 53° 11′ E.

NOTE.—This part of the South Indian Ocean is liable to changes of sea temperature. The Southern Ocean Drift here has a northerly component, thus bringing the cold water from higher latitudes further north. On the other hand, some warm water passes into this region by the recurvature of part of the Agulhas Current at the Southern Ocean Drift. Also between Latitudes 38° S. and 50° S., from southward of the Cape and about Longitude 60° E., the isotherms of sea-surface temperature lie close together and are irregular, so that the ship, as the observations show, passed into water of a different temperature in a relatively short distance. This is particularly the case between Latitudes 40° S. and 45° S.

CURRENT RIP.

North Pacific Ocean.

THE following is an extract from the Meteorological Record of S.S.

Tudor Star. Captain J. TAYLOR. San Francisco to Balboa. Observer, Mr. S. W. LANE, 4th Officer.

9th October, 1936, at 1735 G.M.T., crossed current demarcation. Line extended in an east and west direction from horizon to horizon. The northern portion was coloured green and was apparently setting S.W.; the southern portion was the deep blue of the open sea. Ship swung 1½ points to port before the helm could check her : ship had been passing through green water for 4 to 5 hours.

Wind S.E. by E., force 3. Moderate sea and S'ly swell. Temperature : air 85° F., sea 83° F.

Position of Ship : Latitude 19° 34′ N., Longitude 105° 19′ W.

RIPS.

Off Coast of French Guinea.

THE following is an extract from the Meteorological Record of S.S *Berwickshire*. Captain J. D. MATTHEWS. Liverpool to Durban. Observer, Mr. R. A. HARRIS, 2nd Officer.

On 17th November, 1936, at 2 p.m. A.T.S. in Latitude 10° 04′ N., Longitude 16° 50′ W., depth of water by echometer, 160 fathoms, vessel steering 143°, parallel to and approximately 10 miles off the 100-fathom line, entered a well-defined patch of disturbed water extending in a S.S.W. and N.N.E. direction as far as could be seen and a mile in breadth, with the seas breaking in a N.W. direction.

On entering, the vessel quickly sheered three points off her course, and was found extremely hard to steer until entering smooth water again.

This solitary disturbance showed great agitation from current or tide, forming seas of from two to three feet in height.

No wind. Surrounding sea smooth.

Mozambique Channel.

THE following is an extract from the Meteorological Record of S.S. *Malda*. Captain H. M. EDMONDSON. East Africa to London. Observer, Sub-Lieutenant J. F. TWITE, R.N.R., 2nd Officer.

11th December, 1936, 1.40 p.m. Kenya Standard Time. Course 356°, log speed 11.75 knots. Wind S.S.E., force 2. Sea smooth, swell slight. Sea temperature 82° F.

Position of Ship : Latitude 14° 36′ S., Longitude 40° 56′ E. Off Janga Point, 4 miles off shore.

Three most pronounced rips were observed stretching as far as the eye could see from seaward in a westerly direction to the beach.

The rips were about 200 yards wide and about 100 yards apart. They were about equal in disturbance to a short rough sea which would be occasioned by a fresh breeze.

The waves were breaking in a southerly direction.

1.55 p.m. Kenya Standard Time.

Position of Ship : Latitude 14° 34′ S., Longitude 40° 56′ E.

About 2 miles farther along two more rips were observed, similar to those seen before except that they were not so turbulent and were observed to break in a northerly direction.

From 10.30 a.m., St. George Island, 328° 16 miles, until noon a current setting 000° at 2.5 knots was experienced. This current had died away completely by 1.00 p.m. and at 2.30 p.m. was setting south at 2.5 knots.

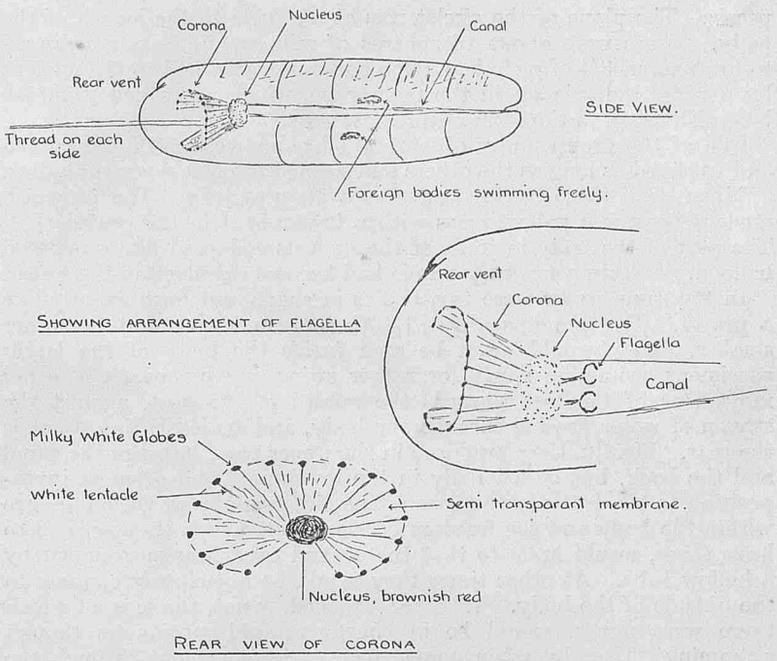
Whilst passing through these rips the vessel swung to port about 3 points. The American S.S. *Robin Gray*, about 2 miles astern on same course, was observed to react in the same way.

ANOTHER FISH STORY.

UNDER the above title the following description of sea organisms has been received from M.S. *Vancouver City*. Captain HUGH C. EGERTON. Malacca Straits to Le Havre. Observer, Mr. H. DAVID, Chief Officer.

22nd December, 1936, 0600 G.M.T.; in South Atlantic Ocean, Latitude 15° 24′ S., Longitude 01° 17′ E.

The sample of water drawn for taking temperature was found to abound with a form of marine life, say about 50 specimens to a gallon of water. A number of them were collected in a jar with the object of carrying them into port alive, but they all died within twelve hours. In this essay an attempt is made at a full description, assisted by sketches, after several hours careful study with a fairly powerful lens. (Just previous to drawing the water the ship had passed through streaks of yellow matter floating on the sea surface; what sailors facetiously term " whale spawn.")



The bodies were all of even size, about half an inch in length and one-eighth of an inch in diameter; being practically circular in section, with a fine thread, about a quarter of an inch in length, at each side of the rear. With the exception of a nucleus near the rear end, which appeared to be the organs, the body was completely transparent and intersected by bands of less transparency which seemed to be the support of the structure. Faint markings on the back gave an appearance of large scales. The mouth, which was at the point of the nose, was broad and large, much like that of a cod, and was perpetually opening and closing. A narrow opaque thread stretched the length of the body from the head to the organs at the rear, a little below the centre of girth (probably an alimentary canal), and this appeared to be surrounded by a space which was kept constantly full of water. That the water completely surrounded this canal was deduced from watching the motion of foreign bodies as referred to below. It is probable that food was obtained from the water within the body by absorption through the walls of the alimentary canal and not directly through the mouth. A small trap at the upper part of the rear was observed to open and close with, but after, the mouth.

By watching a few in a separate jar of polluted water, it was evident that inlet and outlet of water served as a means of propulsion as well as for oxygen and food supply. Water taken in through the mouth, filling the comparatively large cavity of the body, was forced out through the rear vent by the rapid contraction of the whole body and a rippling movement of the back.

There were no markings to indicate that the creatures possessed any organs of sight, and their movements would lead one to suppose that they were sightless.

The nucleus itself was of dark brown colour and very small (compared with the size of the body), being not more than 1/20th of an inch either way. The conditions under which the observations were made were such as did not allow of a very detailed study of this vital part, but it was noted that two pairs of flagella, a pair on each of two short arms, protruded from it into the alimentary canal, and that these flagella were constantly in motion making a sweeping movement towards the central tissue.

Behind this brownish nucleus and attached to it by a semi-transparent membrane was a corona of small white globes. The corona, about 1/10th inch in diameter and practically filling the rear portion of the body, was by far the most conspicuous and most picturesque part of the whole structure, and could best be compared to a part circlet of

pearls. The plane of the circlet was at an angle to the length of the body. There were about 16 spheres of milky-white colour arranged to form about 3/4 of a circle. Each globe was attached to the nucleus by a white tentacle set in the membrane, which protruded from the brownish organ in the form of a hollow cone.

One of the group under observation had no vestige of the corona and yet lived as long as the others and seemed to possess equal vitality.

When dead these bodies were like a mass of jelly. The brownish nucleus became a yellow mass with a brown spot in the centre of it. The part of the body in front of the nucleus collapsed like a deflated balloon. Within a week the whole had become dissolved in the water.

In the same water were two bodies in shape and form exactly like a prawn. The one was about 1/10th inch in length and the other smaller. They would often be seen *inside* the body of the larger specimens swimming freely, or rather swimming by means of rapid movement of the feet towards the mouth of the host, against the stream of water passing through the body, and again drifting towards the rear. Mostly, they would be in the upper part, between the canal and the back, but occasionally in the lower part and often in juxta-position to the brownish nucleus. The circumstance of their presence within the body and the freedom of movement which they seemed to have there, would indicate that the central canal was surrounded by a hollow tube. At other times they would be tenaciously clinging to the outside of the body. Whether attached or not, the legs, of which there were many, would be in constant rapid motion as though swimming. Usually, when unattached, their movement through the water was slow, but at times they would dart across the jar with surprising rapidity. The fact that they were so often attached to the larger specimens, either inside or out, would lead one to suppose that they were parasites, yet the body to which they attached themselves did not appear to be impaired nor yet inconvenienced by their presence.

Possibly their entry into the bodies was accidental, but two markings on the head (of the smaller bodies) and also their deliberate movements would indicate that they were possessed of a sense of sight.

It is presumed that these specimens were the young of some well-known fish. It would be interesting to learn what particular type of fish they were. Also whether it is an accumulation of such forms of life which gives those yellowish streaks so often seen at sea.

WHALE ATTACKED BY FISH?

South Atlantic Ocean.

THE following is an extract from the Meteorological Record of S.S. *Harmonides*. Captain F. R. ELWELL. Norfolk, Va. to Cape Town. Observer, Mr. V. GREEN, Chief Officer.

26th December, 1936, at 1840 G.M.T., moderate S.E. wind and moderate sea. A cloud of sea birds numbering some thousands was seen ahead. On approaching, a disturbance was noticed in the water. Many large fish resembling porpoises were seen jumping out of the water and splashing around a whale whose back seemed scored by many wounds. The whale seemed to be on the point of dying from its injuries. We could not ascertain if the whale was being attacked by the large fish which may have been a species of small shark. Although we passed quite close, little or no notice was taken of us. At the time the nearest land was Ascension Island, 300 miles away. The birds seemed to be of a dark colour with a light-coloured breast. Position of Ship: Latitude 03° 44′ S., Longitude 17° 12′ W.

LAND-BIRDS.

North Atlantic Ocean.

THE following is an extract from the Meteorological Record of S.S. *Orduna*. Captain C. W. BENSON. La Pallice to Bermuda. Observer, Mr. R. D. ECKFORD, 2nd Officer.

11th October, 1936. 0400 G.M.T. (4.00 a.m. A.T.S.). A large number of small birds were observed about the ship. Later in the day several of the following species were recognized, viz., swallows, thrushes, robins, finches. Position of Ship: Latitude 45° 33′ N., Longitude 03° 03′ W.

12th October, 1936. From 0000 to 0600 G.M.T. (11.46 p.m. to 5.40 a.m. A.T.S.). Ship was stopped 5 miles off the coast of Spain in Latitude 43° 30′ N., Longitude 08° 30′ W., and from 0700 to 1200 G.M.T. (6.46 a.m. to 11.46 a.m. A.T.S.) was at La Coruña. After leaving La Coruña westward bound no swallows were seen, but several finches remained, two thrushes, and one or perhaps two robins.

14th October, 1936. 0900 G.M.T. (7.36 a.m. A.T.S.), in Latitude 40° 44′ N., Longitude 24° 10′ W., the robin was last seen.

15th October, 1936. 0948 G.M.T. (8.00 a.m. A.T.S.) ship passed within 3 miles of Lagens Point, Flores, after which time the thrushes were not seen. It seems probable they left us at Flores.

19th October, 1936. 1000 G.M.T. (6.20 a.m. A.T.S.), in Latitude 33° 33′ N., Longitude 58° 30′ W., was the last occasion that any finch was seen. Doubtless some of these birds also left us at Flores. The appearance of a hawk from nowhere during this day is significant.

20th October, 1936. 1000 G.M.T. (6.00 a.m. A.T.S.). Arrived at Bermuda.

PHOSPHORESCENCE.

Arabian Sea.

THE following is an extract from the Meteorological Record of S.S. *Thistleglen*. Captain G. A. WHITFIELD, O.B.E. Bunbury, W.A., to Basra. Observer, Mr. N. DALTON, 2nd Officer.

22nd October, 1936, at 10.45 p.m. ship's time observed around one quarter of the horizon, from ahead to abeam on the starboard side, what appeared to be the twinkling lights of a large town.

At 11.00 p.m. the vessel entered an intense area of a light-greenish coloured water, displaying numerous small but very brilliant lights, which had a most beautiful and fascinating appearance.

A faint haze of light seemed to be cast upwards from the sea, giving everything a greenish tint. The ship's wake could be seen for a considerable distance and the bow-wave and wash along ship's side was of exceptional brilliance. By 11.20 p.m. the vessel had passed out of this area of phosphorescent water, but it could plainly be distinguished by the contrast in colour from the rest of the sea, which by this time had taken on its normal aspect, though flecked with phosphorescence. Weather: Gentle N.'ly breeze. Slight sea. Cloudy; Stcu. predominating. Fine and clear weather with vivid lightning. Barometer (corrected) 29.914 in. Air temperature 82° F., sea 83° F. Ship's course 330°. Speed 9 knots.

Position of Ship: Latitude 11° 30′ N., Longitude 74° 42′ E.

23rd October, at 5.15 a.m. ship's time, the above phenomenon was again observed, the vessel entering a similar area of phosphorescent water of equal intensity. On this occasion the look-out reported a conspicuous light ahead, which later proved to be the effect of a small shoal of fish swimming around.

STROMBOLI.

THE following is an extract from the Meteorological Record of S.S. *Mashobra*. Captain J. L. BEATTY. Port Said to Marseilles. Observer, Mr. LIONEL OSBORNE, 2nd Officer.

26th October, 1936. Stromboli (Chiappe Point) abeam at 3.19 p.m. Peak obscured by cloud, with which smoke was mixed, occasionally sending up cloud in sudden puffs, and then showering rain and soot into sea and over Strombolicchio.

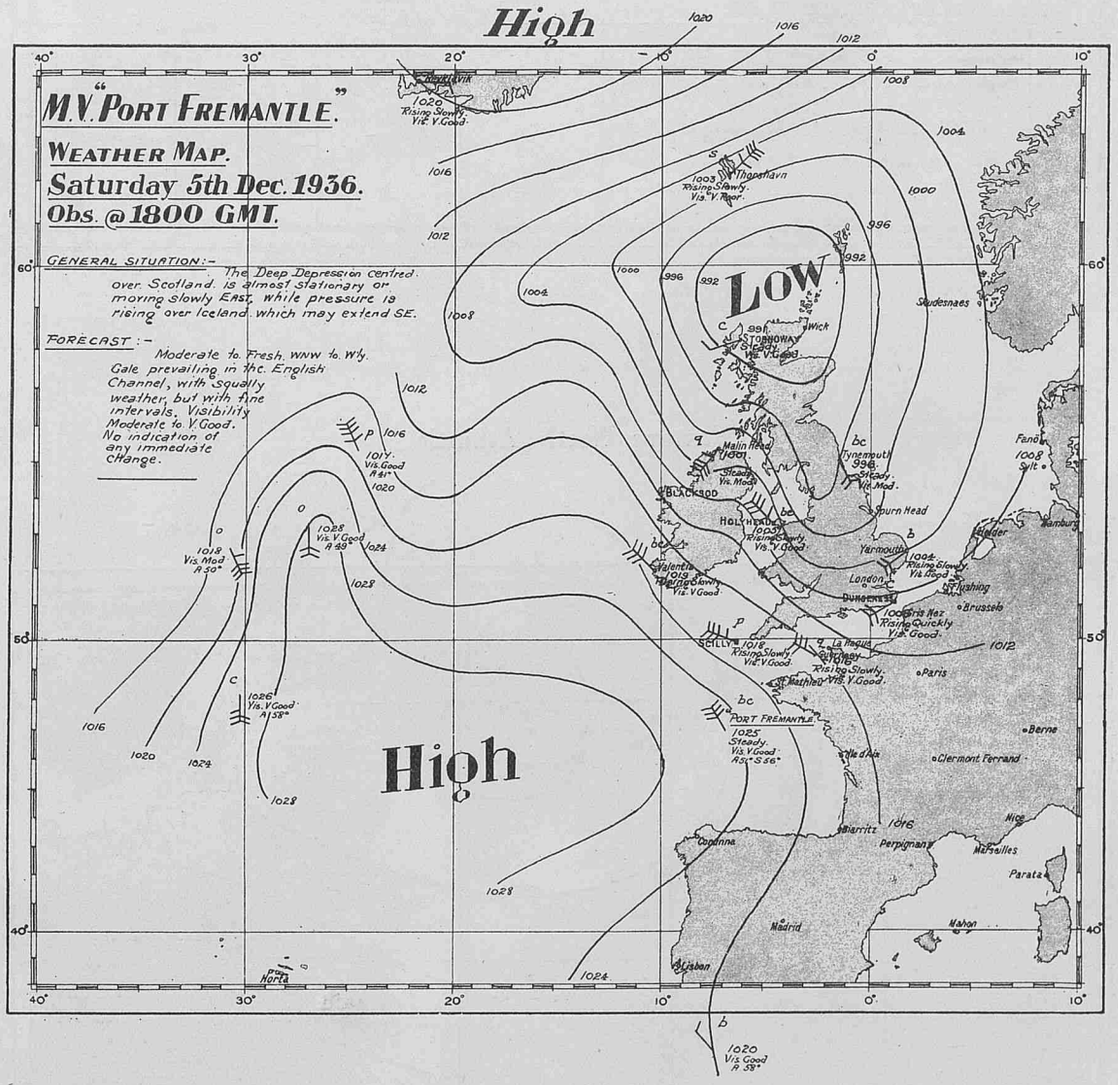
On western side of volcano, lava observed falling down slope of mountain and into sea, causing dense smoke or steam to be given off, to rise in turn in puffs up the mountain-side and mix in cloud. The water where the lava was deposited was greatly agitated, as though boiling.

WEATHER FORECASTING AT SEA.

SAMPLES of Weather Charts and Forecasts made at sea by the Officers named, being typical examples of the good work referred to in "Work of the Year," page 82, Vol. XIV, No. 127.

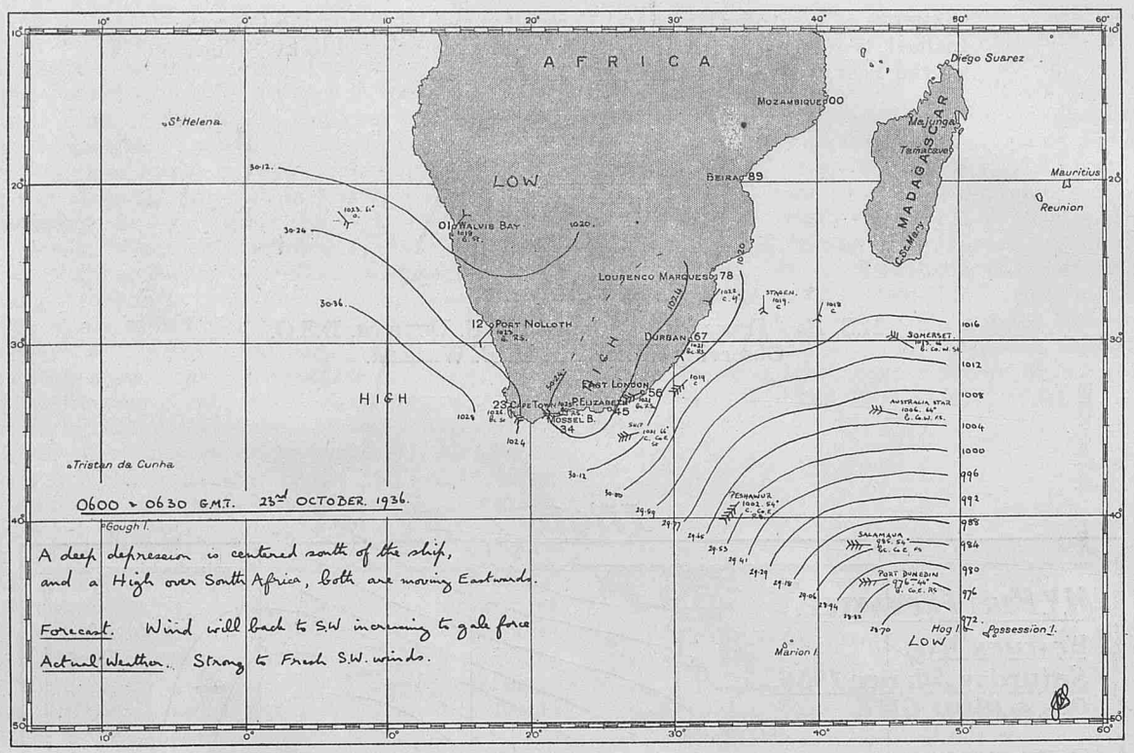
North Atlantic.

M.S. *Port Fremantle.* Captain R. S. DURHAM, D.S.O.
Observing Officer, Mr. H. B. WALKER.

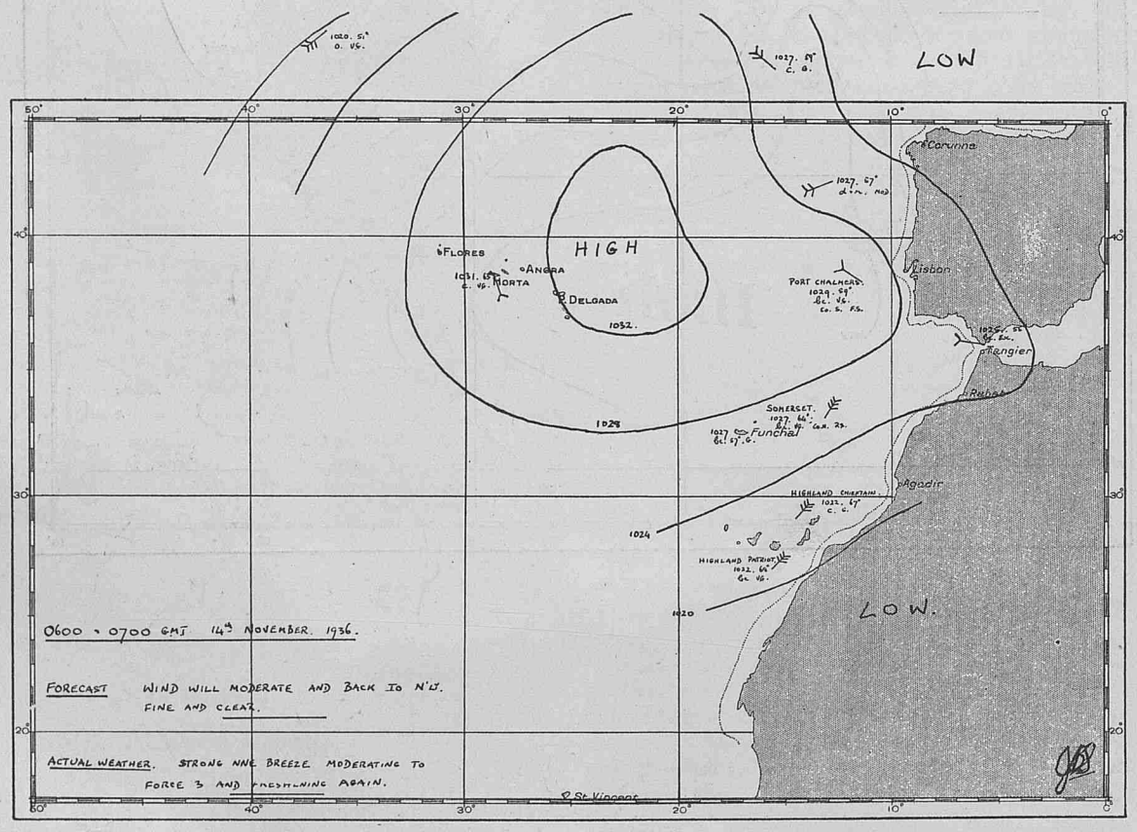


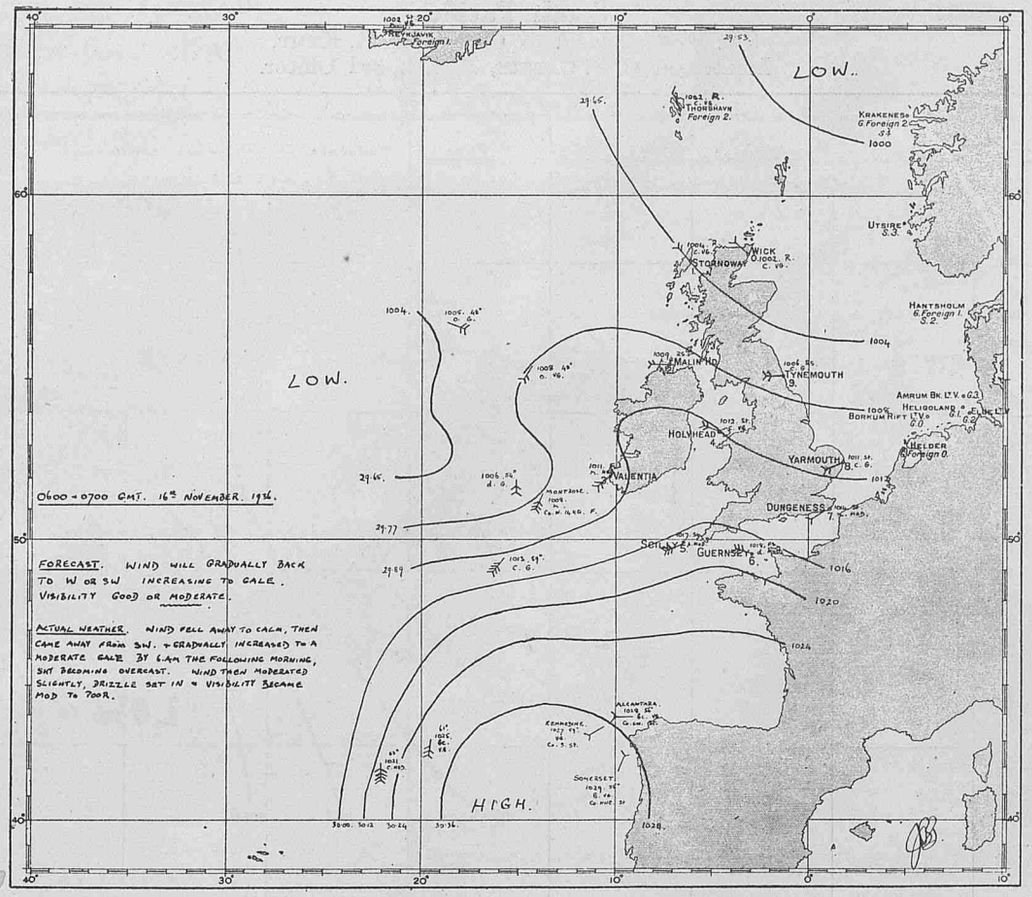
South African Waters.

S.S. *Somerset.* Captain C. R. PILCHER.
Sub-Lieutenant J. BROOKE SMITH, R.N.R., 3rd Officer.

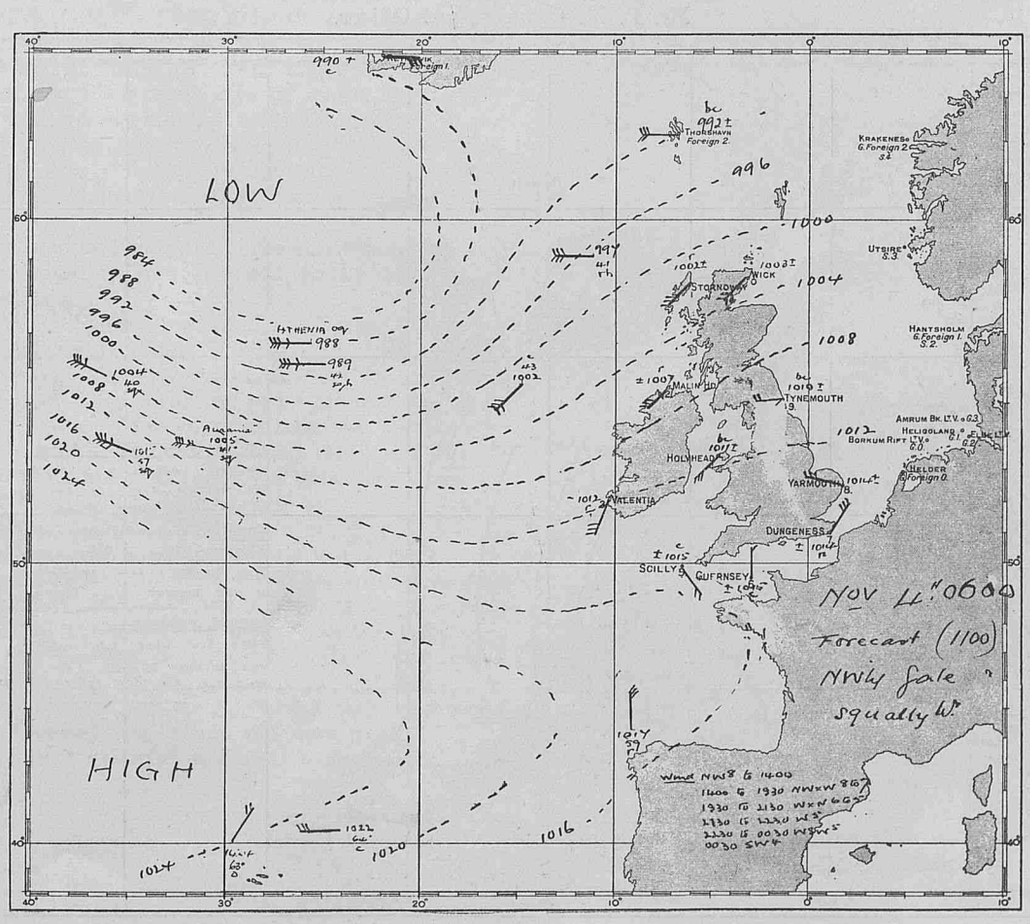


Eastern North Atlantic.



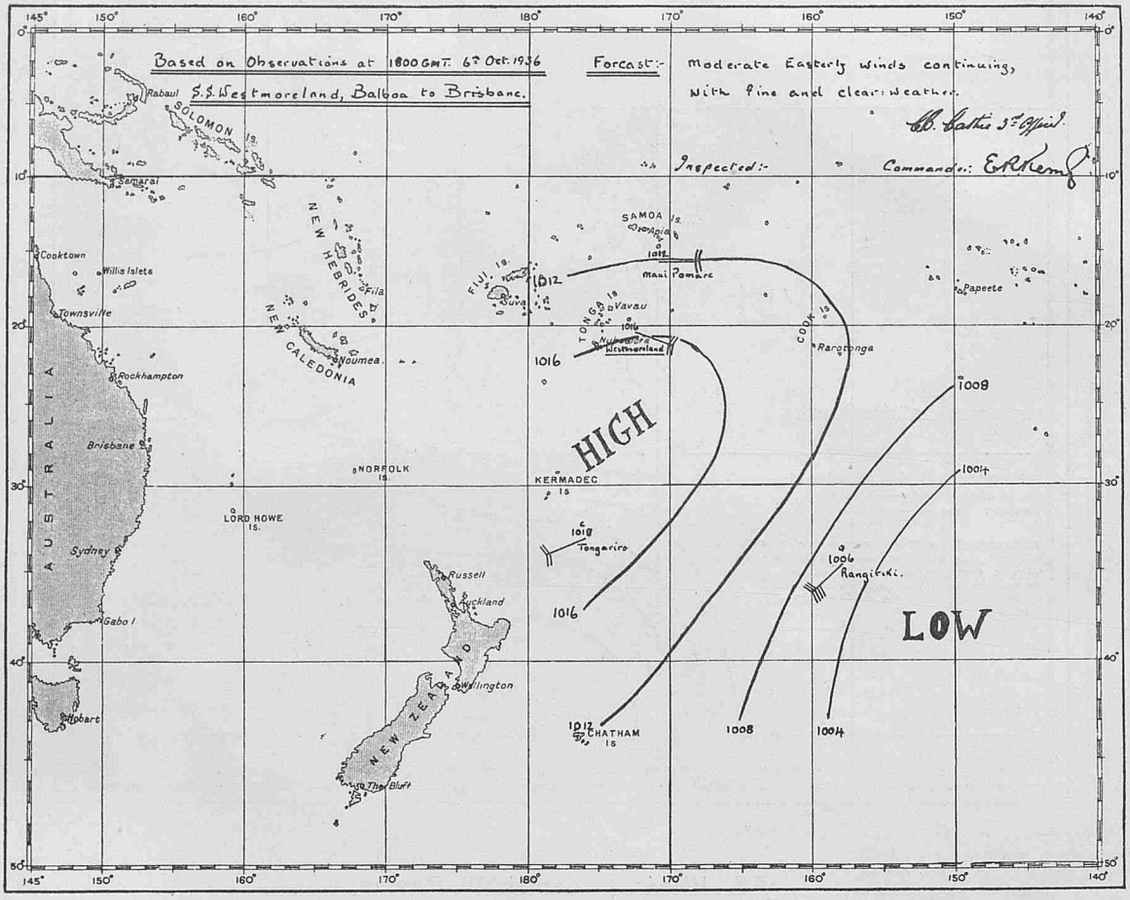


S.S. *Athenia*. Captain W. RENNIE.
Lieutenant J. H. BLACKWOOD, R.N.R., 1st Officer.

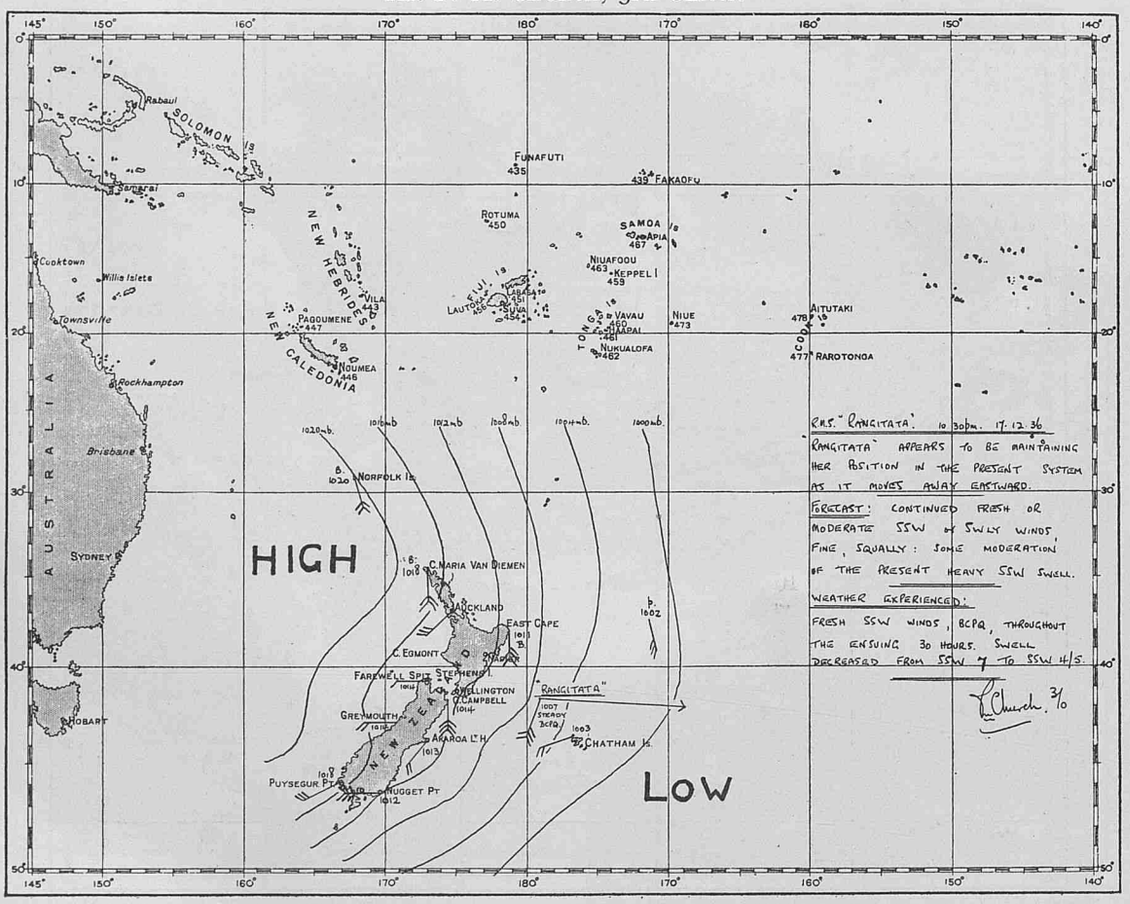


South Pacific.

S.S. *Westmoreland*. Captain E. R. Kemp.
Lieutenant C. B. Cathie, R.N.R., 3rd Officer.



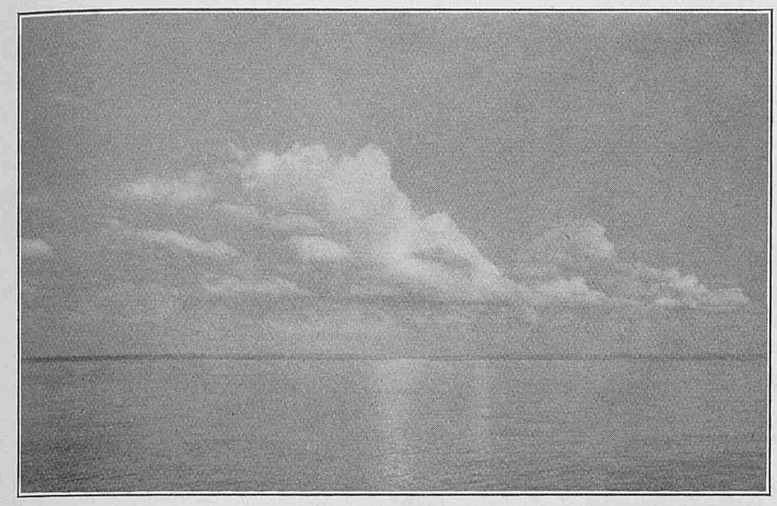
M.S. *Rangitata*. Captain E. Holland.
Mr. P. M. Church, 3rd Officer.



CLOUD PHOTOGRAPH.

Off West Coast of Africa.

THE accompanying photograph was taken by Mr. Ian Crichton, B.Sc., Lecturer of Zoology, Cape Town University, from the bridge of S.S. *City of Exeter*. Captain D. L. LLOYD.



The photograph was taken at 3 p.m. A.T.S. on 23rd December, 1936, in Latitude 6° 24′ N., Longitude 14° 06′ W., looking eastwards.

AURORA.

North Coast of Anticosti.

THE following is an extract from the Meteorological Record of S.S. *Athenia*. Captain W. RENNIE. Glasgow to Montreal. Observers, Lieutenant J. H. BLACKWOOD, R.N.R., and Mr. L. T. NAPIER.

9th October, 1936, 0200 G.M.T., 2200 Atlantic Standard Time. Aurora became visible, to the northward, as a faint arc, the extremities of which gradually increased in brilliance. The entire northern half of the sky gradually became filled with rays of white light which appeared above the arc and which extended to and converged at the zenith. The light emitted by the Aurora was equal to that of a bright moonlight night. The rays slowly closed together until they presented the appearance of a huge ethereal curtain which swayed gently to and fro.

The " curtain " slowly faded and as it did so the arc, which had been very faint, gradually increased in intensity and finally produced a magnificent coloured display.

First the western extremity of the arc increased in brilliance to a strong white light which then slowly moved east along the arc drawing after it a succession of colours varying from green and blue to a reddish violet. As the last colour sank out of sight at the end of its journey the whole arc faded to a pale white light. A few minutes later the western end of the arc began to increase in brilliance again and the whole display was repeated at about ten-minute intervals for a little over an hour. The Aurora then settled down into a ragged white arc with a distinct reddish tinge along its concave side. Aurora continued to be visible in varying forms and intensity through the middle watch (0430–0900 G.M.T.), though at times obscured by cloud. On at least two occasions it filled the whole sky, being visible to within 10° of the southern horizon. This first occurred about 0500 G.M.T. when the whole sky was filled with swirls and patches of pale white light, sometimes stationary, sometimes changing rapidly in position and form. At about 0800 G.M.T. the whole sky became filled with small cloud-like patches of white light which flickered in and out very rapidly.

Position of Ship : Off North Coast of Anticosti in Latitude 50° N., Steering 270°.

North Sea.

THE following is an extract from the Meteorological Record of S.S. *Eastern Coast*. Captain WILLIAM QUIRK. Liverpool to Newcastle. Observer, Mr. W. H. DAVIES.

9th November, 1936. Aurora bearing from N.W. by W. to N. by E. during period midnight to 0200 G.M.T., appeared as diffused light, and at 0215 became active on the N. by E. side, showing rays which merged to form a band, which then broke up again to form narrow rays darting up to the height of Kochab. The rays seemed to rotate slowly like the spokes of a wheel from west to east. After about fifteen minutes the whole of the light diminished and died away to the eastward of the points of origin.

Position of Ship : Latitude 58° N., Longitude 2° W.

20th December, 1936, 2315 G.M.T. Aurora bearing N. (true). Small arc reaching to about 10° altitude, with two shafts of light like searchlight beams issuing from near its centre. The rays, which were very bright, occasionally faded out, to reappear from the same position. Position of Ship : Latitude 58° 10′ N., Longitude 2° 30′ W. (approximately).

NOTE.—The frequency of Aurora seen in temperate latitudes is increasing at the present time with the increase of solar activity in the 11-year cycle. Sunspots are expected to be at a maximum about the end of 1938.

ANNULAR ECLIPSE OF THE SUN.

New Zealand.

THE following account has been received from S.S. *Tongariro*. Captain P. B. CLARKE, D.S.C. Napier to London. Observer, Sub-Lieutenant C. C. ENNEVER, R.N.R., 4th Officer.

14th December, 1936. Position of Ship : Latitude 38° 07½′ S., Longitude 178° 21′ E. ; at anchor in Waima Cove.

N.Z. Summertime.

0600	The sky was overcast with rain threatening, but towards eight o'clock a general clearance was seen towards the east. The sun was first sighted through clouds at 0815 and then at intervals.
0900	During a clearance the moon's lower right limb was observed on the left hand edge of the sun's upper limb. Clouds then obscured observation.
1003	The sun emerged clear of cloud bank and was seen to be a little over a quarter eclipsed. Alt. 60° 24′ (approx.) G.M.T. 22.02.00
1034	Visibility favourable, the sky clearing all over. Alt. 66° 08½′ G.M.T. 22.33.48½.
1100	The left-hand limbs of both bodies appeared to be in transit.
1100¾	The moon was wholly seen, and the annular phase of the eclipse began. Alt. 70° 18′ G.M.T. 23.00.40½.
1104½	The moon appeared to be in the dead centre of the sun, the angle of sun's rim showing being 1′ 40″. An altitude of the sun at 1105½ was— Alt. 70° 57′ G.M.T. 23.05.33
1108½	The right-hand limbs appeared to be in transit and became blurred almost immediately, such indistinctness lasting for about three minutes.
1130	After this time altitudes of the sun were unobtainable, the sun's bearing being across the land. At sunset (7.17 p.m. approximately) the clouds, stratocumulus, appeared to be of a purple hue, the sky around the horizon rose-coloured and overhead blue.

General Observations.

(1) The moon first appeared to be travelling across the sun at an angle of approximately 135°. When the left-hand limbs were in transit, the path of the moon appeared to be horizontal through the centre of the sun. Having passed through the centre, the moon appeared to be travelling at an angle of about 60° until finally disappearing. (Diagram next page.)

(2) Before and during eclipse the light could be described as like the effect produced by sunshine late in the afternoon during rainy weather. The colour of the sky at the time of eclipse was blue with a slightly grey tinge.

(3) At mid-eclipse the rim of the sun was exceptionally bright and glaring.

(4) A drop in temperature was noticeable between ten o'clock and noon.

(5) All seagulls settled on water.

(6) Close observations of barometer corrected for latitude, height of eye, temperature, wind and clouds, were taken continually; the material changes and times are given below. At all times observations were made with a sextant.

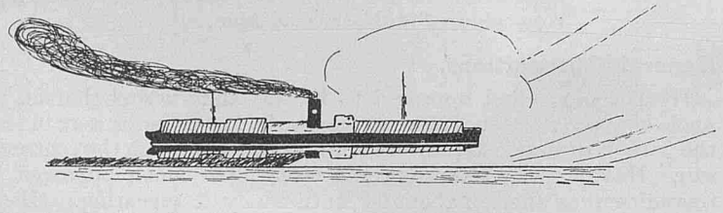
N.Z. Summer-time.	Barometer.	Wind.	Cloud.	Tenths Amt.	Air Temps. Wet.	Air Temps. Dry.
0600	30.29	S. 2	Cunb.	10	—	58°
0800	30.31	S.E. by S. 2	Stcu.	8	56°	59°
1003	30.325	S.E. 3	Cu.	6	54°	63°
1105	30.330	S.E. by S. 4	Cu.	4	53°	60°
1200	30.325	S.E. by S. 3	Cu.	4	54°	63°
1330	30.35	S.E. by S. 3	Cu.	3	56°	66°
1917	30.32	S.E. 1	Cu.	3	55°	60°

N.Z. Summer-time.	Corrected Altitudes.	Corrected G.M.T.	True Bearing.	Phase.	Remarks.
		13d.			
0815	39° 56′	20.14.44	N.90°E.		First sight of morning.
1003	60° 24′	22.02.00	N.69¼°E.		Approx. quarter of sun obscured.
1034	66° 08½′	22.33.48½	N.55½°E.		Approx. half obscured.
1100¾	70° 18′	23.00.40½	N.45¼°E.		Breaking of contact very distinct.
1105½	70° 57′	23.05.33	N.43°E.		Estimated eccentricity ⅞.
1108½	71° 28½′	23.08.04½	N.41°E.		Duration of annular eclipse 7 *mins.* 24 *secs.*
1225	—	23.25.01	N.19¾°E.		Last sight of sun.

MIRAGE.

Mediterranean Sea.

The following is an extract from the Meteorological Record of S.S. *Mooltan*. Captain F. E. French, R.D., R.N.R. Adelaide to London. Observer, Mr. J. Darley Strike, 2nd Officer.



MIRAGE OBSERVED ON NOVEMBER 16TH AT 1315 IN THE MEDITERRANEAN

On 16th November at 1315 G.M.T. the upper part of the hull of a ship steering an easterly course, was observed appearing above the horizon, 3 points on the starboard bow. As she drew abeam the whole of the hull appeared above its inverted image, the ship and the image being above the horizon. The image was slightly distorted and dense smoke issuing from the funnel caused a shadow trailing astern of the ship as shown in the accompanying figure. As the sun became obscured by clouds the ship resumed her normal appearance, and eventually dipped below the horizon.

Wind N.E., force 2. Sky 6/10ths covered by fractocumulus and cirrostratus. Air temperature 71° (dry bulb). Sea water 77°. Height of eye 65 feet. Visibility excellent; few clouds on the horizon at time of observation.

Position of Ship: Latitude 32° 32′ N., Longitude 29° 50′ E.

ABNORMAL REFRACTION.

North Atlantic Ocean.

The following is an extract from the Meteorological Record of M.S. *Rangitata*. Captain E. Holland. Plymouth to Colon. Observers, Mr. F. J. Jones, 4th Officer, and Mr. P. M. Church, 3rd Officer.

22nd October, 1936, towards Noon A.T.S. (1440 G.M.T.). Two independent observers whilst standing by for noon meridian altitude observed the following phenomenon:—About 11.56 A.T.S. observed sun's altitude 45° 11′; horizon clear but very bright under sun. Sun thereafter appeared to dip suddenly about 4′ of arc—altitude remaining approximately 45° 07′ for fully two minutes. No noticeable change in appearance of horizon, which appeared as a clear-cut line through medium horizon-shade. About 11.58 A.T.S. conditions apparently became normal again, and noon meridian altitude was observed 45° 12′, agreeing with results of ex-meridian observations taken at 11.43 and 11.46 A.T.S.

Weather partly cloudy; about 5/10ths fine cirrostratus cloud and 2/10ths scattered cumulus. Wind E.N.E., force 4–5. Sea 75° F. Air 77° F. Wet bulb 73° F. Barometer (corrected) 30.26in. Moderate to rough sea; slight S.E'ly swell.

Position of Ship: Latitude 33° 33′ N., Longitude 41° 45′ W.

LIGHTNING FLASH.

English Channel.

The following is an extract from the Meteorological Record of S.S. *Worthing*. Captain B. Shaw. Newhaven to Dieppe. Observer, Mr. H. L. Smith, 2nd Officer.

8th November, 1936, 2238 G.M.T. Barometer 29.25 in., rising slowly. Wind W., fresh gale, squally. Weather, rainy, very heavy hail-storms, extensive lightning. After observation: showers of snow or soft hail, then moderate fog for a few minutes, followed by further rain and hail.

An exceptionally large flash to S.E. of ship, accompanied by an explosion, in appearance and sound as of a large shell bursting, at or near the sea surface. Of a blinding white colour as distinct from bluish lightning flash. The white flash, though not instantaneous with burst, was still visible and appeared as a background to it. No streak or trail of any kind was observed between clouds and bursting point. Appeared to be about 100 yards distant from ship and was audible and visible throughout ship, even in engine room and stokeholds.

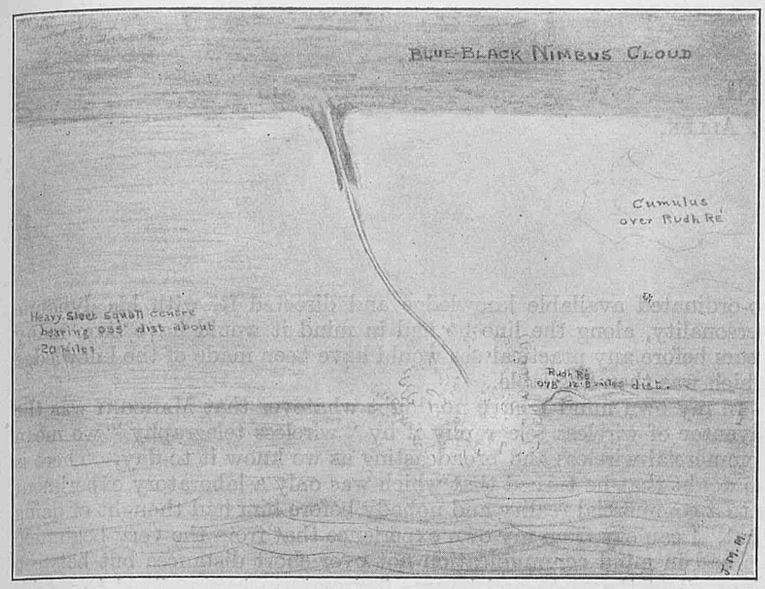
Sea rough to high; W.'ly.

Position of Ship: Latitude 50° 40′ N., Longitude 0° 11′ E.

WATERSPOUTS.

The Minch.

The following remarks from Captain John M. Murray of the Fishery Cruiser *Vigilant* have been forwarded by Commander L. D. Fisher, R.N., D.S.O., of the Fishery Board for Scotland.



5th December, 1936, at 1053 G.M.T.; in Latitude 57° 49′ N., Longitude 6° 12′ W., with Rudh' Ré, Ross-shire, bearing 078°, distant 12.8 miles. Course 348°, speed 12½ knots. Wind W.S.W., magnetic, force 6–7. Sea moderate to rough W.S.W., with moderate northerly swell. Weather overcast, snow showers. Barometer 29.39 in., falling slightly. Air temperature 39° F., sea 42° F.

At the above-stated time and position, a sudden disturbance on the sea surface was observed close on the port beam. It passed within 20 feet astern of *Vigilant*, and appeared to be a small whirlwind moving moderately fast in the direction of Rudh' Ré, and increasing in intensity.

At 1058 a protuberance suddenly appeared at the base of a heavy blue-black nimbus cloud to the northwards of the sea disturbance. This immediately formed into a thick trunk with a vivid white centre, from the lower end of which an antenna (in appearance like a whiplash) commenced to descend, waving to and fro as it did so. At 1100 the lower end of the antenna suddenly darted towards, and into, the centre of the sea disturbance, which then commenced throwing spray to a great height, the outer fringes of the spray cascading back into the sea. At the same time a vivid white streak appeared down through the centre of the antenna.

At 1120 the waterspout, travelling in the direction of Rudh' Ré, was obscured by a heavy rain squall and dense nimbus.

Two other waterspouts were observed forming at 1100, one to the southwards in the direction of Eilean Trodday, and one to the north-eastwards in the centre of The Minch; but these dispersed or were obscured by dense nimbus shortly after being observed.

GREEN FLASH.

South Atlantic Ocean.

The following is an extract from the Meteorological Record of S.S. *Somerset*. Captain C. R. Pilcher. Cape Town to Dakar. Observer, Sub-Lieutenant J. Brooke Smith, R.N.R., 3rd Officer.

29th October, 1936. A very fine example of "green flash" was observed at sunset. With the aid of a telescope the last of the sun's upper limb was seen to turn green, and as the extreme tip disappeared below the horizon its colour changed to brilliant blue. The whole flash was so rapid that it was difficult to define the exact shade of colour, but the change was gradual from green to green-blue and then dark blue. The sky was cloudless and the atmosphere extremely clear. Wind S.E. by S., force 4. Barometer 1022 mb. Temperature, air 63° F., sea 62° F. Position of Ship: Latitude 30° 16′ S., Longitude 15° 10′ E.

30th October, 1936. Sunset was again watched through a telescope. There was a slight haze on the horizon which caused the sun to appear like a pale yellow disc and made observation easy owing to the absence of dazzle. When about one-third of the sun was below the horizon, the upper limb became curiously affected: tiny strips seemed to peel off and melt away; some were coloured green and some violet. They bore a slight resemblance to flames. The effect seemed to stop just before the disappearance of the upper limb, which was accompanied by a very faint "green flash." Weather cloudless. Temperature, air 62° F., sea 62° F. Barometer 1018 mb. Wind S.S.E., force 6. Position of Ship: Latitude 26° 15′ S., Longitude 11° 40′ E.

METEORS.

Gulf of Mexico.

The following is an extract from the Meteorological Record of M.S. *San Adolfo*. Captain H. Paterson. Falmouth to Houston, Texas. Observer, Mr. W. S. Lamb, 2nd Officer.

22nd October, 1936, at 0300 A.T.S. (0830 G.M.T.), observed a very large and brilliant meteor bearing S.W. It was first seen at an altitude of about 60°, travelled in W.'ly direction and burst with much brilliance at an altitude of about 30°. The trail, which at first followed the path of the meteor and was a straight line, was quite plainly visible 5 minutes afterwards, by which time it had bulged out to the shape of a long horizontal U. Wind at the time was N.E. 3. I read in the October issue of The Marine Observer of the trail of a meteor being visible for 21 minutes in South African waters, but I don't think I've ever seen one visible for longer than this one I am reporting in this part of the world.

Position of Ship: Latitude 25° 35′ N., Longitude 85° 18′ W.

South Indian Ocean.

The following is an extract from the Meteorological Record of M.S. *Clydebank*. Captain W. Broome. Calcutta to Rio de Janeiro. Observer, Mr. E. Needham, 2nd Officer.

16th November, 1936, 0400 G.M.T. An exceptionally bright meteor came under observation in approximately Declination 20° N., R.A. 7h. 30m., close southwards of Pollux. Travelling westwards it faded rapidly, but when in a position about midway between Aldebaran and Capella suddenly burst into renewed brilliance, and, maintaining its direction, finally disappeared from sight near the Pleiades in Declination 30° N., R.A. 4h. 00m. During its period of visibility, about 30 seconds, it retained the same dull yellowish colour, leaving a faint luminous trail.

Position of Ship: Latitude 23° 31′ S., Longitude 37° 58′ E.

MARCONI.

By Henry W. Allen.

I have been asked by the Editor of The Marine Observer to contribute a personal note on Marchese Marconi whose death on the 20th July we all deplore. I have been asked to do this, I understand, because I was associated with Senatore Marconi in his life's work for a longer period of years than any other man and I knew him from very shortly after the time when he came to England first.

Marconi came to England in 1896 and I was brought into contact with him in the same year. From that time I was in constant touch with him for nearly 40 years. I can therefore claim, perhaps, that I have as close a knowledge of Marconi, his character and his work, as anyone living. I make this statement because many people, who have had less knowledge than I, have been tempted to appraise his work less highly than I think is right or just. It has been said that Marconi was not the inventor of wireless and that he, perhaps, obtained more credit than was his due. I think the answer to this was well put by the " Times " when they said " Marconi, like Newton, and all other great men of science, stood upon the shoulders of giants, yet the popular judgment rightly selects Marconi as the representative of the whole body of workers in this field, and this judgment is accepted by the community he is chosen to represent."

Let me say from my experience that from the first time I met Marconi I found him to be a quiet unassuming young man whose last thought would be to claim any credit for himself which was not justified by his own labours. Those who knew him only in his later years can have little idea of the manner in which he impressed those who came in contact with him in the early days with his undoubted genius. He knew exactly what he wanted to do, he went quietly on with his work of doing it and he had a very good idea as to the final goal of his achievements.

He seemed to possess an uncanny faculty of seeing the simple way of dealing with problems which seemed baffling to others and his utter absorption in any experiment he was carrying out convinced all those who were working with him that he was a man above other men.

I have seen him engaged in an experiment in which he has proceeded step by step. When each step was completed a scientist of distinction who was working with him was able to explain exactly how he obtained his results, but this same scientist was absolutely incapable of foreseeing the next step which, however, was perfectly clear in Marconi's mind. This I think was the secret of his success, and whatever people may say about the assistance he had from other people's researches and discoveries, those whose memories can go back to those early days have no doubt at all in their own minds that if Marconi had not co-ordinated available knowledge and directed it, with his dynamic personality, along the line he had in mind it would have been many years before any practical use would have been made of the knowledge which was then available.

In my own mind I have no doubt whatever that Marconi was the inventor of wireless telegraphy if by " wireless telegraphy " we mean commercial wireless and broadcasting as we know it to-day. There is no doubt that he turned that which was only a laboratory experiment into a commercial reality and nobody before him had thought of doing that. I can say from my own experience that from the very beginning he had in mind communication not over short distances but between the ends of the earth and he was fortunate in having lived to see his original dream fulfilled. As Professor Appleton so rightly said in his broadcast appreciation of Marconi he was never deflected from his purpose by the fact that scientists considered that he was tackling the impossible.

In The Marine Observer it is only right that one should say that from the beginning Marconi had the clearest ideas in his mind as to the value of wireless to shipping. Some of his earliest experiments were carried out with ships and between ships, and one might recall that when he was the chief guest at the British Shipmasters Dinner in Liverpool in 1921 he said, " To me it is a particular pleasure to be here, for although I am not a sailor by profession I have always been attracted by the sea. Most of my work has been carried out afloat, and a very considerable portion of my life has been spent amongst sailors. Moreover, in this assembly there is a great number of Captains who are old friends of mine who assisted me very loyally in the first tests and experiments which I carried out at sea."

As everyone knows Marconi was never happier than when he was on board his yacht *Elettra*. This was his floating laboratory, and much of his most important work was done on board this ship. The discoveries which lead to the development of short waves for long distance communication were made during experiments on the *Elettra* and much of the preliminary work which led to the development of wireless direction finding for ocean-going vessels was done while Marconi was cruising on this yacht.

Marconi had a perfect knowledge of English, a keen sense of humour, a measure of Irish wit, and a clear and direct mind which commended itself to seamen. I am glad, therefore, to have this opportunity of paying some slight tribute to his memory in The Marine Observer, which is devoted to the interests of a profession which was dear to Marconi's heart.

MARCONI.

DATE, TIME, POSITION, COURSE AND SPEED FOR W.T. COMMUNICATION.

By Captain L. A. Brooke Smith, R.N.R.

Ever since Marconi, who has just passed away, made communication possible between ships at sea out of range of vision of each other, the masters of ships have made use of wireless telegraphy for communicating to other ships the above information.

Ships on meeting courses by thus informing each other, when wishing to communicate by boat have done so without undue delay.

In hazy weather, by broadcasting this information, risk of collision may have been reduced, and certainly confidence has been increased.

The Direction Finder used in conjunction with this information has been instrumental in reducing the time of giving succour to ships in distress.

All this is so well known, and so obvious to navigators, that it would be unnecessary to state it here if only they were concerned.

Weather reports, in which some information to locate the position of a reporting ship at sea is necessary, are used by those ashore as well as at sea.

Before 1929 when the International Ships' Wireless Weather Telegraphy Code was adopted by the International Meteorological Committee (it has been in use in British ships since 1st May, 1930), there was experience of figure codes for reporting weather to the shore by ships in the North Atlantic dating back to 1909; and we had the experience of British ships reporting weather from 1921 to 1930 in all parts of the world in what became to be known as the standard form of *en clair* message, in which these navigational elements were given in the customary manner of the sea.

At the time that the Ships' International Wireless Weather Telegraphy Code, 1929, was drawn up, the meteorologists had a great desire to greatly augment the number of weather observations to be reported from the sea to the shore.

The wireless companies desired brevity, and in the interests of everyone it was desirable that there should be as much uniformity as possible.

In the circumstances then prevailing, a consensus of nautical opinion was not obtained, but, having consulted a number of masters of ships who had had considerable experience of reporting weather by standard *en clair* message to ships at sea, I came to the opinion that it would be of advantage to navigation in the future and possibly to aerial navigation as well if the weather code could be brought into line with ordinary sea practice as regards navigational particulars.

Since 1930 much has happened. The wireless Direction Finder is carried in many ships at sea.

The system of communication of routine weather reports is carried on by British Selected Ships regularly at scheduled times, and supplemented where and when necessary by other British ships, so that all over the oceans, positions of weather reporting ships are being made through the ether.

Now, one of the objects in establishing the Selected Ship system was to reduce the number of messages required to make known the desired information to the shore and to ships at sea.

Selected Ships have continued to make in plain language their position with time and date, and their course and speed, with the customary exactitude for the purposes of navigation, and doubtless some of them do so in the International Code of Signals (Volume II. Radio) *as well* as making routine reports of weather in the Ships' International Wireless Weather Telegraphy Code; and sometimes at the same time and position.

Surely, if the weather code could be brought into line in this respect for navigation, the benefit to navigation and wireless traffic might outweigh the now comparatively small cost of the slightly lengthened message to the shore, duplication being averted.

By Notice to Mariners recently, ships in the North Atlantic who were likely to be in the vicinity of aircraft during their experimental flights, information of which being broadcast, were requested to make their position, with time, course and speed for a specified period.

Such information is of great use, not only to those at the control stations for aircraft ashore, but to the airman; and no doubt when the airman has confidence that the time, position, course and speed of a ship, communicated by her by wireless, is made with the customary accuracy of navigators, he too can make good use of his direction finder.

In writing these notes I am expressing my own beliefs and opinions; and, in doing so, it must be clearly understood that the Meteorological Office is not committed in any way.

If the masters of ships and those responsible for navigation will tell me whether, in their view, it is desirable that the navigational elements in the Ships' International Wireless Weather Telegraphy Code should be capable of being made in the customary manner of modern sea navigation, with an indication as to whether the position is that of a fix or D.R., or whether they should remain as they are, it will help us to formulate proposals when the time comes for revising the code. When the present code was adopted, I expressed the opinion that it was most desirable that there should be a period of stability and freedom from change for ten years.

The present code gives information of the day of the week, hour only for time, course to the nearest cardinal or quadrantal point only, speed to the nearest two knots only, position, which may be exact to one minute of latitude and longitude, but may be five minutes out on the usual manner of indicating a position to minutes of latitude and longitude.

SOUND TRANSMISSION AND METEOROLOGICAL CONDITIONS.

Prepared in the Marine Division by E. W. Barlow, B.Sc.

As was stated in " Special Observations, Tests and Investigations and their Influence on the Work," in The Marine Observer, Volume VI. 1929, No. 65, information as to the range and the vagaries of the audibility of sound in air over the sea in various types of weather is of importance for safe navigation. It was further remarked that while there had been a great development in recent years of devices utilizing the transmission of sound through water, such as submarine sound signalling, the hydrophone and echo sounding gear, much remains to be learnt of the transmission of sound through air under natural conditions. The purpose of the present article is to present in a simple form the knowledge we already have in regard to this subject. It will be seen in due course that the transmission and audibility of sound in natural conditions, as opposed to the artificial restrictions of experiments in the laboratory, are very complex and depend upon a number of factors. We shall therefore take into account not only some of the known laws of physics but also such investigations as have already been made in natural conditions. The latter are, however, few in number.

Wave Motion.—Before dealing with such practical knowledge as we have, it is desirable to give a short account of the nature of sound in so far as it is necessary for our present purpose. Sound is propagated as a wave-motion of material particles. The sounds we normally hear in daily life come to us as wave-motions of the earth's atmosphere, but sound may also be propagated or originated as wave-motion in liquid or solid matter. It is easy to prove that sound requires material substance for its transmission, and there is a well-known experiment in which the bell of an alarm clock placed within a glass vessel exhausted of air can be seen to strike but cannot be heard. Herein lies the essential difference between sound and those waves familiar to us as light, heat and electro-magnetic waves, which are quite independent of material substance for their propagation and which are usually referred to as being wave-motions in the ether of space. Hence light, heat, &c., reach us from the sun and other celestial bodies, while sound does not. This is a fortunate provision of nature, otherwise it is probable that we should live in the continual noise of the storms and explosions of the sun's surface. We also see why the speed of sound, 1,100 feet per second in air, is enormously less than the speed of ether waves, in round numbers 186,000 miles per second, since it depends on the comparatively slow movements of the molecules of material substances. The ratio of the speed of ether waves to sound waves is thus about 900,000 to one.

A source of sound in air is a source of energy which sets the molecules of air in vibratory motion in its immediate vicinity. The disturbance immediately spreads outwards equally in all directions as a series of concentric shells composed of alternate condensations and rarefactions of the previously undisturbed air. If the source continues to operate, the disturbed air at a given moment will have a spherical form, a plane section through the centre of which is shown diagrammatically in Figure 1. It is to be understood that we are assuming that no obstacles exist in the path of the waves and that the air is quite still and is uniform in temperature and humidity, an ideal state almost impossible to find in natural conditions. In the diagram it is also assumed that the source of sound is quite pure, giving a musical tone of one definite wave-length. The wave-length is the distance, measured along a radius, from any region of maximum condensation to the next similar region. The energy of the waves, by making the drums of the ears vibrate, produces in us that sensation which we call sound. The wave-motion is propagated by the molecules of the air, each one of which hands on, by collision with its neighbours, a part of the original energy of the source. If we think of a train of goods trucks with spring buffers, standing without an engine, and imagine an impulse given to the end truck by the arrival of an engine, we shall get an excellent illustration of the propagation of sound. Each truck in turn passes on the impulse to the next one by moving towards it with a compression of the buffers; it then moves back again to its original position. Thus, while each truck has only moved a short distance

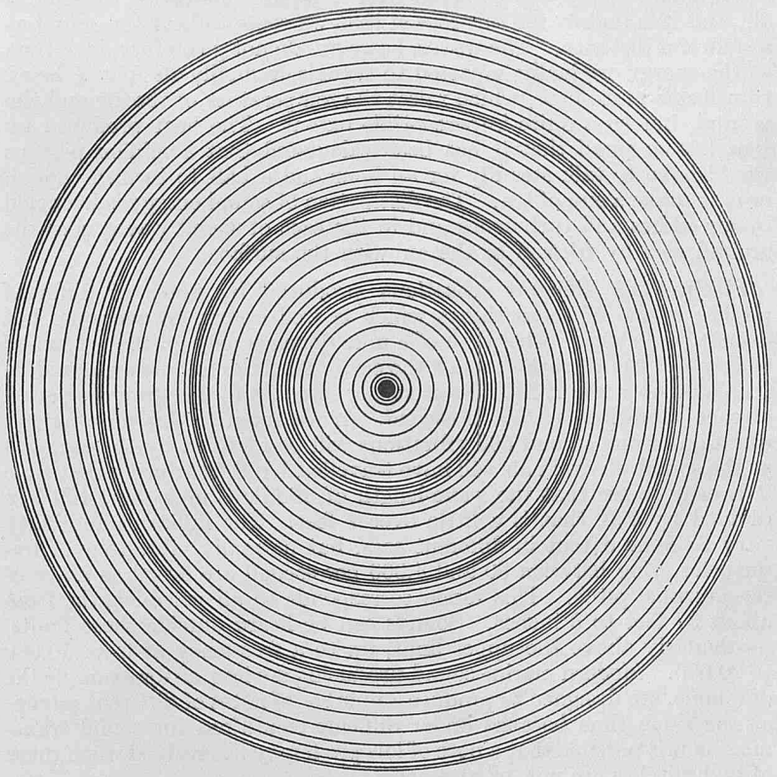


Figure 1.—A plane section of a spherical volume of air containing undistorted sound waves. The source of sound is at the centre.

and back again, a condition of compression or condensation has travelled along the entire train. Furthermore, the speed of transmission of the condensation is considerably more than the speed of the individual trucks. Precisely the same thing occurs in the case of sound except that conditions alternately of condensation and rarefaction are transmitted.

Everyone is familiar with the outward-spreading circular waves produced when a stone is dropped into a still pond. It is interesting to note the resemblances and differences between these water waves and sound waves. The water waves are circles, not spheres, as the motion takes place in a horizontal plane. They are propagated outwards by the motion of each water particle forward and backward along a radius just as happens with the air particles in sound waves through the atmosphere. The fact that there is no continuous outward motion of the water as a whole is well known to everyone from watching the behaviour of any floating object as the wave-motion passes it. In water waves there is also an up and down motion, which causes the familiar ripples, at right angles to the radius. Technically, therefore, these water waves would be described as both longitudinal and transverse, while sound waves are longitudinal only. In light and other ether waves the vibration is transverse only.

Loudness of Sound.—The intensity of a sound at a given place depends on the length of the forward or backward excursion of the air molecules from their mean positions or, as it is called, the amplitude of the wave. The amplitude of the transverse vibration of a water wave is the height of the crest of the wave above that of the undisturbed water, or the depth of the trough below that level. The amplitude, and therefore the loudness with which we hear the sound at a given place, depends on the degree of the original vibration of air by the

source of energy. Assuming as before the ideal state of calm, uniform air, the law of decrease of intensity of sound with increasing distance from the source is as follows: At double the distance the intensity is reduced to one-quarter, at treble the distance one-ninth, and so on. In other words the intensity is inversely proportional to the square of the distance, and this well-known law of physics applies also to light or any other kind of energy transmitted by regular wave-motion. As each of the concentric shells representing successive wave-lengths is larger than the preceding one, it is easily seen that the decrease of intensity with distance from the source must be a fairly rapid process, the original energy being spread over a rapidly increasing volume of air, and it is mainly for this reason that we cease to hear the sound at a sufficient distance. The waves, however, do not go on for a long time as the energy originally imparted to them is gradually dissipated, being transformed into heat, which raises the temperature of the air and the ground, but to a quite imperceptible extent. The heat produced by sound is so small that it has been calculated that a million persons would have to talk steadily for an hour and a half to furnish enough heat to make a cup of tea. The dissipation of sound energy is hastened by air eddies and turbulence and in the case of sound waves near the ground also by friction of the air with the surface.

Pitch.—The different sensations produced by notes of different pitches is one of those things which is well known to everyone but cannot be defined. The pitch of a note depends only on the frequency with which the vibrations reach the ear. Thus the frequency of middle C on a piano is about 500 vibrations per second and therefore the period of each vibration is 1/500th second. If we listen to this note for the duration of one second 500 vibrations will be received by the ear, and as the sound waves in air will have travelled 1,100 feet during that time it is easy to see that the wave-length of middle C must be 1,100 feet divided by 500, that is a little over 2 feet. The limits of audibility vary to some extent in different ears, but normally vibrations of frequencies lying between 30 and 4,000 per second are heard as notes of recognizable pitch. This range corresponds to all wave-lengths from about 37 feet to 3 inches. Sounds can be heard outside these limits, particularly above the upper limit, up to a frequency of from 10,000 to 20,000. Modern marine sound-producing devices, as for example the diaphone, are designed to produce a number of notes of different pitches at the same time because under difficult conditions for sound transmission it is possible that a note of low pitch may be received when those of high pitches are not, or vice versa.

Speed of Sound.—In the practical consideration of sound transmission at sea the vital factors are those which weaken the intensity of sound waves or which deflect them away from a place at which audibility is normally expected. Before dealing with these factors it is however necessary to say a few words about the speed of sound. Sound of any pitch travels at precisely the same rate, and hence, no matter what combination of pitches is emitted by a sound-producing device, the various notes all arrive at any given distance simultaneously. If this were not so the music from a band playing in the open would be a mere jumble of sound when heard from a distance. It must be clearly understood that this only means that when sounds of two or more pitches are heard together they have reached the hearer in exactly the same time; it does not imply that the meteorological conditions may not be such as to render one or more of the notes inaudible at a given distance from the source of sound, while the remainder are transmitted.

The speed of sound is not greatly affected by changes in meteorological conditions. Variations of atmospheric pressure alone have no effect, but the speed is slightly altered by variations of temperature and humidity. It increases with rise of temperature and also with increase of absolute humidity. Thus, at a temperature of 32° F. it is approximately 1,089 feet per second, at 60° F. 1,115 feet per second, and at 90° F. 1,148 feet per second. Friction with the ground and the presence of air eddies and disturbances, already noted as dissipating the energy of sound, also slightly diminish its speed. Wind also affects the speed. The speed of sound in air is slightly greater for very loud sounds, such as a gun firing, than for fainter sounds. It may be remarked, incidentally, that the speed of sound in water is much greater than in air and is greater still in solids.

A knowledge of the speed of sound may be useful on occasion. Thus, the distance of a thunderstorm in miles may be approximately determined by timing carefully the interval between a flash of lightning and its accompanying peal of thunder and dividing the number of seconds by five. Also sound echoes are easily formed by reflection of the sound waves from a solid mass such as a cliff. If the interval between the sound produced on board the ship and its return as an echo is noted and half this number of seconds is multiplied by 1,100 feet, the distance in feet of the ship from the coast is found. The passage of the light from the flash of lightning, or that from the emission of steam in the experiments described in the article above referred to, is quite instantaneous for practical purposes, but a slight error may occur because the response of the eye to impressions of light is a little quicker than that of the ear to those of sound. The difference of response, however, does not usually exceed a small fraction of a second.

General Remarks on Meteorological Conditions.—In giving the above account of the nature of sound waves it was assumed that they were undisturbed by meteorological or other special conditions. We have now to state what we know about the disturbance of sound waves in air in natural conditions. It must be understood that natural conditions are usually complex, often in the highest degree, and it would be beyond the power of anyone to set out all possible variations of the actual paths of waves of sound. Not only have the conditions near the ground to be taken into account, but also those in the upper air, in some cases to a very great height. Thus every change in speed or direction of wind with height in the upper air will affect the path of sound and so will every change of temperature or humidity. All that can be done in the present article is to consider the effect of wind, temperature, &c., separately in the form of general principles and to give simple illustrations, remembering that in nature the various factors are acting together at the same time. Also, the further we are from the source of the sound the greater the probability that the meteorological conditions along the path of the sound will be variable. The transmission of sound in air is thus a much more complex problem than its transmission in water.

In the years 1921–22 Mr. E. S. Player carried out a series of experiments on the audibility of the sirens of the North Goodwin and neighbouring lightships. He was stationed at Joss Gap, near the North Foreland, and the sound was received by electrical and photographical recording instruments as well as by the ear. The Elder Brethren of Trinity House granted the privilege of special blasts on certain days of the week so that the transmission of sound could be studied in different types of weather. The result of one set of observations is given in Table I and is very interesting as showing the great variation of the intensity of the sound received in successive minutes. The lightship bore 122° at a distance of 7 miles and the wind was 215°, 12 m.p.h. The galvanometer deflections for 44 blasts with one minute between each are shown in the table, the figure 0 indicating inaudibility.

Table I.

Variations in Intensity of Sound received from the Siren of the North Goodwin Light-Vessel, 12th March, 1921, 3.50 p.m. to 4.34 p.m. (B.S.T.).

Blast.	Galvanometer Deflection.	Blast.	Galvanometer Deflection.
1	1	19	2
2	4	20–28	0
3	1	29	5
4	0	30	9
5	0	31	3
6	5	32	9
7	1	33	3
8	1	34	3
9	6	35	5
10	1	36	3
11	1	37	7
12	1	38	2
13	4	39	1
14	3	40	0
15	3	41	8
16	1	42	1
17	3	43	1
18	1	44	2

The Effect of Terrestrial Obstructions.—When an island, hill, building or other terrestrial object is in the path of direct sunlight it throws a shadow. When sound waves meet a similar obstruction sound is heard on the side away from the source, in other words the obstruction does not produce a sound-shadow. Those rays of sound which are inclined upwards just sufficiently to graze the top of the obstruction bend downwards and fill the space beyond it. This is an example of the diffraction of sound waves. Diffracted sound waves suffer some loss of intensity and a slight diminution of speed, as the path from source to hearer is longer than the distance in a straight line.

The Effect of Surface Wind on Sound Transmission.—The effect of surface wind is to distort the spherical sound waves, as shown diagrammatically in FIGURE 2, where the source of sound is at S and

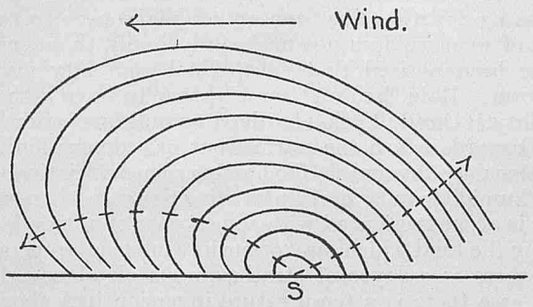


Figure 2.—Vertical section through sound waves distorted by surface wind. The source of sound is at S. The dotted lines represent two rays of sound.

the wind direction is indicated by the straight arrow. We are considering here wind which, as is usually the case, increases in velocity with height above the ground. On the leeward side of the source the sound waves advance more rapidly above than below, while on the windward side the reverse is the case. There are thus two reasons why sound is better heard to leeward of the source. The first is that the sound waves received at a distant point to leeward of the source have come down from above and so have lost less energy than the waves travelling nearer the ground on the windward side, which are subject to friction with the ground. Also, as shown in the diagram, the waves to windward very soon leave the ground altogether. The second reason is that the waves to leeward are more likely to pass over obstacles than the waves on the windward side on account of the greater upward curvature of their paths. It may also be remarked that in the direction in which the wind is blowing the speed of sound is increased by the speed of the wind; directly against the wind the speed is decreased by the speed of the wind. Since the speed of sound is about 650 knots it is obvious that only very strong winds have much effect on its speed. Pitch is not affected by the speed of the wind. From the effect of wind in distorting sound waves, it may easily happen that a sound, such as a gun firing, made at a place A, is heard at a place B to leeward of A while the sound of a similar gun fired at B is quite inaudible at A. The statement that sound is heard better to leeward than to windward only applies at or close above the land or sea surface; at greater heights the sound will be better heard to windward. In a ship to windward of a source of sound, the sound would be better heard at the masthead than on deck.

The Effect of Winds in the Upper Air.—Sound waves can be refracted and reflected like light waves. In considering the paths of sound in these cases it is easier to think of rays of sound rather than the waves themselves. Thus, with our original undisturbed spherical waves, any radius of the sphere represents a ray of sound because sound travels equally far along any radius in a given time. In the diagram of waves distorted by wind, shown in FIGURE 2, two of the sound rays are indicated by dotted lines showing the downward curve of the path of sound to leeward and the upward curve to windward. Now let us suppose that the wind near the surface is calm or light and that the rays of sound proceeding upwards meet a definite wind current in the upper air. In such a case the sound ray is refracted, continuing upward but making a smaller angle with the horizontal. If, in the upper air, the sound ray suddenly enters a region of less wind it is also refracted, continuing upward but making a larger angle with the horizontal. If the sound rays pass into a region where wind speed is gradually increasing with height the result is similar to that of FIGURE 2, where the rays are bent successively downward to leeward and upward to windward. If the wind speed gradually decreases with height the paths would curve upward to leeward and downward to windward. Thus endless variations of the path are possible if the sound waves meet successive wind changes in the upper air. Also, whenever there is an abrupt change of wind and refraction occurs, a small proportion of sound will be reflected downwards towards the ground. In certain conditions the whole of the sound will be reflected downward by total reflection at a stratum where the wind speed abruptly increases.

Zones of Silence.—These effects of wind provide one means by which the phenomenon of zones of silence may be explained. It has long been known that sound, for example that of gunfire, may be heard up to a distance from the source, then be inaudible for a further distance and heard again at still greater distances. Maps have been constructed from a number of observations of a particular sound which show very clearly these more or less irregularly-shaped areas of inaudibility, and the great explosions of surplus ammunition dumps in France and elsewhere since the war have been utilized in studying the subject. It is easy to see that the total reflection of sound from a height in the air could direct a ray downwards which might ultimately reach the land or sea surface. When this is the case it may give rise to audibility at a point beyond which the direct rays from the source, travelling more or less horizontally, could affect the ear.

The Effect of Temperature on Sound Transmission.—Generally speaking, temperature decreases with height above the ground and this results in the upward deflection of sound rays. Hence the normal state of affairs is for sound to be heard at greater distances upward than horizontally along the ground. Thus FLAMMARION in a balloon in the neighbourhood of Paris heard the chirping of crickets at a height of 2,620 feet and the croaking of frogs at 2,950 feet. When there is a temperature inversion, that is, when temperature increases with height for some distance above the ground, sound is deflected downwards, and as on these occasions there is usually little or no wind, conditions are very favourable for audibility in all directions along the sea or land surface. When different air currents are superimposed there may be considerable sudden changes in temperature with height. In such cases refraction occurs as in the case of wind currents, and it is quite possible for total reflection downwards to occur in suitable circumstances. Generally speaking, variations of wind speed and variations of temperature are acting at the same time in the deflection of sound rays, but they may be working together or in opposition. The irregularities introduced by temperature differences may therefore also have their place in the explanation of zones of silence. Recent research on meteors shows that at a very great height in the earth's atmosphere, about 40 miles, there is a large and rather sudden rise of temperature. It has been pointed out by Dr. WHIPPLE that reflection of sound waves from this layer would give a zone of audibility on the earth's surface whose nearest point to the source would be about 90 miles. Such a zone was actually observed on the occasion of the Oldbroek Explosion of 28th October, 1922. Temperature differences existing in a horizontal direction along the ground will reduce audibility.

The Effect of Humidity and Fog on Sound Transmission.—PLAYER's observations of the sirens of light-vessels, previously referred to, show that humidity has a definite effect on the distance over which sounds can be heard. Thus on 21st April, 1921, with little variation of temperature during the day, variations in audibility followed those of humidity almost exactly. Audibility decreases with lowered humidity and increases with rising humidity. On this day the Tongue Light-Vessel's fog signal, distant 9 miles, was inaudible with relative humidity 70 per cent. or less, faintly heard with humidity 70 per cent. to 75 per cent., moderate from 75 per cent. to 80 per cent. and loud above 80 per cent. Effects of refraction and reflection will also be obtained if the sound rays encounter strata of abrupt or gradual change of humidity, and the same applies to nearly horizontal waves which meet such changes of humidity near the sea or land surface at varying distances from the source. The path of the sound rays therefore depends on the combined effects of strata or patches of different wind speed, temperature and humidity. As it is known that the humidity of the air may on certain occasions change appreciably almost from

minute to minute without change in temperature or apparent change in other conditions, it is probable that the rapid variations of audibility in TABLE I are mainly due to humidity changes.

It is well known to navigators that in foggy conditions at sea sound signals are unreliable and while they may be heard further from the source, are not always heard at shorter distances. It is also well known that sounds normally inaudible may be heard in foggy weather and that frequently the presence of fog definitely increases audibility. These statements appear at first sight contradictory, but there is quite a simple explanation. If the source of sound and the observer are in a continuous stratum of fog audibility will be increased. The presence of the temperature inversion normally associated with land or sea fog refracts the paths of the rays downwards. Also the high humidity, as we saw above, is advantageous, and finally the almost complete absence of wind (which applies, however, more to land than to sea fog) allows the sound to spread equally well in all directions. If, however, the fog is patchy the conditions are quite different. Suppose the source of sound and the observer are both in fog with clear air in between. There may then be large reflections of sound at the two surfaces between the fog and clear air so that little or no sound comes through to the observer. The same applies if the source and the observer are both in clear air with a fog bank between them. Even in stretches of continuous fog there are usually patches of variable density and these may cause a loss of sound which may wholly or partially neutralize the advantages of the fog to audibility.

Restricted Audibility.—As stated above, under certain conditions of the atmosphere some of the notes of a sound which is a combination of high and low tones may be inaudible. We have considered the various ways by which sound waves may be diverted to other directions, also ways in which they may be weakened. In some states of the air these factors act singly or together to divert or weaken notes of certain pitches, rendering them inaudible, while others, less affected, may be heard. Such a break-up of a sound is called sound scattering. A combination of wind eddies and local temperature variations affects the shorter waves more than the longer, so that only the notes of lower pitch may be audible. On the other hand, if waves of various pitches are being refracted above the observer, he may hear the high-pitched sounds, brought down to him by scattering, while the low-pitched sounds are quite inaudible.

Audibility and Weather.—There is no simple relation between the weather and audibility, nor does good visibility necessarily imply good audibility. It is not possible to state exactly the degree of audibility experienced with all the various types of weather since the factors are so complex. The following general remarks may, however, be made. On bright warm summer days audibility is often poor, but if a cloud comes up and covers the sun it will generally improve. On what are usually called " oppressive days," with little or no wind, high shade temperature and a cloudless sky, with a slight but definite haze which dims the sun a little, PLAYER found that the worst conditions prevailed for audibility along the land or sea surface, although sounds coming downward as from an aeroplane were transmitted well. This type of weather does not necessarily imply thundery conditions, and it has been noticed that exceptional audibility may precede a thunderstorm. Rain, hail and snow appear to have little or no effect on audibility. On dull, cloudy days sounds are often heard well. At places towards which the warm front of a depression is advancing the conditions are favourable for hearing, since variations of temperature and humidity in a horizontal direction are then small. Good audibility is also experienced with some types of anticyclonic weather, particularly the kind which may occur in winter in temperate latitudes, in which there is a layer of stratocumulus cloud covering the sky. In such a case there is a temperature inversion just above the cloud.

Diurnal Variation of Audibility.—Sounds are usually heard on land at greater distance at night than in the daytime. On calm nights the distance may be ten or twenty times as great as during the day. This is mainly due to the decrease of air disturbance at night. Other factors are the inversion of temperature which usually occurs on calm clear nights, and the smaller number of distracting sounds and noises at night. At sea, however, these factors do not wholly apply and there is probably less difference between day and night audibility.

CURRENTS IN THE SOUTH PACIFIC OCEAN, EASTERN PORTION, DURING THE SOUTHERN WINTER AND GENERAL SUMMARY.

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

DURING the southern winter (May to October) the general flow of current in the eastern part of the South Pacific Ocean is similar to that of the summer (November to April). The South Equatorial Current is, however, stronger in August to October. From May to October the eastern end of the Counter-Equatorial Current, north of the equator, is also stronger and extends further eastward, towards the coast of Colombia, than during the summer months.

Seasonal Variation of Currents.—The mean set and drift of current for each quarter of the year has been computed for a number of areas, the results being given in the accompanying table. By this means the seasonal variation within each of these areas is shown.

General Current Circulation of the South Pacific Ocean.—The general flow of current in those parts of the South Pacific Ocean already charted are shown in FIGURES 1 and 2. These charts will be completed in next year's work.

The Peru Current forms the eastern part of the circulation round the area of permanent high barometric pressure in the eastern part of the South Pacific Ocean, which is centred in about Latitude 30° S., Longitude 100° W. The South Equatorial Current, into which the Peru Current passes in about the latitude of the Gulf of Guayaquil, forms the northern part of this circulation. On the southern side of the high-pressure area there is a general easterly current completing the circulation and forming the northern part of the Southern Ocean Drift, as in the other oceans.

Unfortunately there are practically no observations during the period 1910 to 1936 on the southern side, and the observations of the Southern Ocean Drift towards Cape Horn, charted last year, are relatively few and do not extend north of Latitude 54° S., between Longitude 88° W. and the coast. It is the general experience of navigators, however, that there is an easterly set on to the coast of southern Chile, which is usually most felt between Chiloe Island and the neighbourhood of the Golfo de Peñas. While easterly on-shore sets are experienced up to Bahia Concepcion or even further north, the current north of Chiloe Island begins to trend towards the north, following the coast and this is the beginning of the Peru or Humboldt Current. South of Golfo de Peñas, on the other hand, the current becomes more and more south-easterly, setting down the coast and joining the more southerly part of the Southern Ocean Drift which flows round Cape Horn. There is thus a division of the easterly drift when it reaches the coast of South America, one part going north, the other south. The few observations which are shown on the charts in this region bear out these general remarks.

Upwelling in the Peru Current.—By the action of the trade wind blowing over the coast of Chile and Peru, water is driven from the coast and this is replaced by cooler water from below. Upwelling in the Peru Current is thus exactly similar to that which takes place on the south-western coast of Africa in connection with the Benguella Current. The charting of the Southern Ocean Drift of the South Pacific Ocean made last year showed it to be a very weak current. While the more northerly part of the Southern Ocean Drift, of which we have no information, may be stronger, it is probable that much of the volume of the Peru Current comes from the upwelling water, the surface water coming up the coast from Chiloe Island playing a minor part. It is certain that the persistence of the low temperature of the Peru Current right up to equatorial regions depends mainly on upwelling of cool water from below, although the surface water when it begins its northerly trend up the coast is also relatively cold.

The explanation of the coldness of the Peru Current by upwelling was first suggested by DE TESSAN in 1844 and although few oceanographical observations were made on this coast until recently, the theory has been generally accepted. In 1931 the Royal Research Ship *William Scoresby* carried out an oceanographical investigation, and by surface and subsurface observations fully confirmed the fact of upwelling.

The Peru Current.—It will be seen from the table of quarterly mean sets and drifts that the Peru Current is nearly constant in direction throughout the year. With few exceptions, the current arrows in the charts are everywhere parallel, or nearly parallel, to the trend of the coast. The mean drift does not vary much, but is slightly stronger in May to October than in November to April. Between the equator and Latitude 14° S., northerly currents exceeding one knot may be experienced at any time of the year. Between Latitudes 14° S. and 36° S. such currents were only observed, in the period 1910 to 1936, in the months of February to July. The strongest northerly currents recorded were one at the rate of 60 miles per day, N. 16° E., in Latitude 0° 24′ S., Longitude 81° 05′ W., on 15th April, 1933, by H.M.S. *Durban*, and one at the rate of 42 miles per day, N. 5° W., in Latitude 13° 02′ S., Longitude 76° 57′ W., on 29th November, 1928, by S.S. *Orbita*.

A considerable proportion of currents do not exceed the rate of 6 miles per day. This proportion is usually between 10 and 30 per cent. of all observed currents, varying with latitude and season.

In the chart for November to January, between Latitudes 18° S. and 32° S., mean currents shown further from the coast are stronger than those nearer the coast, in three cases out of four, but the number of observations is small.

Southerly Sets in the Peru Current.—The occurrence of southerly sets in the Peru Current off the coast of northern Chile and Peru is well known. The present investigation shows them to be of frequent occurrence. Out of the 324 currents observed during the period 1910 to 1936, between latitude 20° S. and 2° S. in the region of the Peru Current, 71 had a southerly component. Two out of every nine currents, therefore, set in some southerly direction. The average drift of these southerly currents was about half a knot. Seven had drifts of from 20 to 48 miles per day, five of which occurred in the equatorial part of the Peru Current, between 2° S. and 7° S. The greatest drifts of the southerly currents, as well as the northerly ones, thus occur in the northerly part of the Peru Current, particularly in the equatorial region. The southerly currents were experienced in all seasons but were rather more frequent in the southern summer, November to January. The mean strength of the northerly current between Latitudes 20° S. and 2° S. must, therefore, be appreciably greater than is shown in the seasonal table, the figures there given being the mean of all currents.

The observations of current off the west coast of South America which have been charted are confined to a narrow region covering ships' tracks. We cannot, therefore, gain any information about the relative situation of northerly and southerly currents, for example whether the southerly current is usually between the ordinary Peru Current and the shore. On the tracks, the southerly currents are most frequent off the Gulf of Guayaquil in about Latitude 3° S. and also north of Punto Aguja, in Latitude 5° S. to 6° S., elsewhere they are fairly evenly distributed in Latitude down to 16° S.; from Latitude 16° S. to 20° S. a few were observed. A few were also recorded at considerable distances from the coast.

It is locally assumed that the northerly Peru Current has swinging movements away from or towards the coast, so that sometimes the cool Peru Current is met near the shore, while at other times the warm southerly current supervenes. There is also the tradition of the Holy Child Current, flowing only in certain years, mentioned in the previous article. This current was referred to in a note by the British Consul at Callao published in THE MARINE OBSERVER, Volume III, 1926, page 40, in connection with the abnormally heavy rainfall which devastated the coastal and inland regions of Peru in the early months of 1925. It was there stated that southerly currents at the rate of

Currents in the South Pacific Ocean.
Summer—November to April.

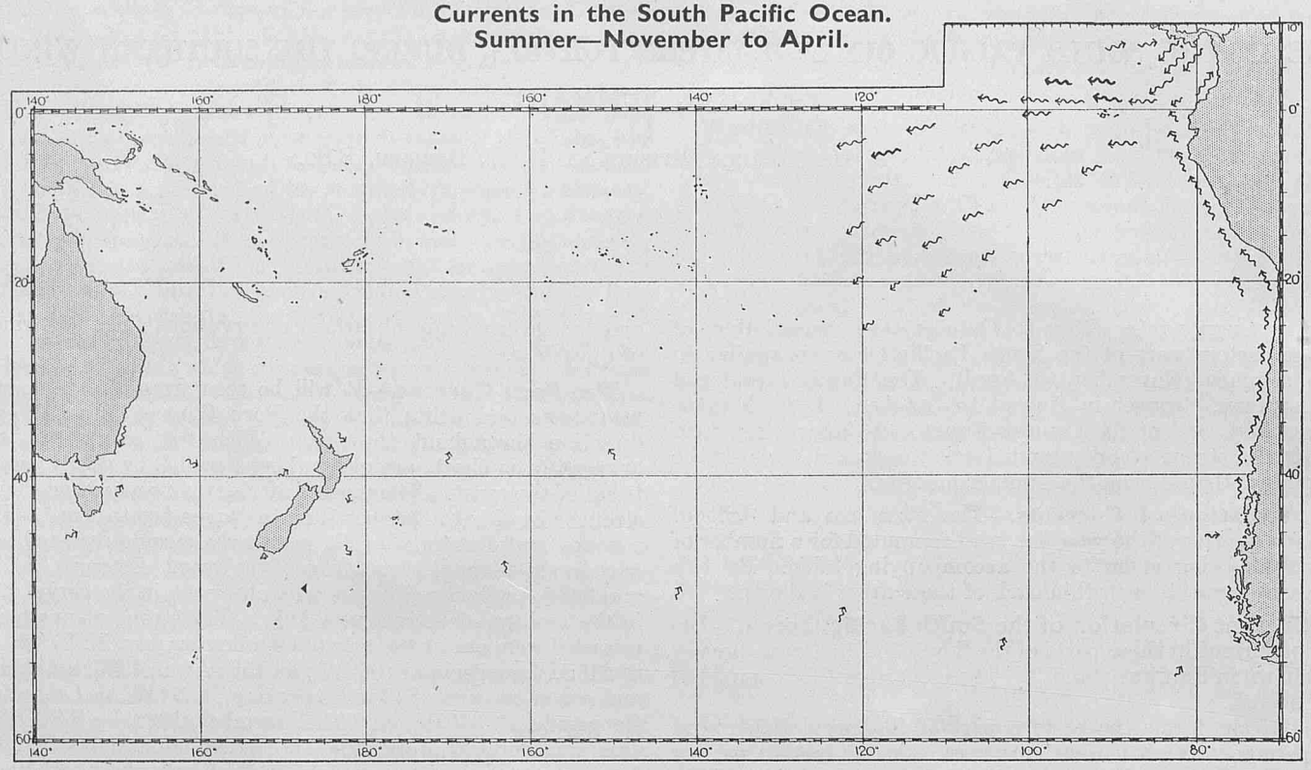


Figure 1.

Currents in the South Pacific Ocean.
Winter—May to October.

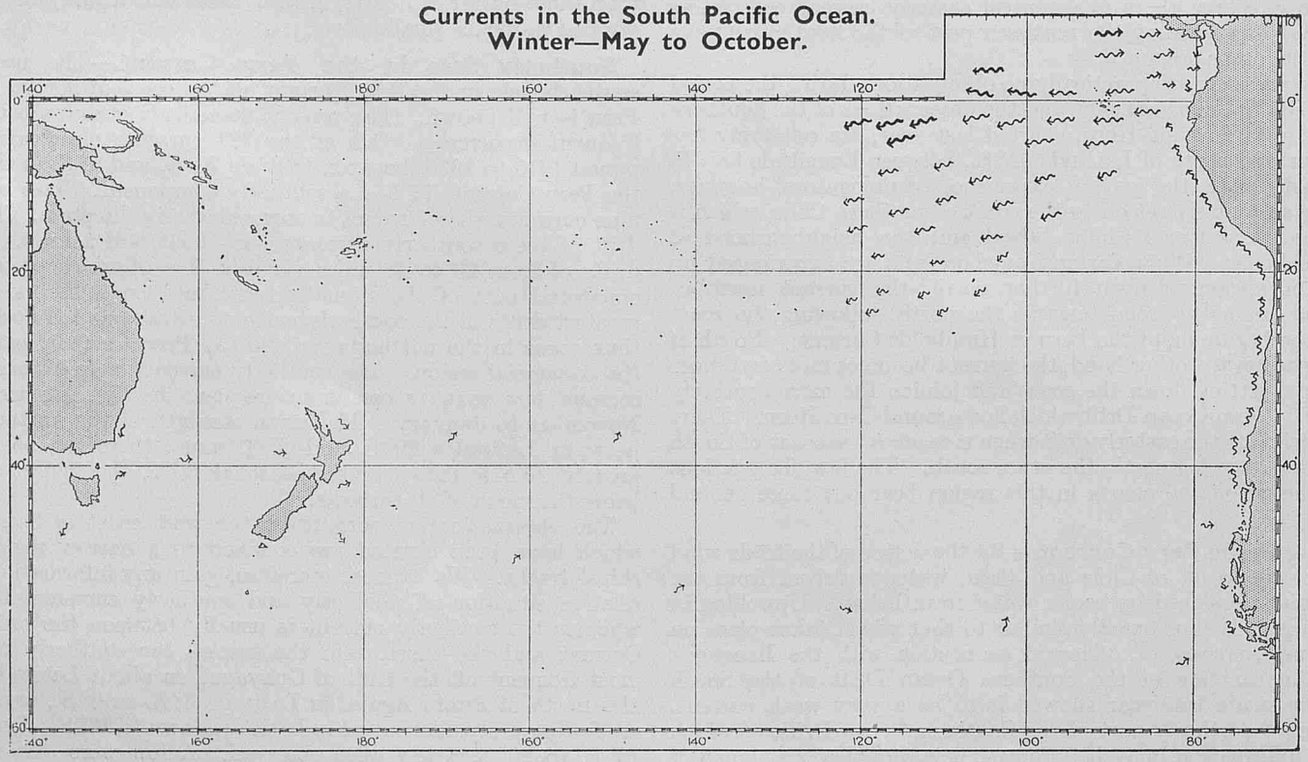


Figure 2.

2 knots were mostly reported at that time by ships proceeding south between Ecuador and Callao. It is probable, therefore, that southerly currents were more frequent than usual during that year, but we have no definite information from any source that a steady southerly current flows in some years between the coast of Peru and the Peru Current.

Between Latitudes 2° N. and 2° S., Longitude 84° W. to the coast, in August to October, the mean set of the 43 currents observed during the period 1910 to 1936 was south. In May to July there is also a mean southerly set between Latitude 2° N. and the equator. These are the only mean southerly sets shown near the coast on the charts. They are, however, north of the Gulf of Guayaquil and therefore north of the main body of the Peru Current.

The phenomenon of Aguaje is believed to be associated with the incursion of warm southerly current. The sudden rise in temperature

kills the fish and other living organisms of the cool Peru Current, which decompose and discolour the water. Aguaje is known by the English names of " the Painter " or " the Callao Painter " because of the darkening effect the hydrogen sulphide given off has upon ships lying at anchor. The Aguaje has a serious effect not only on the fishing industry, but also on the guano industry, the sea birds migrating or dying of starvation.

The Gulf of Panama.—While the bulk of the Peru Current passes into the South Equatorial Current, a portion continues its northerly course up the coasts of Ecuador and Colombia into the Gulf of Panama. The west coast of Colombia and the south coast of Panama as far as Cape Mala form a large bay with the Gulf of Panama at its head. Water from a second source also enters this region, the easterly setting Counter-Equatorial Current of the North Pacific Ocean. The water so entering produces an outflow from the Gulf of Panama in a south-westerly direction throughout the year, this current attaining its greatest strength during the season of northerly winds, December to April.

In November to January the Counter-Equatorial Current does not flow east of about Longitude 84° W., but its waters add to the south-westerly flow, which sets with a mean drift of 15 miles per day out of the Gulf of Panama and 10 miles per day in the ocean south-westwards of Cape Mala. This outflow loses strength towards the equator and passes into the South Equatorial Current. In February to April conditions are similar but the outflow is stronger, having a mean drift of 17 miles per day from the Gulf of Panama and 13 miles per day south-westward of Cape Mala. It retains much of this strength and passes into the South Equatorial Current in Latitude 2° N. to 4° N.

In May to October the Counter-Equatorial Current is stronger and extends as far as Longitude 80° W., or even nearer the Colombian coast, and some of its water joins the northward extension of the Peru Current, which is weaker at this time, and recurves into the Gulf of Panama. The south-westerly outflow from the Gulf of Panama, past Cape Mala, has a mean drift of 9 miles per day in May to July and 13 miles per day in August to October, when the Counter-Equatorial Current in this region attains its greatest strength. The outflow from the Gulf of Panama does not pass into the South Equatorial Current during these months, being separated from it by the Counter-Equatorial Current.

The currents between Panama and the equator are thus subject to great variation both of set and drift throughout the year, but the outflow from the Gulf of Panama and from the coast westward of Cape Mala is a constant feature. A number of drifts of 2 knots or more have been observed in this region during the period 1910 to 1936, the greatest being one at the rate of 99 miles per day, S. 22° W., recorded by S.S. *Rimutaka* in Latitude 3° 29′ N., Longitude 81° 53′ W., on 3rd March, 1925, and one at the rate of 62 miles per day, S. 75° W., recorded by S.S. *Maimoa* in Latitude 6° 20′ N., Longitude 80° 44′ W., on 27th January, 1930.

The South Equatorial Current.—The eastern part of the South Equatorial Current, shown on the present charts, is a strong and comparatively steady current. As in all such currents, variable and even reverse sets are experienced, but in August to October when the current is strongest these are few in number and very weak everywhere between Longitudes 92° W. and 124° W., the limit of the charts. The boundary between the Peru Current and the South Equatorial Current is of course arbitrary, but the latter may be said to begin in about Longitude 84° W.

The South Equatorial Current has no definite southern boundary. As explained later the water for a long way south of the equator has also a definite westerly drift. East of Longitude 108° W. there is for most of the year a fairly well-marked decrease of mean speed south of Latitude 6° S.; this may, therefore, be taken as the southern limit of the main body of the current. From Longitude 108° W. to 124° W. the southern limit is at Latitude 8° S. The northern limit varies between Latitudes 2° N. and 4° N., east of Longitude 92° W., being at Latitude 2° N. during November to July and extending to Latitude 4° N. in August to October, when the strongest outflow comes from the Gulf of Panama. West of Longitude 92° W. there is a westerly set between Latitudes 2° N. and 4° N. throughout the year as far as the charts extend.

The strongest mean drifts occur in August to October over the whole area from Longitude 84° W. to 124° W.; between Latitudes 0° and 6° S., Longitudes 108° W. and 124° W. it is 19 miles per day during this quarter. In no part or season is the mean drift less than 10 miles per day. North of the equator, between Longitude 92° W. and 108° W., mean drifts of from 32 to 46 miles per day are shown by some of the current arrows for August to October and in one case also in May to July. These are the strongest mean drifts so far charted in an equatorial current in any ocean; the only other one exceeding 30 miles per day is that closely north of Madagascar in May to July, 35 miles per day.

Currents of 2 knots may be experienced in the main body of the South Equatorial Current at any time of the year. Five currents at the rate of 60 miles per day or over were observed in the period 1910 to 1936, the greatest being at the rate of 95 miles per day, N. 75° W., in Latitude 1° 12′ N., Longitude 100° 07′ W., recorded by S.S. *Port Darwin* on 14th October, 1933.

The Counter-Equatorial Current.—This easterly current is shown between Latitudes 6° N. and 8° N., Longitude 84° W. to 92° W., during November to April. It extends furthest south in the northern summer, May to July, when it is found down to Latitude 2° N., between Longitudes 80° W. and 92° W. In August to October it is strongest generally, though weak south of Latitude 4° N., and extends east of Longitude 80° W., near the coast of Colombia. Easterly sets up to 1 knot, or occasionally 1½ knots, may be experienced in the Counter-Equatorial Current.

The Region South of the South Equatorial Current.—The large area south of the main body of the South Equatorial Current and west of the Peru Current is only partly covered by the observations. The area of Latitude 6° S. to 26° S., Longitude 96° W. to 124° W., has been divided into three parts for the computation of mean sets and drifts and these will be found in lines 4 to 6 of the seasonal table. Although the current arrows in these regions show considerable differences of mean set and drift the means for each region are much more regular. Between Latitudes 6° S. and 16° S. the mean set is nearly due west throughout the year and the mean drift is practically constant at 5 to 6 miles per day. There is thus on the average a steady flow of water westwards throughout the year exactly as in the main body of the South Equatorial Current, but of about half the strength. Similar remarks apply to the region between Latitudes 18° S. and 26° S., except that during November to April the mean set is W.S.W. and the flow is weaker throughout the year.

The South Equatorial Current of the Pacific Ocean differs in this respect from that of the Indian Ocean; there is no such mass of surface water over a large extent of latitude moving westward there.

According to the observations of H.M.S. *Ajax* in September to November, 1936, published in the Marine Observer's Log of the present number, the Peru Current sets more to the westward outside a distance of 10 miles from the coast, between the equator and Latitude 42° S. Together with the fact that the mass of westward-moving surface water shown on the chart must have come from somewhere, this renders it probable that the uncharted space down to Latitude 20° S. or 25° S. is also filled with westward-moving water. The older current charts bear this out, the water tending to spread out fanwise from the Peru Current seaward. On the western side of the high-pressure area there should be a current at first south-westerly and then southerly, to complete the circulation. This flow may take place westward of the limits of the present charts but there are some indications of it in the south-westerly sets of a number of the current arrows south of about Latitude 16° S. and also in the deflection of the mean current south of Latitude 18° S. to W.S.W. in November to April, as mentioned above.

Coastal Currents (the Experiences of Navigators).—The following remarks on the currents of the west coast of South America have been received from Captain A. Ridyard, R.M.S. *Orduna*, who has collated them from recent conversations with British and foreign Captains and ex-Captains of coastal steamers and various pilots. These remarks refer only to the ordinary steamer tracks from port to port, say from 5 to 15 miles off the principal headlands.

" C. Pillar to Huafo I.—In the northern part the currents set directly on to the shore and into the several channels of the archipelago. Farther south they set more and more south-east.

Huafo I. to Concepcion Bay.—In the south part the current sets

directly on to the shore, but farther north gradually follows the trend of the coast northward with, however, occasional strong sets into the deeper bays (e.g. Arauca Bay, Concepcion Bay).

Concepcion Bay to Port Huasco.—The general drift is northward all the year round but in the season of the strong south winds (i.e. southern summer) an off-shore set is frequently experienced between C. Carranza and Topocalma Pt., and between C. Caraumilla and Lengua de Vaca. On the other hand during the season of variable or northerly winds (i.e. southern winter) a set to the eastward of north can be expected. Between Lengua de Vaca and Port Huasco during the latter season the current often sets strongly north-eastwards; indeed, this was particularly noticeable on 13th April, 1936, in this locality.

Port Huasco to Arica Hd.—The inshore currents along this section of the coast are weak and inconsiderable.

Arica Hd. to Islay Pt.—Occasionally a slight northerly set is felt between Arica and Morro Sama : thence to Coles Pt. this set, though rarely strong, should be anticipated.

Between Coles Pt. and Islay Pt. the current sets north about 25 miles per day, but close inshore follows the trend of the coast. At Mollendo great difficulty is generally experienced canting a vessel on her anchor to a stern mooring buoy; she will always ride to a single anchor heading E.S.E.

Islay Pt. to Callao Bay.—The current is very regular at all seasons setting north-westward at 12 to 26 miles per day, following the trend of the coast as far as San Gallan I. Frequently a weak set towards the coast northward of Pisco is felt in the offing, but close inshore as far north as Callao a counter-current running south-east is generally found, sometimes indeed setting quite strong.

Callao Bay to Sechura Bay.—The currents on this part of the coast are more variable and uncertain than on any other part, which fact, together with the prevalence of fog, makes pilotage hereabouts rather anxious.

The set may be in any direction between north-east, north, or north-west over the whole section northward of the Huara Islands, often attaining a velocity of 1½ kt. in the vicinity of Lobos Islands; and inshore occasionally setting south-eastward. Indeed, the currents near the Lobos Islands are not only often strong but are also quite irregular and unpredictable, a reason advanced to account for the recent stranding of the Chilean S.S. *Cantin*. Near False Pt. a strong set south or south-west is frequent.

Sechura Bay to La Plata I.—The current generally sets out of Sechura Bay and the Gulf of Guayaquil, but a small north-east drift may be encountered between C. Blanco and Zorritos.

In the depth of the Gulf tidal streams predominate.

Northward of C. Santa Elena the set is mainly northerly with a slight indraught towards the land, while close inshore a south-going stream is frequent, following the trend of the coast and the sweep of Santa Elena Bay.

La Plata I. to Panama Bay.—From La Plata I. the current sets north-eastward towards Gorgona I. where it curves to northward and begins to cast off branches fanwise to the westward. Thence it follows the coast up the east side of the Gulf of Panama, recurving near the Perlas Islands and setting strongly S.S.W. towards C. Mala. Off the latter cape it attains great velocity, particularly during the season of northerly winds (i.e. December–April). Passing C. Mala it spreads fanwise westward, running strongly W.S.W. towards Morro Puercos.

Further off-shore (80°–81° W.) the set is nearly always southward, being strongest from December to April.

During the latter half of the year the set between La Plata I. and Gorgona I. is mostly eastward or south-eastward."

An account of the currents has also been received from Captain G. H. Large, M.V. *Lobos*, which is endorsed by his Senior Officers who have had many years' experience on this coast.

" Panama to Plata Island.—The current sweeping north on the east side of the Gulf of Panama and south on the west side, is apparently always present, its strength increasing in the ' Dry Season ' at Panama.

The currents setting across the approach to the mouth of the Gulf of Panama are uncertain both in strength and latitude.

Making a practice of approaching the Pearl Isles from a position of 100 miles due south of San Jose, in order to avoid adverse current without unduly lengthening the passage to Panama, I have occasionally found the vessel set 4 or 5 miles west during the 10 hours run, and never to the east.

On the other hand, farther to the east, when proceeding from Buenaventura to the Pearl Isles, or vice versa, an easterly set is invariably experienced.

On the coast of Colombia, the current setting northwards sometimes deflects to the eastward and at others to the westward.

There is no apparent reason or season for these deflections, previous voyages' experience at the same time of the year being no guide.

The ' set in ' (eastward) during the last 150 miles approaching Cape Chirambira from the Pearl Isles is frequently half a knot or more, whilst having prudently made this allowance, vessels have, to my knowledge, actually ' set ' that amount in the opposite direction.

Many coasting vessels, in view of this uncertainty, make Cape Corrientes when southbound for Buenaventura and proceed south, stemming the current.

Coast of Peru.—On the whole Peruvian Coast, close inshore, from midnight until the south wind gets up in the morning (at about 10.00 a.m.), the current usually sets north. This is a belt 2 to 4 miles wide. During fog, this current appears to extend considerably further to the west, possibly to the limit of the fog belt.

This northerly set is of uncertain strength, sometimes negligible, and occasionally there is a counter-current in the early morning.

At Callao, the latter is of apparently sufficient strength to wash the mud from the north side of the fairway approaching the Harbour Works into the fairway and necessitate dredging.

At Pimentel, on the 24th January, 1936, it was observed the lighters in the Roads lay heading north, current rode, in the early morning and the ship on coming to anchor lay with a lazy cable.

This is extremely unusual, vessels approaching the Roads generally having to allow for being swept to the north on losing way.

The local pilot remarked that during two years he had been stationed there, this southerly current had only occurred once before. I cannot myself recollect having observed this more than two or three times.

Having made allowance for set to the north from Lobos de Tierra (with a good departure) to Pimentel, a set to the contrary direction had been experienced that morning, about a quarter of a knot.

About 11 a.m. the current changed, and at Eten, nine miles south, in the afternoon, a current from the south was in evidence.

In fog, on the Peruvian coast, I have always allowed for a set toward the coast, which I have usually found justifiable.

Coast of Chile.—On the coast of Chile, from Arica to Caldera, the north current appears to me to set parallel to the coast at all times.

South of Caldera, to Magellan Straits, a set toward or away from the land is often experienced. The farther south, the more frequent and stronger these deflections from the main north current appear.

South of Valparaiso to Magellan Straits, I have observed, with west to north winds, there has generally been a set towards the land, whilst with west to south winds, the set has been from the land.

On 3rd September, 1935, when passing Chiloe Island north bound, the usual set toward the land (South American Pilot, Part 3, page 109, line 48) was not experienced until reaching 42° 20′ S.

Good departure from Huafo light, good stellar morning sights and noon position, the ship passing Huafo 17 miles distant and noon position 42° 18′ S., 74° 49′ W. From Noon to Cape Quedal, a distance of 85 miles, steaming time 9 hours, the ship was set East True, 10½ miles. No set from Cape Quedal to Galera Head. Previous weather : northerly gale, rapidly decreasing.

The inference is that, after northerly gales, there is a strong indraught into Chaco Narrows, particularly on the flood tide which is felt a considerable distance off-shore, no previous set having been evident notwithstanding."

South Pacific Ocean (Eastern Portion).
Seasonal Mean Set and Drift (in miles per day).

Region.	November to January.		February to April.		May to July.		August to October.	
	Mean Set and Drift.	Number of Observations.	Mean Set and Drift.	Number of Observations.	Mean Set and Drift.	Number of Observations.	Mean Set and Drift.	Number of Observations.
1. South Equatorial Current, Latitude 2° S. to 2° N., Longitude 84° W. to 108° W.	N. 82° W. 12	385	S. 87° W. 13	502	N. 72° W. 10	388	N. 83° W. 18	388
2. South Equatorial Current, Latitude 6° S. to 2° S., Longitude 84° W. to 108° W.	S. 86° W. 13	446	S. 71° W. 10	487	S. 81° W. 13	416	S. 85° W. 15	373
3. South Equatorial Current, Latitude 6° S. to 0°, Longitude 108° W. to 124° W.	S. 81° W. 12	96	S. 80° W. 15	93	S. 73° W. 15	83	S. 81° W. 19	145
4. Latitude 18° S. to 6° S., Longitude 96° W. to 108° W.	S. 80° W. 6	773	S. 76° W. 6	926	W. 6	748	S. 84° W. 6	598
5. Latitude 18° S. to 6° S., Longitude 108° W. to 120° W.	S. 71° W. 5	426	S. 84° W. 6	491	S. 87° W. 5.5	457	S. 78° W. 6	403
6. Latitude 26° S. to 18° S., Longitude 104° W. to 124° W. ...	S. 59° W. 3	579	S. 69° W. 3	694	N. 76° W. 2	510	S. 72° W. 3	438
7. Counter-Equatorial Current, Latitude 6° N. to 8° N., Longitude 84° W. to 92° W.	N. 66° E. 12	13	S. 89° E. 7	17	N. 71° E. 4.5	15	N. 73° E. 15	13
8. Counter-Equatorial Current, Latitude 4° N. to 6° N., Longitude 84° W. to 92° W.	N. 2° W. 1	43	N. 77° W. 7	48	E. 8	36	N. 88° E. 8	46
9. Peru Current, South American Coast, Latitude 42° S. to 20° S....	N. 5° W. 5	34	N. 12° W. 7	28	N. 15° W. 6	18	N. 8° E. 8	9
10. Peru Current, South American Coast, Latitude 20° S. to 2° S. ...	N. 42° W. 5	110	N. 40° W. 6	75	N. 57° W. 7	66	N. 38° W. 6	73
11. Latitude 2° S. to 2° N., Longitude 84° W. to South American Coast.	N. 73° W. 2	42	N. 76° W. 5	60	S. 63° W. 1	48	S. 5° E. 4	43
12. Region of Panama, Latitude 4° N. to 8° N., Longitude 84° W. to South American Coast.	S. 37° W. 9	327	S. 50° W. 14	403	S. 41° E. 1	269	S. 31° E. 4	277

SOUTHERN ICE REPORTS.
During the year 1936.
October.

Year.	Day.	Position of Ice. Latitude.	Position of Ice. Longitude.	Description.	Remarks.	Name of Ship reporting.
1936	3	54° 21′ S.	11° 22′ W.	Growler and large irregular berg	... ...	R.R.S. *Discovery II.*
		54° 40′ S.	12° 04′ W.	Growler	... ...	do.
	4	54° 56′ S.	12° 41′ W.	Large tabular berg	... ...	do.
		55° 25′ S.	13° 28′ W.	Large tabular berg	... ...	do.
	5	55° 43′ S.	14° 44′ W.	Pack ice, numerous growlers and bergs ...	... ...	do.
		55° 49′ S.	14° 49′ W.	2 large tabular bergs and a small irregular berg.	... ...	do.
	10	54° 50′ S.	27° 53′ W.	Small berg	... ...	do.
		55° 15′ S.	28° 37′ W.	2 growlers	... ...	do.
		55° 25′ S.	28° 55′ W.	3 small tabular bergs	... ...	do.
	11	56° 17′ S.	29° 28′ W.	Large tabular berg	... ...	do.
		57° 15′ S.	29° 34′ W.	Small irregular berg	... ...	do.
	12	57° 51′ S.	29° 57′ W.	3 medium irregular and 2 tabular bergs ...	... ...	do.
	9	49° 54′ S.	74° 22′ W.	Heavy pack ice	... ...	S.S. *Emergency Aid.*

November.

	9	58° 54′ S.	42° 36′ W.	2 tabular bergs	Approximately 3 miles to east	R.R.S. *Discovery II.*
		From 58° 54′ S.	42° 36′ W.	} Numerous growlers	Within 2 miles of track	do.
		To 59° 31′ S.	42° 42′ W.			
		59° 40′ S.	42° 40′ W.	2 irregular bergs	2 miles west of ship	do.
		59° 50′ S.	42° 39′ W.	6 irregular medium sized bergs	Within 4 miles of ship	do.
		60° 10′ S.	42° 38′ W.	7 irregular medium sized bergs	Within 3 miles of ship	do.
		58° 45′ S.	42° 34′ W.	Loose drift ice	... ...	do.
	9	60° 29′ S.	42° 37′ W.	6 medium sized irregular bergs	Within 1 mile	do.
		61° 05′ S.	42° 41′ W.	2 tabular bergs, moderate size, and numerous medium sized irregular bergs and growlers, in close vicinity.	... ...	do.
	10	From 61° 06′ S.	42° 51′ W.	} Drift ice, pack ice and bergs	{ Arrived at edge of pack ice after passing through occasional streams of drift ice. During this time pack ice was visible to the south and trended S.W. 4 large tabular bergs within 3 miles of course and many irregular bergs—well weathered and broken.	do.
	11	To 62° 09′ S.	45° 45′ W.			
	11	62° 22′ S.	46° 27′ W.	Pack ice, drift ice and bergs	An edge of pack ice with 15 irregular bergs in sight in the pack ice. 4 medium sized tabular bergs within 3 miles. On the 11 and 12th vessel passed through occasional streams of loose drift ice—composed of floes much worn. Two small growlers about 100 feet long floating with 40 feet above water were of a bottle green colour whilst occasional bergy bits of a similar colour were also encountered. The bergy bits are extremely difficult to see even in daylight as they assume the same appearance as the water which surrounds them.	do.

Year.	Day.	Position of Ice. Latitude.	Position of Ice. Longitude.	Description.	Remarks.	Name of Ship reporting.
1936	11	62° 39′ S.	47° 28′ W.	7 bergs, irregular medium size—occasional streams of loose pack.		
		62° 36′ S.	47° 54′ W.	5 bergs tabular, 4 irregular. Many growlers	Pack ice visible to south	R.R.S. *Discovery II.*
		62° 35′ S.	49° 32′ W.	10 irregular bergs, and many growlers ...		
	12	63° 25′ S. To 63° 32′ S.	51° 23′ W. 53° 59′ W.	Pack ice and bergs	Vessel skirting edge of pack ice with numerous bergs and growlers in sight. The maximum S'ly latitude reached before vessel was stopped at the edge of impenetrable pack ice was 64° 03 .7′S. in 53° 04 .7′ W.	do.
		63° 32′ S.	53° 59′ W.	Bergs	The bergs here were very numerous and most of them were aground—all tabular bergs—they ran in a N. & S. direction along the shelf adjoining east coast of Grahamsland and presented an appearance similar to an interrupted barrier face. Darwin Island and two other small islets were ice free and if a beach or foreshore exists landing would have been possible. No such beach was visible in the distance. The shores of the island appeared steep and difficult of access.	do.
	12	From 63° 32′ S. To 62° 56′ S.	53° 59′ W. 53° 59′ W.	27 bergs, medium sized irregular and 15 tabular bergs large sized. Many heavy floes and growlers. Within 5 miles of track and occasional streams of loose pack ice.	... ...	do.
	13	61° 21′ S.	54° 04′ W.	1 small berg, aground off C. Bowles, Clarence Is. 2 medium sized tabular bergs 4 miles East.	... ...	do.

December.

	4	52° 42′ S.	11° 48′ E.	16 growlers	Very small growlers and a few patches of brash	R.R.S. *William Scoresby.*
		52° 52′ S.	11° 41′ E.	2 bergs	Tabular, distant and partly obscured by mist	do.
		53° 05′ S.	11° 45′ E.	2 bergs	Very small irregular. A few small growlers	do.
	5	54° 22′ S.	11° 45′ E.	5 bergs, 1 bergy bit	3 low tubulars. 1 small and 2 medium, several growlers ...	do.
		54° 47′ S.	11° 41′ E.	1 berg, 3 bergy bits	1 small pinnacle berg. 4 very small growlers...	do.
		54° 56′ S.	11° 40′ E.	6 bergs, 2 bergy bits	2 tabulars and 4 irregular bergs. (One typical glacier berg and one half capsized.)	do.
		55° 12′ S.	11° 23′ E.	8 bergs, growlers	4 small tabulars. 4 small irregulars or broken down tabulars. Many growlers.	do.
		55° 42′ S.	11° 23′ E.	6 bergs, 7 large growlers	4 small tabulars. 2 small weathered bergs	do.
	6	56° 02′ S.	11° 23′ E.	6 bergs	3 tabulars and 3 indistinct in darkness...	do.
		56° 58′ S.	12° 22′ E.	23 bergs, bergy bits, growlers, etc. Visibility very good.	5 tabulars (2 medium, others small or broken down). Remainder of bergs small and irregular, or low and sea worn. In 56° 53′ S. passed the end of a stream of loose pack running N. & S., about 4 miles to westward. Numerous growlers.	do.
		56° 53′ S.	12° 07′ E.	8 bergs, growlers	4 tabulars, and 4 small weathered bergs. Scattered drift ice.	do.
		56° 56′ S.	12° 07′ E.	4 bergs, pack ice	Skirting edge of loose pack running E. & W. about 3 miles in extent. Later followed edge of more pack for 16 miles eastward. Four bergs in pack. 2 tabulars and 2 irregulars. 1 irregular very high.	do.
		56° 57′ S.	13° 09′ E.	Bergs	1 tabular, 7 small irregular bergs	do.
		56° 42′ S.	14° 16′ E.	Bergs, bergy bits, growlers and drift. ...	6 small broken down tabular and 28 small irregulars. Area of loose pack visible about 4 miles to southward in 56° 57′ S., 13° 49′ E.	do.
	6	56° 30′ S.	14° 39′ E.	Bergs	3 small tabular, 7 irregular weathered bergs	do.
	7	56° 39′ S.	15° 27′ E.	Bergs and pack ice	1 medium tabular, 5 small irregulars. Visibility very poor. Position given is 1 mile inside northern edge of loose pack extending E. to W. Pack composed of small light floes and much brash.	do.
		56° 50′ S.	15° 23′ E.	Bergs, growlers, and bergy bits	1 tabular, 3 irregular. Vessel in area of clear water surrounded by pack ice.	do.
	8	56° 44′ S.	15° 50′ E.	Pack ice and drift	In open lead with pack ice to northward. Pack as above ...	do.
		56° 26′ S.	16° 24′ E.	Bergs, growlers	3 old, small weather-worn bergs and a few growlers	do.
		56° 03′ S.	16° 56′ E.	Bergs and growlers	2 small tabulars, 1 broken down tabular, 1 cambered berg and 1 small irregular.	do.
		55° 57′ S.	17° 12′ E.	Bergs and bergy bits	4 small irregular bergs. Visibility poor	do.
		55° 51′ S.	17° 19′ E.	Bergs	1 medium	do.
	9	55° 50′ S.	17° 21′ E.	Bergs	2 small pinnacle bergs	do.
		55° 36′ S.	17° 45′ E.	Bergs, growlers and bergy bits	4 small and old tabulars. 5 small, irregular, and sea-worn bergs. 1 bergy bit. Several growlers.	do.
		55° 11′ S.	18° 27′ E.	Bergs, growlers	1 large tabular, 1 small tabular, 1 small cambered, 1 small pinnacle. 4 or 5 growlers around bergs.	do.
	10	54° 51′ S.	19° 35′ E.	Bergs	2 small bergs, and 1 small half capsized berg, all small and irregular.	do.
		54° 48′ S.	19° 34′ E.	Bergs	3 small bergs, low and sea worn	do.
	11	54° 12′ S.	21° 16′ E.	Bergs	1 small berg, low and sea worn. Visibility poor	do.
		54° 12′ S.	21° 06′ E.	Bergs	2 small bergs, much weathered...	do.
		54° 54′ S.	21° 23′ E.	Bergs, bergy bits, growlers, brash	1 small high tabular. 1 small low sea worn berg. Brash and growlers about 1 mile to leeward.	do.
	12	55° 32′ S.	24° 15′ E.	Bergs, bergy bits	4 small old tabulars. 1 bergy bit (old) showing bottle-green ice.	do.
		55° 30′ S.	22° 31′ E.	Bergs	1 small tabular. 6 worn and irregular	do.
		55° 39′ S.	23° 44′ E.	Bergs	5 small bergs. Old and worn, 2 breaking up	do.
		55° 48′ S.	23° 48′ E.	Bergs, pack, drift	7 small, irregular, bergs. Edge of loose pack lies 2 miles to southward of position given. It extends E. by N. to W. by S. (true), with areas of loose drift and brash about 1 mile north of its northern edge.	do.
		55° 23′ S.	24° 32′ E.	Bergs, bergy bits, growlers	1 small tabular. 4 small irregular and worn bergs. 2 bergy bits, a few growlers.	do.
	13	54° 23′ S.	24° 33′ E.	Bergs	3 small tabular. 3 small and irregular	do.
		55° 03′ S.	25° 00′ E.	Bergs	1 very small, old, and sea worn. 5 tall old tabular bergs (small).	do.
		54° 54′ S.	25° 06′ E.	Bergs	1 small tabular. 5 broken-down and worn bergs	do.
		54° 48′ S.	24° 43′ E.	Bergs	1 medium tabular, with much hummocked top	do.
	14	55° 02′ S.	24° 57′ E.	Bergs	1 medium broken-down tabular, with 2 small parts attached by under-water shelf. 2 small, old, tabulars.	do.
		55° 02′ S.	26° 17′ E.	Bergs, bergy bit	3 small and sea-worn bergs. 1 pinnacle berg. 4 small tabulars. 1 half-capsized tabular. 1 bergy bit.	do.
		54° 56′ S.	26° 44′ E.	Bergs	2 tabulars. 2 broken-down tabulars. 2 irregular bergs ...	do.
	15	54° 55′ S.	27° 12′ E.	Bergs, bergy bit	2 small tabulars. 2 small irregular and worn. 1 pinnacle. 1 bergy bit.	do.
		54° 58′ S.	26° 50′ E.	Bergs, bergy bit	1 small tabular, low. 5 small and broken-down tabulars. 1 bergy bit.	do.
		54° 44′ S.	26° 48′ E.	Bergs, bergy bits	2 small tabulars, 2 small, old and worn, bergs. 2 bergy bits	do.
		54° 28′ S.	26° 58′ E.	Bergs	5 small old and worn bergs	do.
		54° 15′ S.	29° 19′ E.	Bergs	2 small old and worn bergs	do.
	16	54° 14′ S.	27° 29′ E.	Bergs	1 small, typical, tabular. 1 small old and broken-down berg	do.
		54° 10′ S.	27° 48′ E.	Bergs, growler	2 small irregular bergs. 1 growler	do.
		54° 00′ S.	28° 19′ E.	1 small growler	... ...	do.
		53° 45′ S.	28° 37′ E.	1 berg	Small and irregular	do.
	17	53° 34′ S.	29° 00′ E.	1 berg	Small tabular. Distant to S.E.	do.
		53° 57′ S.	29° 12′ E.	4 bergs, bergy bits	1 tabular and 3 pinnacle bergs	do.
		54° 09′ S.	29° 40′ E.	4 bergs, bergy bits	2 small tabulars. 2 small irregular bergs. 2 bergy bits ...	do.

Year.	Day.	Position of Ice. Latitude.	Position of Ice. Longitude.	Description.	Remarks.	Name of Ship reporting.
1936	18	54° 21′ S.	30° 03′ E.	Berg	1 small and irregular to N.E.	R.R.S. *William Scoresby.*
		54° 36′ S.	30° 08′ E.	Berg	1 small and irregular indistinct in mist	do.
		54° 50½′ S.	30° 11½′ E.	Berg	1 small and worn	do.
	19	54° 59′ S.	30° 17′ E.	Berg	1 medium tabular	do.
		55° 10′ S.	30° 00′ E.	Bergs, bergy bit	1 broken-down tabular. 2 low and sea worn. 1 irregular. 1 bergy bit.	do.
		55° 12′ S.	29° 47′ E.	Bergs	4 small, old and worn	do.
		55° 03′ S.	30° 04′ E.	Bergs, bergy bit, and growlers	1 small tabular. 3 small, old and worn. 2 growlers. 1 bergy bit.	do.
		55° 12′ S.	30° 18′ E.	Berg, bergy bit and growlers	1 small old, and listed tabular. 1 bergy bit. Growlers	do.
		55° 29′ S.	30° 47′ E.	Bergs, brash	1 medium tabular. 1 worn and irregular berg. A little brash ice. 1 growler.	do.
	20	55° 49′ S.	31° 18′ E.	Berg, bergy bits	1 small pinnacle berg, indistinct in darkness. 3 bergy bits	do.
		56° 07′ S.	31° 51′ E.	Bergs, growlers	2 very small irregular bergs, several small growlers near them	do.
		56° 23′ S.	32° 52′ E.	Bergs	3 small old and worn	do.
		56° 44′ S.	33° 04′ E.	Bergs	1 berg and 1 growler. Indistinct, very poor visibility	do.
		57° 04′ S.	33° 04′ E.	Growlers	Several growlers. Very poor visibility	do.
	21	57° 33′ S.	32° 55′ E.	Bergs	2 small bergs. Poor visibility	do.
		57° 57′ S.	32° 58′ E.	Drift ice	Encountered northern edge of extensive area of very scattered drift ice, mainly small pieces of rotten floes. Ice blink to westward.	do.
		57° 39′ S.	33° 43′ E.	Drift ice, bergs and bergy bits	4 small bergs. 3 bergy bits. Some occasional drift ice	do.
		57° 24′ S.	33° 37′ E.	Brash, growlers	Much brash and growlers (small), in patches	do.
		57° 47′ S.	33° 54′ E.	Brash, drift ice	Loose streams of drift ice and brash	do.
		58° 08′ S.	34° 16′ E.	Bergs, growlers	1 broken down tabular. 2 worn and irregular bergs. 4 growlers.	do.
	22	58° 40′ S.	34° 40′ E.	Bergs, growlers and brash	3 small irregular bergs. 2 growlers. 1 patch of brash	do.
		59° 15′ S.	35° 08′ E.	Berg	1 pinnacle berg, very small	do.
		59° 11′ S.	35° 22′ E.	Bergs	1 large tabular. 2 small and worn bergs	do.
		59° 50′ S.	34° 58′ E.	Bergs, bergy bits	1 small pinnacle berg. 2 worn and irregular bergs. 3 bergy bits.	do.
		60° 29′ S.	35° 17′ E.	Bergy bits, bergs	4 low, small, and sea-worn bergs. Some growlers. 2 bergy bits.	do.
	23	59° 16′ S.	36° 36′ E.	Bergs	2 small pinnacle bergs	do.
		58° 58′ S.	37° 13′ E.	Bergs, bergy bits	1 small irregular berg. 3 bergy bits	do.
		58° 48′ S.	37° 22′ E.	Bergs	2 small irregular bergs	do.
	24	60° 10′ S.	38° 03′ E.	Bergs, brash, growlers	1 small irregular berg. 1 large growler. Some brash ice. Very poor visibility.	do.
		60° 38′ S.	38° 03′ E.	Bergs, growlers	1 small tabular. Several growlers	do.
	25	61° 32′ S.	38° 03′ E.	Bergs, growlers	1 small old, worn berg. 3 small growlers	do.
		61° 38′ S.	38° 01′ E.	Berg	1 small old, worn berg	do.
	26	62° 29′ S.	37° 46′ E.	Drift ice	Much scattered drift ice, and loose streams of pack in neighbourhood, and to southward.	do.
		62° 05′ S.	37° 37′ E.	Drift ice	Much scattered drift, 1 small, irregular berg	do.
		61° 26′ S.	39° 41′ E.	Berg	1 small berg	do.
		61° 13′ S.	40° 05′ E.	Growlers	3 growlers	do.
	27	61° 07′ S.	40° 19′ E.	Bergs	2 bergs on horizon	do.
		60° 42′ S.	41° 01′ E.	Bergs, growlers, and bergy bits	1 small broken-down tabular. 6 small and irregular bergs. 1 low and sea-worn bergy bit. 2 growlers.	do.
		60° 14′ S.	41° 50′ E.	Bergs, growlers and bergy, bits	1 medium irregular berg. 2 small, weathered bergs. 1 bergy bit. Several growlers. Some brash.	do.
		59° 53′ S.	42° 39′ E.	Bergs, drift ice	1 medium irregular, 5 small irregular bergs. A little brash and drift ice to S.W. in position about 60° 14′ S. and 41° 50′ E.	do.
	28	59° 35′ S.	43° 17′ E.	Bergs, brash	1 small tabular. 2 small irregular bergs. A little brash	do.
		59° 24′ S.	43° 47′ E.	Bergs, bergy bit	1 small tabular. 4 small irregular bergs. 1 low sea-worn berg. 1 bergy bit.	do.
		59° 22′ S.	43° 52′ E.	Bergs	1 medium (capsized). 4 small and irregular. 1 medium irregular, much hummocked.	do.
		59° 00′ S.	44° 30′ E.	Bergs, growlers	1 low sea-worn berg. 2 small and irregular bergs. Several small growlers.	do.
	29	58° 56′ S.	45° 22′ E.	Bergs, bergy bit	4 small and irregular. 1 broken down tabular (330 feet high). Height measured by finding distance off (by 4 point bearing), and vertical angle (by sextant). 1 bergy bit.	do.
		59° 20′ S.	45° 27′ E.	Bergs	2 small sea-worn bergs	do.
		59° 23′ S.	47° 18′ E.	Bergs	3 small sea-worn bergs	do.
	30	59° 23′ S.	47° 48′ E.	4 bergs, brash, and drift ice	2 worn and irregular bergs. 2 small tabulars. Much brash and drift ice to leeward of one of the above tabulars and also a large bergy bit, apparently recently carved from same berg.	do.
		59° 23′ S.	48° 33′ E.	4 bergs, 1 bergy bit	1 small broken-down tabular. 3 small irregular bergs	do.
		59° 23′ S.	49° 47′ E.	3 bergs	3 small old and worn bergs	do.
		59° 17′ S.	50° 51′ E.	3 bergs	3 small old and worn bergs. 1 small tabular	do.
		59° 27′ S.	51° 59′ E.	3 bergs, growlers	1 small old and worn berg, 1 small irregular, 1 broken-down tabular, and a few growlers	do.
	31	59° 40′ S.	53° 37′ E.	Bergs, bergy bit, and growlers	2 small irregular bergs. 1 pinnacle. 1 small tabular. 2 growlers. 1 bergy bit.	do.
		59° 49′ S.	53° 59′ E.	Bergs, bergy bits, and growlers	6 small, irregular, sea-worn bergs. Bergy bits. Growlers	do.
		59° 45′ S.	54° 37′ E.	Bergs	3 small, irregular, sea-worn bergs	do.
		59° 55′ S.	55° 16′ E.	Bergs, growlers, and bergy bit	4 small, irregular, sea-worn bergs. 3 growlers and 1 bergy bit	do.
		59° 55′ S.	55° 54′ E.	Bergs, growlers, and bergy bit	1 bergy bit. 6 small irregular or broken-down tabulars. some growlers.	do.
		59° 52′ S.	56° 31′ E.	Bergs, growler	3 small, irregular bergs. 1 growler	do.
		54° 47′ S.	35° 18′ W.	5 small irregular bergs	Within 5 miles	R.R.S. *Discovery II.*
		55° 01′ S.	36° 00′ W.	15 small irregular bergs	Within 5 miles	do.
		From 55° 53′ S. To 56° 03′ S.	From 38° 05′ W. To 38° 35′ W.	3 small irregular bergs	Within 5 miles	do.

Reports of Ice previous to October, November, and December, 1936, will be found in the " Marine Observer," Volume XIII, No. 124, p. 140.

WIRELESS WEATHER SIGNALS.

I.—SHIPS' WIRELESS WEATHER SIGNALS.

A full description of the world-wide system of voluntary "Selected Ships" routine weather reports with instructions was given on pp. 36-47 of the January number of this volume of THE MARINE OBSERVER.

The list which follows contains the latest information of stations to which "A Selected Ships" should report in accordance with those instructions, and stations detailed to intercept or receive reports from "B Selected Ships" also in accordance with those instructions.

To decode these reports, and for information of the system of communication of "Selected Ships," all concerned are referred to the PAMPHLET, M.O. 329, concerning which special notice to the masters of British ships will be found on p. 39, paragraphs (27) and (34) of the January 1937 number of THE MARINE OBSERVER.

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 36 OF VOL. XIV, NO. 125, JANUARY, 1937.

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.
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.
	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.	Signals 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 address their 0000 and 1200 G.M.T. observations to Signals Toronto and their 1800 G.M.T. observations to CQ in accordance with schedule.
	Chatham Mass.	Lat. 41° 43′ N. Long. 70° 47′ W.	**WCC.**						
	Amagansett (Montauk).	Lat. 41° 00′ N. Long. 72° 03′ W.	**WSL.**						
	Thomaston.	Lat. 44° 01′ N. Long. 69° 13′ W.	**WAG.**		142·9kc/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.
	Jupiter.	Lat. 26° 42′ N. Long. 80° 02′ W.	**WMR.**						
	Lake Worth.	Lat. 26° 38′ N. Long. 80° 03′ W.	**WOE.**						

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. observation required. All British "A Selected Ships" within area should report, commencing at 0618 G.M.T.
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.	Weather Khartoum.	Weather only. Four universal groups.	All British "A Selected Ships" within area should report in accordance with Schedule. † Alternatively see particulars on p. 161 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.	Weather.	Weather only. No. 9 Supplementary Groups.	See Section (35), p. 40 January 1937 number.
	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.	Weather.	Weather only. 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 1500 miles.	Weather.	Weather only. No. 6 Supplementary Groups preferred.	All British "A Selected Ships" within area should report in accordance with Schedule.
	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.	All British "A Selected Ships" within area should report 0600 G.M.T. observations.
	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.	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. 38, of the January 1937 number.
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. 162 and use wave length 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.	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. 38, of the January 1937 number.

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

In cases where routine weather reports made to CQ might not be received by the appropriate station within range, indicated in this list, they should be made to that station by call sign, but so that they may be readily intercepted by all ships. 600 m. is used throughout.

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteoro-logical 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° 5′ 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. 40, January, 1937, number as amended by June, 1937, Supplement.
	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. 40, January, 1937, number as amended by June 1937 Supplement.
	St. John's N.F.	Lat. 47° 34′ 09″ N. Long. 52° 41′ 04″W.	**VON**	Signals Toronto.	Weather only, optional No. 3 Supplementary Groups.	
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° 46′ 30″ S. Long. 35° 16′ 20″ W.	**PXN**			
	Olinda.	Lat. 8° 00′ 55″ S. Long. 34° 50′ 40″ W.	**PPO**			
	Amaralina.	Lat. 13° 00′ 50″ S. Long. 38° 28′ 27″ W.	**PPA**			
	Abrolhos.	Lat. 17° 57′ 35″ S. Long. 38° 42′ 00″ W.	**PXH**			

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

(Continued.)

In cases where routine weather reports made to CQ might not be received by the appropriate station within range, indicated in this list, they should be made to that station by call sign, but so that they may be readily intercepted by all ships. 600 m. is used throughout.

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.*
South Atlantic (*continued*).	Victoria.	Lat. 20° 18′ 52″ S. Long. 40° 19′ 06″ W.	PPT	Meteoro Rio.	Weather only, including supplementary groups.	
	Rio.	Lat. 22° 59′ 19″ S. Long. 43° 11′ 26″ W.	PPR			
	Santos.	Lat. 23° 59′ 22″ S. Long. 46° 18′ 18″ W.	PPS			
	Floriano-polis.	Lat. 27° 35′ 22″ S. Long. 48° 34′ 17″ W.	PPF			
	Juncçao.	Lat. 32° 03′ 22″ S. Long. 52° 08′ 13″ W.	PPJ			
Red Sea and Indian Ocean.	Port Sudan	Lat. 19° 36′ 35″ N. Long. 37° 13′ 28″ E.	STP	Weather Khartoum.	Weather only, four universal groups.	
Persian Gulf	Basra.	Lat. 30° 32′ 39″ N. Long. 47° 47′ 04″ E.	YIB	Meteor. Basrah.	Weather only, four universal groups.	
Indian Ocean.	Jacobs (Durban).	Lat. 29° 55′ 40″ S. Long. 30° 58′ 50″ E.	ZSD	Met.	Weather only, 4 universal groups and first group of No. 6 Supplementary Groups.	
	Algoa Bay (Port Elizabeth).	Lat. 33° 57′ 16″ S. Long. 25° 35′ 30″ E.	ZSQ	Met.	Weather only, 4 universal groups and first group of No. 6 Supplementary Groups.	
	Calcutta.	Lat. 22° 33′ 31″ N. Long. 88° 20′ 16″ E.	VWC	Weather.	Weather only, preferably No. 9 Supplementary Groups.	
	Rangoon.	Lat. 16° 45′ 57″ N. Long. 96° 11′ 51″ E.	VTR	Weather.	Weather only, preferably No. 9 Supplementary Groups.	
	Madras.	Lat. 12° 59′ 17″ N. Long. 80° 10′ 56″ E.	VWM	Weather.	Weather only, preferably No. 9 Supplementary Groups.	
	Bombay.	Lat. 19° 04′ 55″ N. Long. 72° 49′ 54″ E.	VWB	Weather.	Weather only, preferably No. 9 Supplementary Groups.	See Section (35), p. 40, January 1937 number.
	Karachi.	Lat. 24° 51′ 05″ N. Long. 67° 02′ 32″ E.	VWK	Weather.	Weather only, preferably No. 9 Supplementary Groups.	See Section (35), p. 40, January 1937 number.
	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.	Weather only, preferably No. 9 Supplementary Groups.	When east of Long. 90° E., but not within 100 miles of the coast.
	Esperance.	Lat. 33° 52′ 40″ S. Long.121° 53′ 34″ E.	VIE	Weather.	Weather only, preferably No. 9 Supplementary Groups.	When east of Long. 90° E., but not within 100 miles of the coast.
Indian Ocean and China Sea.	Penaga (Penang).	Lat. 5° 32′ 02″ N. Long. 100° 22′ 51″E.	VPX	Obs. Weather Singapore.	Weather only, preferably No. 9 Supplementary Groups.	
	Paya Lebar (Singapore).	Lat. 1° 20′ 26″ N. Long. 103° 53′ 20″E.	VPW			

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

(Continued.)

In cases where routine weather reports made to CQ might not be received by the appropriate station within range, indicated in this list, they should be made to that station by call sign, but so that they may be readily intercepted by all ships. 600 m. is used throughout.

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteoro-logical Centre desiring information.	Information desired.	Notes.
Column No. 1.	*No. 2.*	*No. 3.*	*No. 4.*	*No. 5.*	*No. 6.*	*No. 7.*
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.	Lat. 36° 50′ 37″ S. Long. 174° 46′ 08″ E.	**ZLD**	Weather Wellington.	Weather only, preferably No. 9 Supplementary Groups.	
	Wellington.	Lat. 41° 16′ 26″ S. Long. 174° 45′ 55″ E.	**ZLW**	Weather Wellington.	Weather only, preferably No. 9 Supplementary Groups.	
	Awarua.	Lat. 46° 30′ 47″ S. Long. 168° 22′ 24″ E.	**ZLB**	Weather Wellington.	Weather only, preferably No. 9 Supplementary Groups.	
	Chatham Island.	Lat. 43° 57′ 28″ S. Long. 176° 34′ 25″ W.	**ZLC**	Weather Wellington.	Weather only, preferably No. 9 Supplementary Groups.	
	Rarotonga.	Lat. 21° 11′ 52″ S. Long. 159° 48′ 52″ W.	**ZKR**	Weather Wellington.	Weather only, preferably No. 9 Supplementary Groups.	
	Apia.	Lat. 13° 50′ 17″ S. Long. 171° 49′ 42″ W.	**ZMA**	Weather Wellington.	Weather only, preferably No. 9 Supplementary Groups.	
	Suva.	Lat. 18° 08′ 43″ S. Long. 178° 27′ 35″ E.	**VRP**	Weather Suva.	Weather in four universal groups, optional supplementary groups.	See Section (35), p. 40, January, 1937, number as amended by May, 1937, Supplement.
	Thursday I.	Lat. 10° 35′ 14″ S. Long. 142° 12′ 43″ E.	**VII**	Weather.	Weather only, preferably No. 9 Supplementary Groups	When west of Long. 160° E., but not within 100 miles of the coast.
	Townsville.	Lat. 19° 16′ 09″ S. Long. 146° 49′ 47″ E.	**VIT**	Weather.	Weather only, preferably No. 9 Supplementary Groups.	
	Brisbane.	Lat. 27° 25′ 34″ S. Long. 153° 07′ 19″ E.	**VIB**	Weather.	Weather only, preferably No. 9 Supplementary Groups.	
	Melbourne.	Lat. 37° 46′ 56″ S. Long. 144° 52′ 09″ E.	**VIM**	Weather.	Weather only, preferably No. 9 Supplementary Groups.	When between Long. 90° E. and 160° E., but not within 100 miles of the coast.
	Adelaide.	Lat. 34° 51′ 14″ S. Long. 138° 31′ 55″ E.	**VIA**	Weather.	Weather only, preferably No. 9 Supplementary Groups.	

CHILE.

II.—Weather Shipping Bulletins.

Santiago Central W/T Station, approximate position Latitude 33° 27′ S., Longitude 70° 42′ W.

Call sign **C C S.**

Wavelengths 3,000 metres and 25 metres C.W.

Times of transmission 0130, 1400 and 2000 G.M.T.

The messages are based upon observations taken at 2300, 1200 and 1800 G.M.T. respectively.

They consist of three parts :—

Part I.—General statement of weather conditions *en clair* (Spanish).

Part II.—Weather Report in code giving actual observations at stations shown on the chart on this page.

Part III.—Forecast of weather in plain language.

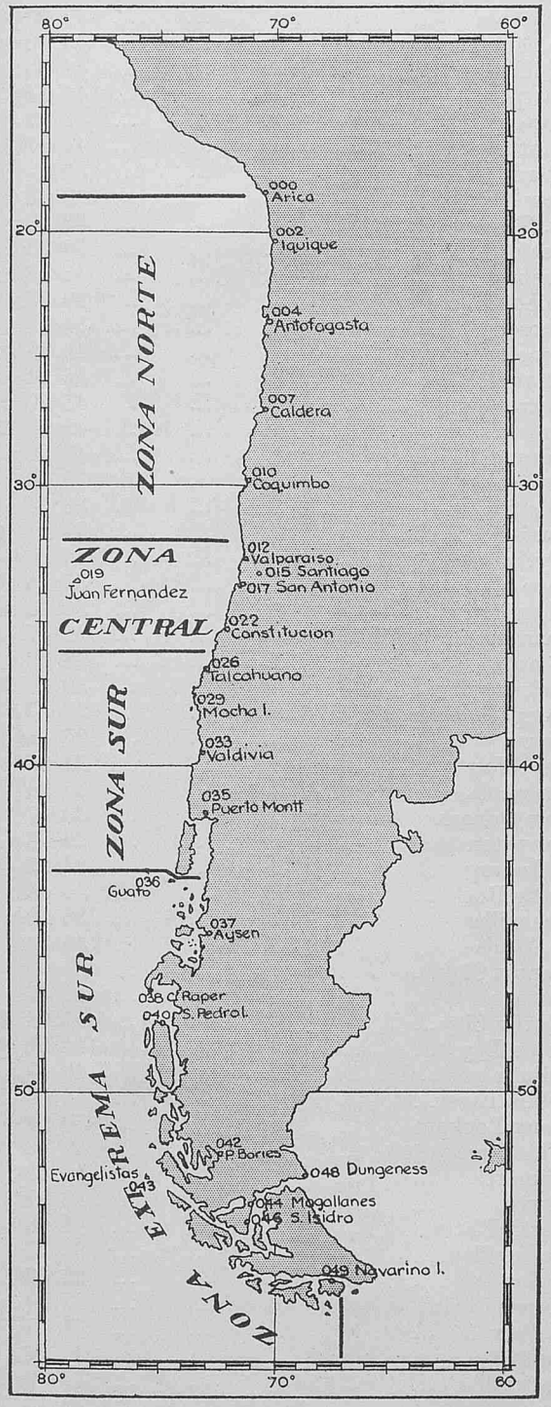
The stations are sent in sets of five, the distinguishing figures of the stations, which are shown alongside each station, on the chart, forming the initial groups of each set of five stations.

The station reports are made in the International Ships Wireless Weather Telegraphy Code.

To decode these reports the tables given in the Decode M.O. 329 are required. The Key letters are fully described on p. 44 of the January, 1937, number and in M.O. 329.

Key letters used for station reports—DDFww PPVTT.

Chart showing Stations for Weather Shipping Bulletin for coast of Chile.



The sea areas for forecasts are indicated on the chart from information supplied by a British Selected Ship.

Wireless Storm Warnings.

Valparaiso W/T Station, approximate position Latitude 33° 01′ S. Longitude 71° 39′ W., call sign **C C E,** broadcasts storm warnings when necessary, on a wavelength of 600 metres (I.C.W.).

III.—Wireless Time Signals.

W/T Station.	Call Sign.	Wavelength (Metres).	G.M.T. of Time Signal.
			h m s h m s
Valparaiso Lat. 32° 59′ 50″ S. Long. 71° 33′ 40″ W.	**C C L**	2,150 (C.W.)	00 55 00–01 00 00

SYSTEM.—The Time Signal commences at 00h. 55m. 00s. G.M.T. and continues for 5 mins., and consists of a series of dots which represent each second, except that the dots at the 29th, 51st, 52nd, 53rd, 54th, 55th, 56th, 57th, 58th and 59th seconds of each of the five minutes are omitted. The dot at the 60th second of each minute is the time signal.

NOTES.—

Time Signal controlled by the Hydrographic Office.

In the event of failure or irregularities in the Time Signal the word "Señal nula" (Signal annulled) will be made three times in succession, one minute after 0100 G.M.T.

ARGENTINA.

II.—Wireless Weather Bulletins.

The following W/T Stations broadcast a weather forecast, for 24 hours, for the coast of Argentina *en clair* in Spanish.

W/T Station.	Position.		Call Sign.	Time of transmission.	Wavelength.
	Latitude.	Longitude.			
Comodoro Rivadavia.	45° 51′ S.	67° 28′ W.	**LOX**	G.M.T 2000	600 metres C.W.
Buenos Aires —Darsena Norte.	34° 36′ S.	58° 22′ W.	**LOL**	0203	1053 ,, ,,
Buenos Aires —General Pacheco.	34° 28′ S.	58° 38′ W.	**LPD**	1700	600 ,, I.C.W.
Parana ...	31° 44′ S.	60° 27′ W.	**LPE**	1830	600 ,, C.W.
Formosa ...	26° 14′ S.	58° 07′ W.	**LOC**	1530	600 ,, I.C.W.

BRAZIL.

II.—Wireless Weather Bulletins.

The Brazilian W/T coast stations given in the list below transmit, **every four hours,** the state of weather and sea, and force and direction of the wind. The observations are made at the W/T Stations. They are sent in Portuguese *en clair*, on a wavelength of 600 metres.

W/T Station.	Position (approx.).		Call Sign.	Times of Sending. G.M.T.
	Latitude.	Longitude.		
Salinas	0° 37′ S.	47° 23′ W.	**PPL**	0245, 0645, etc., etc.
S. Luiz do Maranhão	2° 31′ S.	44° 17′ W.	**PXM**	0300, 0700, etc., etc.
Fernando de Noronha	3° 51′ S.	32° 26′ W.	**PSO**	0300, 0700, etc., etc.
Natal Norte... ...	5° 47′ S.	35° 16′ W.	**PWN**	0330, 0730, etc., etc.
Olinda (Pernambuco)	8° 01′ S.	34° 51′ W.	**PPO**	0000, 0400, etc., etc.
Amaralina (Bahia) ...	13° 01′ S.	38° 28′ W.	**PPA**	0315, 0715, etc., etc.
Abrolhos	17° 58′ S.	38° 42′ W.	**PWH**	0320, 0720, etc., etc.
Santos	23° 59′ S.	46° 18′ W.	**PPS**	0245, 0645, etc., etc.
Florianopolis ...	27° 35′ S.	48° 34′ W.	**PPF**	0315, 0715, etc., etc.
Juncçaõ (Rio Grande do Sul)	32° 03′ S.	52° 08′ W.	**PPJ**	0345, 0745, etc., etc.

III.—Wireless Time Signals.

W/T Station.	Call Sign.	Wavelength (Metres).	G.M.T. of Time Signal.
Rio de Janeiro— Lat. 22° 59′ 19″ S. Long. 43° 11′ 26″ W.	**PPR**	1,000 (I.C.W.)	h m s 00 00 00 and 14 00 00

The Time Signals are relayed from Rio de Janeiro Observatory in accordance with the New United States system of W/T Time Signals, see figure, p. 166.

In the event of failure, the time signals are transmitted thirty minutes later.

NOTE.—Sent daily except Sundays and public holidays.

UNITED STATES OF AMERICA, ATLANTIC COAST, AND BERMUDA.

II.—Wireless Weather Bulletins.

Washington—Arlington W/T Station, approximate position Latitude 38° 52′ N., Longitude 77° 05′ W., call sign NAA.

Washington—Annapolis W/T Station, approximate position Latitude 38° 59′ N., Longitude 76° 27′ W. Call sign NSS.

Times of Transmission—0300 and 1500 G.M.T.

The messages are based upon observations taken at 0100 and 1300 G.M.T. respectively, with a few exceptions as shown in the list of stations. Ship observations taken at 0000 and 1200 G.M.T.

Wavelengths—2653 m. and 4690 metres C.W. simultaneously.

The bulletins are divided into four parts and begin with the words, "The Marine-Angot Bulletin."

PART I.—Weather reports in code from ships in the North Atlantic.

PART II.—Weather reports in code, giving actual observations at stations shown in the list below.

PART III.—Weather reports in code from ships in the North Pacific.

PART IV.—General summary of weather conditions, forecasts and storm warnings for the areas shown on the chart, p. 165, which commences at 0330 and 1530 G.M.T. respectively.

The station observations are sent in sets of five, the distinguishing letters of the stations forming the initial groups of each eleven groups.

The reports are made in the International Ships Wireless Weather Telegraphy Code, with the exception of Y, for land stations, which is made in a special United States code.

To decode these reports the tables given in the Decode M.O. 329 are required. The Key letters are fully described on p. 44 of the January, 1937, number and in M.O. 329.

Key letters used for { station reports—DDFww PPVTT.
ships' reports—YQLLL IIIGG DDFww PPVTT.

Distinguishing letter.	Name of station.	Latitude north.	Longitude west.
		° ′	° ′
B	Belle Isle	51 55	55 20
G	St. George's (Nfld.)	48 28	58 25
R	St. John's (Nfld.)	47 34	52 42
Y	Clarke City	50 10	66 25
C	Chatham	47 03	65 29
S	Sable Island	43 56	60 00
H	Halifax	44 38	63 35
M	Eastport	44 54	66 59
B	Boston	42 21	71 04
N	Nantucket	41 17	70 06
A	Atlantic City	39 22	74 25
Y	New York	40 43	74 00
Z	St. Georges (Bermuda)	32 18	64 42
H	Horta	38 32	28 29
Q	Quebec	46 48	71 13
M	Chibougamau	49 53	74 23
U	Moosonee	51 14	80 30
D	Doucet	48 17	76 40
T	Ottawa	45 24	75 43
P	Parry Sound	45 20	80 01
B	Buffalo	42 53	78 53
C	Cleveland	41 30	81 42
O	Cincinnati	39 09	84 31
W	Washington	38 54	77 03
N	Norfolk	36 51	76 17
V	Wytheville	36 56	81 05
H	Cape Hatteras	35 15	75 40
Q	Wilmington	34 14	77 57
S	Charleston	32 47	79 56
A	Atlanta	33 39	84 26
J	Jacksonville	30 20	81 39
T	Tampa	27 57	82 27
M	Miami	25 48	80 12
K	Key West	24 33	81 48
P	Pensacola	30 25	87 13
N	New Orleans	29 57	90 04
G	Galveston	29 18	94 50
V	Vicksburg	32 22	90 53
L	Little Rock	34 45	92 16
T	Nashville	36 10	86 47
S	St. Louis	38 38	90 12
K	Kansas City	39 05	94 37
C	Chicago	41 47	87 35
I	Charles City	43 04	92 38
G	Green Bay	44 31	88 00
D	Duluth	46 47	92 06
R	White River	48 35	85 16
L	Sioux Lookout	50 08	91 52
W	Winnipeg	49 55	97 10
B	Bismarck	46 48	100 48
H	Huron	44 21	98 14
N	North Platte	41 08	100 45
K	Dodge City	37 45	100 00
T	Dallas	32 46	96 47
C	Corpus Christi	27 49	97 25
P	El Paso	31 47	106 30
S	Santa Fe	35 41	105 57
F	Flagstaff	35 12	111 37
D	Denver	39 45	105 00
U	Salt Lake City	40 46	111 54
L	Lander	42 50	108 45

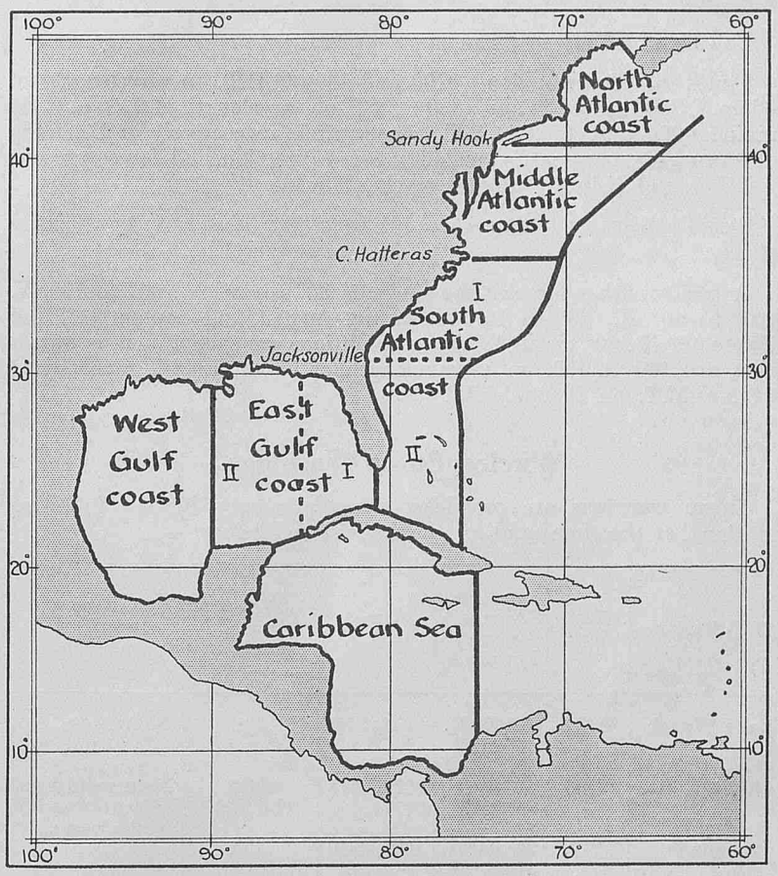
Distinguishing letter.	Name of station.	Latitude north.	Longitude west.
		° ′	° ′
R	Rapid City	44 04	103 12
M	Miles City	46 25	105 49
H	Helena	46 34	112 04
T	Tatoosh	48 23	124 44
O	Roseburg	43 13	123 20
B	Boise	43 37	116 13
N	Tonopah	38 09	117 11
S	San Francisco	37 48	122 26
	San Diego	32 43	117 10
H	Honolulu	21 19	157 52
M	Midway (*a*)	28 12	177 22
K	Ketchikan	55 20	131 37
J	Juneau	58 18	134 24
	Cordova	60 32	145 42
F	Fairbanks	64 51	147 39
N	Nome	64 30	165 24
B	Barrow	71 21	156 30
A	Atka	52 10	174 12
P	St. Paul	57 15	170 10
Y	Aklavik	68 14	134 50
M	Coppermine	67 50	115 45
S	Ft. Simpson	61 52	121 35
F	Ft. Smith	60 00	111 56
W	Fairview	56 04	118 23
K	Kamloops	50 41	120 29
D	Edmonton	53 33	113 30
H	Medicine Hat	50 01	110 37
P	Prince Albert	53 10	105 38
G	God's Lake	54 50	94 50
C	Churchill	58 51	94 11
I	Chesterfield Inlet	63 16	91 46
N	Nottingham Island (*b*)	63 20	78 00
A	Hopes Advance	61 02	69 30
R	Resolution Island	61 18	64 53
W	Cartwright	53 30	57 30
J	Julianehaab	60 43	46 03
G	Godthaab	64 10	51 45
K	Godhavn	69 14	53 45
M	Angmagsalik	65 36	37 34
S	Coco Solo	9 22	79 53
B	*Belize (*e*)	17 30	88 12
C	*Guane	22 08	84 03
H	*Havana	23 06	82 30
T	*Cienfuegos (*g*)	22 11	80 33
U	*Tela	15 45	87 28
N	*Bluefields	12 00	83 45
K	*Kingston	17 58	76 48
B	*Nassau (*e*)	25 05	77 22
N	*Turks Island (*f*)	21 30	71 02
	*Port au Prince (*d*)	18 31	72 19
J	*San Juan (*f*)	18 29	66 07
W	*Willemstad (*c*)	12 06	69 00
	*Port of Spain (*c*)	10 38	61 30
B	*Bridgetown (*c*)	13 04	59 37
K	*St. Kitts (*c*)	17 18	62 43

(*a*) One observation a day taken at 1200 G.M.T.
(*b*) Observations taken at 1150 and 2350 G.M.T.
(*c*) ,, ,, ,, 1200 ,, 2200 G.M.T.
(*d*) ,, ,, ,, 1200 ,, 2230 G.M.T.
(*e*) ,, ,, ,, 1200 ,, 2300 G.M.T.
(*f*) ,, ,, ,, 1300 ,, 2300 G.M.T.
(*g*) ,, ,, ,, 1300 ,, 2310 G.M.T.

* Stations are sent only during the period 1st July to 31st October, inclusive, each year.

Bilboa (Darien) W/T Station, approximate position Latitude 9° 07′ N., Longitude 79° 46′ W., call sign, NBA, rebroadcasts the bulletin from Washington, explained above, on 2653, 6518 and 12490 metres C.W. at 0430 and 1630 G.M.T.

Chart showing Forecast and Storm Warning Areas for Atlantic and Gulf Coasts of United States.



Weather Information broadcast for the benefit of Shipping approaching New York Harbour.

The following W/T stations broadcast weather conditions at Sandy Hook from observations made one hour previous to the times of transmission. The information will include barometric pressure, temperature, wind direction and force, state of sky, state of sea, and visibility.

W/T Station.	Call Sign.	Position (approx.). Latitude.	Position (approx.). Longitude.	Time. G.M.T.	Wave-length. Metres.
Tuckerton, N.J.	**WSC**	39° 33′ N.	74° 23′ W.	1400, 2200	649 (I.C.W. and C.W.)
Chatham, Mass.	**WCC**	41° 43′ N.	70° 46′ W.	1400, 2200	738, 2325 (C.W.)
Thomaston, Me.	**WAG**	44° 09′ N.	69° 13′ W.	1400, 2200	718, 2420 (I.C.W. and C.W.)

Weather forecasts are issued from the following stations at the times and for the areas given :—

W/T. Station.	Position. Latitude.	Position. Longitude.	Call Sign.	Times of Transmission, G.M.T.	Wave-length.	Area affected (see chart, above).
Lake Worth	26° 38′ N.	80° 03′ W.	WOE	0348, 1548	761 m.	S. Atlantic Coast, E. Gulf and Caribbean Sea.
Jupiter	26° 57′ N.	80° 05′ W.	NAQ	1648	2653 m.	S. Atlantic Coast, II.
Savannah	32° 04′ N.	81° 07′ W.	WSV	1600	735 m.	S. Atlantic Coast.
Charleston	32° 52′ N.	79° 58′ W.	NAO	1710, 2300	2653 m.	S. Atlantic Coast, I.
Norfolk	36° 50′ N.	76° 18′ W.	NAM	0500, 1630	2653 m.	Mid Atlantic Coast.

BERMUDA.

Bermuda W/T Station, approximate position Latitude 32° 23′ N. Longitude 64° 40′ W.

Call sign, **VRT**.

Times of Transmission—0100 and 1300 G.M.T. on wavelength of 665m. I.C.W. and 0130 and 1330 G.M.T. on wavelength of 2250m. C.W. giving 0000 and 1200 G.M.T. observations respectively at Bermuda of barometer, barometric tendency, wind direction and force, present weather, and visibility when it reaches 5 or less.

SAMPLE MESSAGE—"*Barometer* 1017.0 *falling, wind N.E.* 4. *Weather cloudy.*"

A brief weather forecast for the area 30° to 40° N., 60° to 70° W. (20° to 40° N., 60° to 70° W. during August and September), and 30° to 40° N., 50° to 60° W. when conditions are exceptional, is broadcast at 2100 G.M.T. on a wavelength of 665m. I.C.W. repeated at 2118 G.M.T. on 2250m. C.W.

Wireless Storm Warnings.

Storm warnings are broadcast when necessary by the following stations, at the times and for the areas stated below :—

W/T Station.	Call Sign.	Position (Approx.) Latitude, Longitude.	Time. G.M.T.	Wave-length. (Metres.)	Area (see Chart p. 165).
Lake Worth	**WOE**	26° 38′ N. 80° 03′ W.	0348, 1548	761	S. Atlantic, Gulf Coast and Caribbean Sea.
†**Jupiter, Fla.**	**NAQ**	26° 57′ N. 80° 05′ W.	0030, 1648	2653 (I.C.W.).	Middle and South Atlantic and E. Gulf Coasts.
†**Savannah, Ga.**	**WSV**	32° 04′ N. 81° 07′ W.	1600, 2330	735 (C.W.).	Do.
†**Charleston, S.C.**	**NAO**	32° 52′ N. 79° 58′ W.	1710, 2300	2653 (C.W.).	Do.
†**Norfolk**	**NAM**	36° 50′ N. 76° 18′ W.	1630	2653 (C.W.).	Middle Atlantic Coast.
Baltimore	**WMH**	39° 17′ N. 76° 36′ W.	1530	720 (C.W. and I.C.W.).	Do.
†**Washington (Arlington)**	**NAA**	38° 52′ N. 77° 05′ W.	0330* 1530*	2653, 4690 C.W. simultaneously.	N. Atlantic and Gulf Coasts.
†**New York**	**NAH**	40° 28′ N. 74° 00′ W.	1648, 2130	2653 (C.W.).	New York.
†**Boston, Mass.**	**NAD**	42° 21′ N. 70° 57′ W.	0530, 1610	2653 (C.W.).	N. Atlantic Coast.

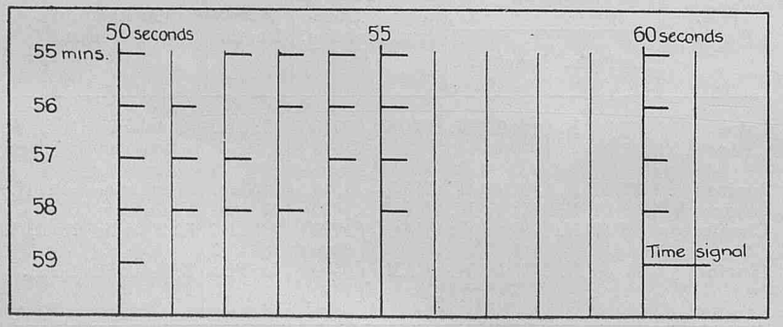
* In Part IV of the Weather Bulletin.

† Transmit Urgent Hurricane warnings on receipt and at the first silent period on 600 m. These are repeated hourly for 12 hours, unless previously cancelled, the wavelength being indicated in commencement of signal.

The messages are preceded by the Safety Signal TTT.

III.—Wireless Time Signals.

Time Signals are broadcast according to the United States New System (See Diagram).



Washington—Arlington, Latitude 38° 52′ 05″ N., Longitude 77° 04′ 47″ W., call sign **NAA,** and **Washington-Annapolis,** Latitude 38° 59′ 25″ N., Longitude 76° 27′ 00″ W., call sign NSS, on a wavelength of 2653 metres, at 00h. 00m. 00s., G.M.T., and each subsequent hour except 0200, 0400, 1400 and 1600 G.M.T., and on wavelengths of 4687 and 16840 metres at 0300 and 1500 G.M.T.

The time signals are broadcast daily and are controlled by the Naval Observatory, Washington.

The error of the time signal is generally less than 0.02 second.

A dash (—) is transmitted at every second except the 29th second and also between the 50th and 60th seconds of each minute, as shown in the above diagram.

In every case the *beginning* of the dash is the *beginning* of the second. The time signal proper is a much longer dash of 1.3 seconds duration.

IV.—Wireless Ice Warnings.

North Atlantic International Ice Patrol.

The North Atlantic International Ice Patrol commences in March, continuing during April, May and June and longer if necessary. The Patrol vessels, call sign **NIDK,** transmit wireless warnings giving the limits and position of the ice in the neighbourhood of the regular Transatlantic Lane Routes.

The warnings are broadcast daily at 0100 and 1300 G.M.T. on a wavelength of 1713m. C.W. and at 1000 and 2200 G.M.T. on a wavelength of 706m. I.C.W.

Ice information will also be sent on request at all times to any ship with which the Patrol Vessel can communicate, without charge.

The following W/T Stations broadcast messages received from the Patrol Vessel :—

W/T Station.	Call Sign.	Times of Transmission. G.M.T.	Wavelength. Metres.
Washington ...	**NAA**	0300, 1500	2653, 4685 C.W.
Boston	**NAD**	0530, 1610, 2200	2653 C.W.
New York ...	**NAH**	1648, 2130	2653 C.W.
Norfolk	**NAM**	0500, 1630	2653 C.W.

CARIBBEAN SEA, GULF COAST AND WEST INDIAN ISLANDS.

II.—Wireless Weather Bulletins.

Weather forecasts are issued from the following stations at the times and for the areas given :—

W/T. Station.	Position.		Call Sign.	Times of Transmission. G.M.T.	Wave-length.	Area affected (see chart, p. 165).
	Latitude.	Longitude.				
Limon	10° 00′ N.	83° 03′ W.	**TIM**	1630	750 m.	Gulf, Caribbean Sea.
Galveston	29° 20′ N.	94° 45′ W.	**NKB**	0530	2653 m.	S. Atlantic II., Gulf, Caribbean Sea.
New Orleans	30° 00′ N.	90° 06′ W.	**WFB**	0430, 1630	3331 m. C.W.	Gulf, Caribbean Sea.
Pensacola	30° 21′ N.	87° 16′ W.	**NAS**	1630	2653 m.	E. Gulf I.
Key West	24° 33′ N.	81° 48′ W.	**NAR**	0400 1610	2653 m. C.W.	S. Atlantic II., E. Gulf I., Caribbean Sea.

Barbados W/T Station, approximate position latitude 13° 06′ N., longitude 59° 37′ W., call sign **VPO,** wavelength 600m. I.C.W., broadcasts the following weather information, received from the Meteorological Station, Codrington (latitude 13° 07½′ N., longitude 59° 36′ W.), when unsettled weather conditions prevail or indications of stormy weather are observed :—

Barometric pressure, barometric tendency, wind direction and force (or velocity in miles per hour), weather at time of observation, and G.M.T. of the observation.

If possible the approximate position of the centre of a tropical cyclonic disturbance will be broadcast.

Wireless Storm and Hurricane Warnings.

Storm Warnings are broadcast by the following W/T Stations for the areas shown on the Chart, p. 165.

When a storm exists that is likely to affect the area, the location and expected direction of movement of the storm centre will be given.

Hurricane Warnings are broadcast when necessary and repeated at the intervals as stated in the last column below.

W/T Station.	Call Sign.	Position (approx.) Latitude. Longitude.	Wave-length. Metres.	Time (G.M.T.) of Storm Warnings.	Area (see Chart, p. 165).
Galveston, Tex.	**WGV**	29° 18′ N. 94° 48′ W.	720 (C.W.)	When issued.	West Gulf Coast.
* „ „	**NKB**	29° 20′ N. 94° 45′ W.	2653 (I.C.W.)	0100, 0530, 1700	Gulf and Caribbean Sea.
Port Arthur...	**WPA**	29° 52′ N. 93° 56′ W.	720 (C.W.)	When issued.	Gulf Coasts. Caribbean Sea. S. Atlantic Coast of U.S.A.
*New Orleans	**WFB**	30° 00′ N. 90° 06′ W.	3331 (C.W.)	0000, 1330, 0430, 1630	Gulf Coasts.
*Pensacola ...	**NAS**	30° 21′ N. 87° 16′ W.	2653 (C.W.)	0000, 1630	E. Gulf Coast I.
*Key West ...	**NAR**	24° 33′ N. 81° 48′ W.	2828 (C.W.)	0400, 1610	S. Atlantic Coast II, E. Gulf Coast I, Caribbean Sea.
*Guantanamo (Cuba)	**NAW**	19° 55′ N. 75° 09′ W.	600 (I.C.W.)	When issued.	—
*San Juan ...	**NAU**	18° 07′ N. 66° 10′ W.	2653	0200 (1 July to 15 Nov.).	E. Caribbean Sea.
Ensenada (Porto Rico)	**WPR**	17° 58′ N. 66° 56′ W.	600	When issued, repeated every 4 hours.	—

* Transmits urgent Hurricane warnings on receipt and at the first silent period, on 600 metres. These are repeated hourly for 12 hours, unless previously cancelled, on the working wavelength shown above.

The messages are preceded by the Safety Signal TTT.

III.—Wireless Time Signals.

Panama.

Balboa (Darien) W/T Station, position Latitude 9° 07′ 12″ N., Longitude 79° 45′ 24″ W. Call sign **NBA** relays the Washington–Arlington time signals sent out at 0300 and 1700 G.M.T. on a wavelength of 6518 metres C.W.

CANADA, NOVA SCOTIA, NEWFOUNDLAND, LABRADOR, ETC.

II.—Wireless Weather Bulletins.

THE following stations broadcast weather bulletins, giving forecasts. Where the times of transmission are omitted, forecasts are sent on request. Stations marked with an asterisk (*) are open during the season of navigation only.

Country.	W/T Station.	Call Sign.	Position (approx.). Lat. N.	Position (approx.). Long. W.	Time. G.M.T.	Wave-length.
Canada (Nova Scotia).	Yarmouth ...	VAU	43° 46′	66° 07′	0430, 1630	720 m.
	Camperdown ...	VCS	44° 30′	63° 31′	0440, 1640	750 m.
	Canso	VAX	45° 19′	60° 58′	—	600 m.
	North Sydney	VCO	46° 13′	60° 15′	—	600 m.
	Louisburg ...	VAS	46° 09′	59° 57′	0400, 1600	2804 m.
Canada ...	*Grindstone Island ...	VCN	47° 23′	61° 54′	—	600 m.
	*Fame Point, Que.	VCG	49° 07′	64° 36′	0430, 1630	660 m.
	*Father Point, Que.	VCF	48° 31′	68° 28′	0420, 1620	600 m.
	*Quebec ...	VCC	46° 48′	71° 12′	0410, 1610	600 m.
	*Montreal ...	VCA	45° 34′	73° 38′	0400, 1600	600 m.
Canada (New Brunswick).	St. John ...	VAR	45° 14′	66° 03′	0400, 1600	650 m.
Newfoundland and Labrador.	St. John's ...	VON	47° 34′	52° 41′	0400, 1600	600 m.
	*Belle Isle ...	VCM	51° 53′	55° 22′	0440, 1640	720 m.
	Cape Race ...	VCE	46° 39′	53° 04′	0420, 1620	660 m.
	*Point Amour ...	VCL	51° 27′	56° 50′	—	600 m.
Hudson Bay and Strait.	†*Port Churchill	VAP	58° 47′	94° 09′	1500	600 m.
	†*Cape Hopes Advance	VAY	61° 05′	69° 33′	—	600 m.
	†*Nottingham Is.	VCB	63° 06′	77° 56′	—	600 m.
	†*Resolution Is.	VAW	61° 20′	64° 50′	1620	600 m.
	†*Chesterfield Inlet	VBZ	63° 20′	90° 43′	—	600 m.

† Forecast and weather conditions for Hudson Bay and Strait and N. Atlantic adjacent thereto.

Wireless Telephony R/T Issues.

THE following stations broadcast weather forecasts, issued by the Canadian meteorological service, by word of mouth.

Country.	Station.	Call Sign.	Position (approx.). Lat. N.	Position (approx.). Long. W.	Time. G.M.T.	Wave-length R/T.
Canada (New Brunswick).	St. John... ...	CHSJ	45° 14′	66° 03′	1000, 1200	268 m.
Canada (Nova Scotia).	Sambro Outer Bank Lt.-V.	VGX	44° 22′	63° 26′	1210, 1740	435 m.
	Louisburg ...	VAS	46° 09′	59° 57′	0400, 1700	441 m.

Wireless Storm Warnings.

Storm warnings are broadcast by the following W/T stations on receipt, on 600 metres and repeated in the Weather Bulletins shown above.

Yarmouth VAU.
Sambro Outer Bank Lt.-V. VGX.
Canso VAX.
North Sydney VCO.
Louisburg VAS.
Grindstone Island VCN.
Father Point VCF.
Montreal VCA.
Belle Isle VCM.
Camperdown VCS.
Fame Point VCG.
Quebec VCC.
St. John VAR.
Cape Race VCE.

Gulf of St. Lawrence Ice Patrol (repeated in ice report, *see* below).

III.—Wireless Time Signals.

Camperdown W/T Station, Latitude 44° 31′ 13″ N., Longitude 63° 32′ 30″ W., call sign **VCS** broadcasts a time signal daily (Sundays excepted) at 14h. 00m. 00s., G.M.T., on a wavelength of 750 metres (spark).

The procedure is as follows :—

G.M.T.			Signal.
h. m. s.	h. m. s.		
13 58 00 to	13 58 57		A dot (•) is transmitted at each second.
13 59 00			(•) Time signal.
13 59 03 to	13 59 50		A dot (•) is transmitted at each second.
14 00 00			(•) Time signal.

For the purpose of these signals the observatory at St. John (New Brunswick) is connected by land telegraph to Camperdown W/T Station.

IV.—Wireless Ice Warnings.

The following W/T stations broadcast ice warnings :—

W/T Station.	Latitude N. (approximate.)	Longitude W. (approximate.)	Call Sign.	Wavelength. (Metres.)	G.M.T. of issue.
Lurcher Lt.-V.	43° 49′	66° 32′	**VGA**	600 (Spk.)	On request.
***Camperdown**	44° 30′	63° 31′	**VCS**	750 (I.C.W.)	,,
***North Sydney**	46° 13′	60° 15′	**VCO**	600 (Spk.)	,,
***Louisburg**	46° 09′	59° 57′	**VAS**	2804 (C.W.)	0400, 1600.
***Grindstone Island**	47° 24′	61° 51′	**VCN**	600 (Spk.)	On request.
Fame Point	49° 07′	64° 36′	**VCG**	660 (I.C.W.)	0430, 1630.
Clarke City	50° 11′	66° 37′	**VCK**	600 (Spk.)	On request.
***Cape Race**	46° 39′	53° 04′	**VCE**	660 (I.C.W.)	0420, 1620.
St. John's	47° 34′	52° 41′	**VON**	600	0400, 1600.
Pt. Amour	51° 27′	56° 52′	**VCL**	600 (Spk.)	On request.
Belle Isle	51° 53′	55° 22′	**VCM**	720 (I.C.W.)	0440, 1640.
Port Churchill	58° 47′	94° 11′	**VAP**	600 (I.C.W.)	On request.
Cape Hopes Advance	61° 05′	69° 33′	**VAY**	600 (I.C.W.)	On request.
Nottingham Is.	63° 06′	77° 56′	**VCB**	600 (I.C.W.)	On request.
Resolution	61° 19′	64° 53′	**VAW**	600 (I.C.W.)	On request.
Chesterfield Inlet	63° 20′	90° 43′	**VBZ**	600	,,

* Broadcasts Gulf of St. Lawrence Ice Patrol report as explained below.

The Gulf of St. Lawrence Ice Patrol.

The Gulf of St. Lawrence Ice Patrol commences from the opening of navigation in the Gulf and continues until the route is clear of ice.

The Patrol Vessel, call sign **VCQP,** transmits wireless warnings of ice conditions from Cape Race to Quebec and recommendations as to route to be followed.

The warnings are broadcast at 0100 and 1300 G.M.T. on a wavelength of 1621 m. (I.C.W.) preceded by the general call CQ on a wavelength of 600 m.

The warnings will also be sent on request to any ship, ships should call **VCQP** on 600 m.

The above warnings are also transmitted by the stations marked* in the list above.

PACIFIC COAST.

II.—Wireless Weather Bulletin.

San Francisco, California, W/T station, approximate position Latitude 38° 06′ N., Longitude 122° 17′ W.

Call sign **NPG.**

Times of Transmission—0218 G.M.T. and 1418 G.M.T.

Wavelengths—7009 and 2778 metres (C.W.) simultaneously.

The messages are based upon observations taken at 0100 and 1300 G.M.T. respectively, with a few exceptions as shown in the list of stations. Ship observations taken at 0000 and 1200 G.M.T.

The bulletins commence with " The Marine Bulletin issued by the United States Weather Bureau will now follow " and are in three parts.

PART I.—Weather reports in code from ships in the N. Pacific.

PART II.—Weather reports in code giving actual observations at stations shown in the list below.

PART III.—General summary of weather conditions, forecasts and storm warnings for the off-shore areas—N. of Cape Blanco; between Cape Blanco and Point Conception; and S. of Point Conception.

The reports are made in the International Ships Wireless Weather Telegraphy Code, with the exception of V for land stations, which is in a special United States code.

To decode these reports the tables given in the Decode M.O. 329 are required. The Key letters are fully described on p. 44 of the January, 1937, number and in M.O. 329.

Key letters used for { station reports—DDFww PPVTT. ships' reports—YQLLL IIIGG DDFww PPVTT.

Distinguishing letter.	Name of station.	Latitude north. ° ′	Longitude west. ° ′
	San Diego	32 43	117 10
I	San Nicholas Island	33 15	123 48
P	San Pedro (*b*)	33 44	118 16
A	Los Angeles	34 03	118 15
C	Point Arguello	34 35	120 39
F	S. E. Farallon Island	37 40	123 00
S	San Francisco	37 48	122 26
N	Eureka	40 48	124 11
M	Marshfield	43 25	124 13
H	North Head	46 16	124 04
T	Tatoosh	48 23	124 44
W	Seattle	47 38	122 20
V	Victoria	48 24	123 19
C	Vancouver	49 17	123 05
B	Estevan	49 22	126 32
R	Prince Rupert	54 18	130 18
K	Ketchikan	55 20	131 37
J	Juneau	58 18	134 24
	Cordova	60 32	145 42
O	Kodiak	57 47	152 22
D	Dutch Harbor	53 55	166 30
P	St. Paul	57 15	170 10
B	Bethel	60 45	161 47
N	Nome	64 30	165 24
Q	Barrow	71 21	156 30
H	Honolulu	21 19	157 52
M	Midway (*a*)	28 12	177 22
			East
I	Manila (*a*)	14 35	120 59
W	Wake Island (*a*)	19 18	166 36
G	Guam (*a*)	13 27	144 45

(*a*) Observations taken at 1130 and 2330 G.M.T.
(*b*) One observation a day taken at 1300 G.M.T.

Weather forecasts are issued from the following stations at the times and for the areas given :—

W/T Station.	Call Sign.	Position (Approx.) Latitude, Longitude.	Time G.M.T.	Wavelength. (Metres).	Area.
Puget Sound	NPC	47° 42′ N. 122° 37′ W.	0030, 0330, 0430, 1248, 1800, 2100.	2653	N. of C. Blanco.
Tatoosh Is.	NPD	48° 23′ N. 124° 44′ W.	0130, 0330, 1300, 1700, 2100.	833	do.
Astoria	NPE	46° 09′ N. 123° 50′ W.	0048, 1530, 1730.	2653	do.
Hilsboro	KEK	45° 29′ N. 122° 57′ W.	0418, 1618.	717	N. of C. Blanco, C. Blanco to Pt. Conception, S. of Pt. Conception.
Eureka	NPW	40° 41′ N. 124° 16′ W.	0018, 0500, 0818, 1218, 1700, 2018.	2653	C. Blanco to Pt. Conception.
Palo Alto	KFS	37° 27′ N. 122° 16′ W.	0400, 1600.	2438 717	N. of C. Blanco, C. Blanco to Pt. Conception, S. of Pt. Conception.
Clearwater	KOK	33° 53′ N. 118° 10′ W.	0448, 1648.	717	do.
San Diego	NPL	32° 42′ N. 117° 15′ W.	1600	2653	S. of Pt. Conception.

Wireless Storm Warnings.

THE following W/T Stations broadcast storm warnings at the times stated below. Ships may request any of the stations mentioned to furnish the latest storm warning. The warnings are for a period of 24 hours beginning at the hour indicated in the messages.

W/T Station and position (approx.).	Call Sign.	Wave-length. Metres.	Broad-casting Time, G.M.T.	Particulars.
†Puget Sound ...	NPC	2653	0030, 0330	Puget Sound and Strait of Juan de Fuca.
Lat. 47° 42′ N.		(C.W.)	0430, 1248	
Long. 122° 37′ W.			1800, 2100	
†Tatoosh Island ...	NPD	833	0130, 0330	do.
Lat. 48° 23′ N.			1300, 1700	
Long. 124° 44′ W.			2100	
†Astoria	NPE	2653	0048, 1530	do.
Lat. 46° 09′ N.		(C.W.)	1730, 2130	
Long. 123° 50′ W.				
*Hillsboro ...	KEK	717	0418, 1618	Oregon, Washington, and California Coasts.
*Clearwater ...	KOK	717	0448, 1648	do.
†Eureka, Calif. ...	NPW	2653	0018, 0500	N. Coast of California, Washington and Oregon Coasts.
Lat. 40° 42′ N.		(C.W.)	0818, 1218	
Long. 124° 16′ W.			1700, 2018	
†San Francisco, Calif.	NPG	2653 7000 (C.W.)	0300, 1500	After weather bulletin.
Lat. 38° 06′ N.				
Long. 122° 17′ W.				
„ „		2653	0000, 0600	N. California Coast.
		(C.W.)	0800, 1200	
			1630, 2000	
†San Diego, Calif.	NPL	2653	1600, 0000,	S. California Coast.
Lat. 32° 42′ N.			0530, 1200,	
Long. 117° 15′ W.			2200	

* Transmit Storm Warnings on receipt and on the half hour at hourly intervals.

† Transmit Urgent Hurricane warnings on receipt and at the first silent period on 600 metres. These are repeated hourly for 12 hours, unless previously cancelled on the working wavelength shown above.

III.—Wireless Time Signals.

For method of transmission of the undermentioned Time Signals, *see* diagram, p. 166.

W/T Station.	Call Sign.	Wavelength. Metres.	Time of Signal being made, G.M.T.	——
			h. m. s. h. m. s.	
San Francisco, Calif.	NPG	2,653 and	23 55 00– 0 00 00	
Lat. 38° 05′ 55″ N.		7,000	2 55 00– 3 00 00	
Long. 122° 16′ 37″ W.		(C.W.)	7 55 00– 8 00 00	
			16 55 00–17 00 00	Sent daily.
			*19 55 00–20 00 00	
			20 55 00–21 00 00	

* On 2653 m. only.

PERSONNEL.

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

PROMOTIONS AND AWARDS.

Commander J. O. Dunn, R.D., R.N.R., Chief Officer of the T.S.S. *Tuscania*, Anchor Line, was presented with the Reserve Decoration by Captain C. J. Gray, D.S.O., R.N., on behalf of the Admiral commanding the coast of Scotland. The presentation took place on board the *Tuscania* before a number of the ship's company and officials of the Anchor Line.

Commander Dunn is an old observer for the Meteorological Office, and served as navigator on board the H.M.S. *Zaza* during part of the war.

W. H.

RETIREMENT.

Captain Ernest Alfred Comley, commander of the R.M.S. *Balmoral Castle*, has retired from active service afloat.

Captain Comley commenced his sea career in 1889 in the Sierra Shipping Company and served for eleven years in sail. In 1900 he joined the R. M. S. P. Co. as a junior officer, transferring to the Union Castle Line two years later. His first command was the *Hansa*, to which he was appointed in 1928, and he has since commanded sixteen of the Union Castle fleet, including some of their largest mail ships.

J.H.

Captain Frederick William Mace, C.B.E., R.N.R., Marine Surveyor and Water Bailiff to the Mersey Docks and Harbour Board, has retired after 35 years' service with the Board.

After some years' service in sailing ships, Captain Mace joined the White Star Line where he was serving in 1902 when appointed Water Bailiff to the Mersey Dock and Harbour Board. In 1909 he was appointed to the dual position of Marine Surveyor and Water Bailiff, since when he has been responsible for the survey, lighting, buoyage and salvage work within the precincts of the port of Liverpool.

J. H.

OBITUARY.

WITH deep regret we record the following:—

Commander Frederick Marsh Cavendish Sergeant, R.D., R.N.R., died recently at his home in Birkdale.

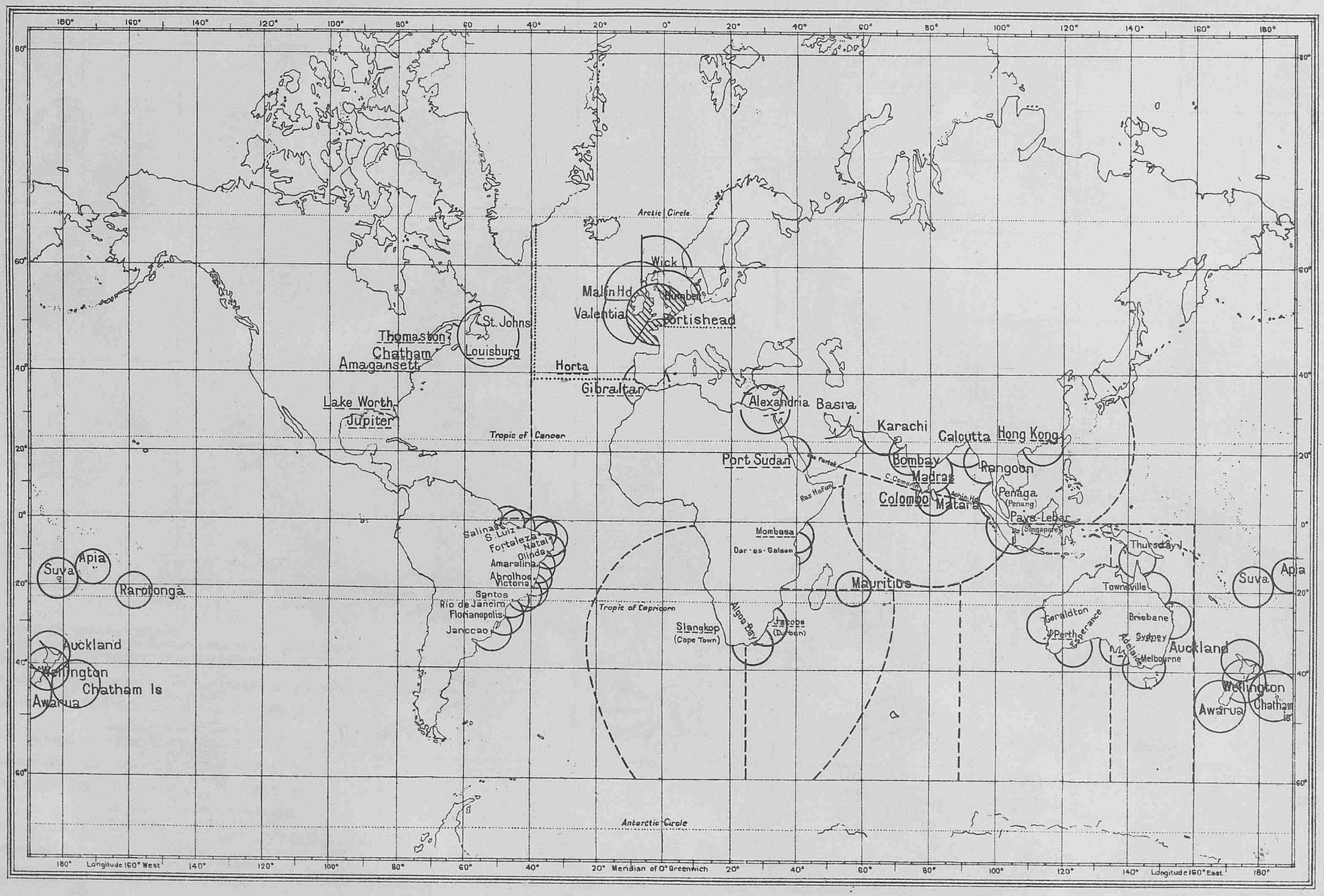
Prior to his retirement in 1926 Commander SERGEANT was for many years Senior Examiner of Masters and Mates, and Secretary of the Local Marine Board at Liverpool. He was also Marine Agent at Liverpool to the Meteorological Office from 1909 to 1921 when he did much to interest the Commanders and Officers of Liverpool ships in the work of the Marine Division.

An account of his career may be found in Volume IV. No. 43, of this journal.

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 intercept "B Selected Ships" reports made to C.Q on 600 metres.

CURRENTS IN THE EASTERN PORTION OF THE SOUTH PACIFIC.

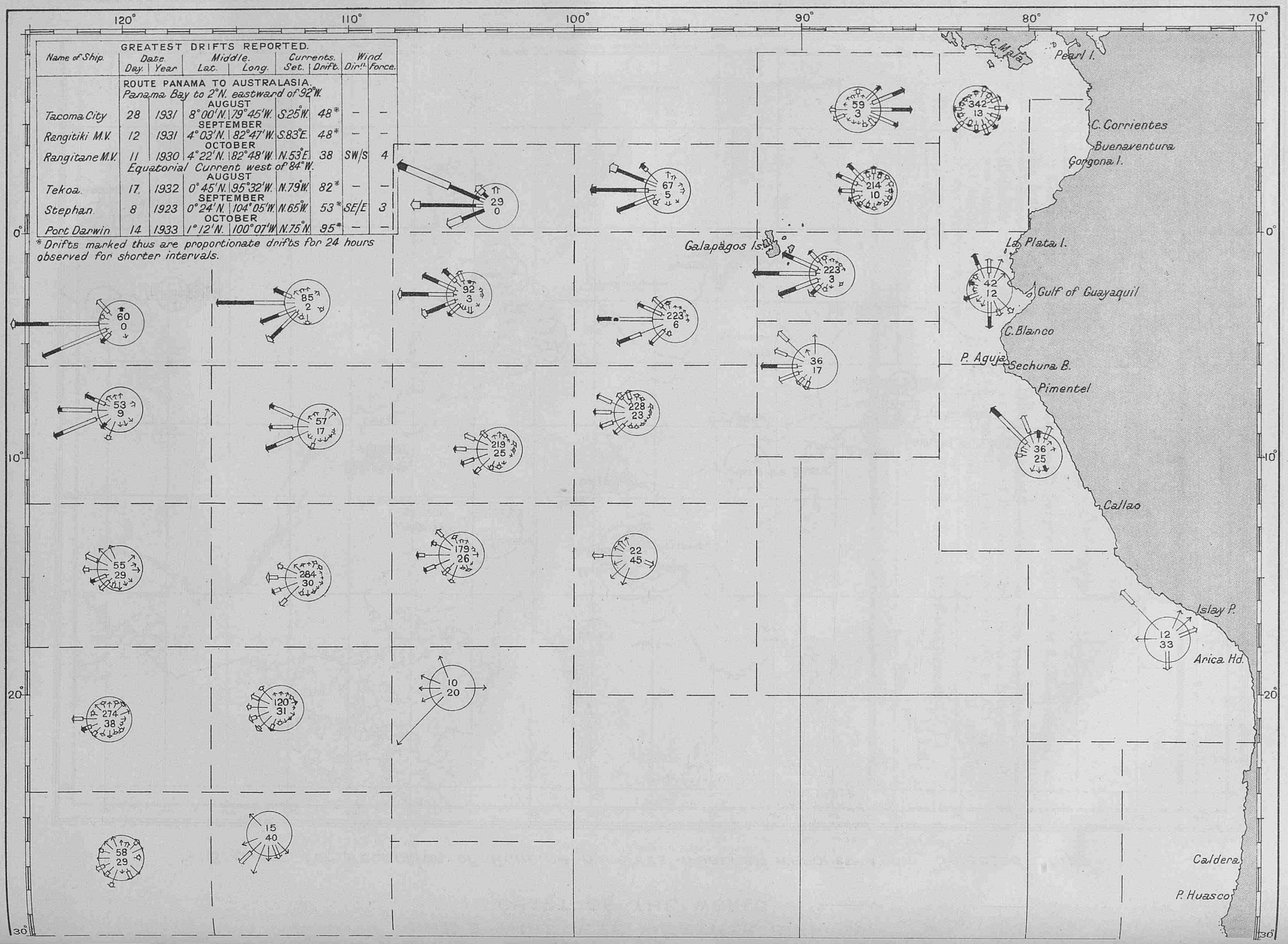
AUGUST SEPTEMBER and OCTOBER.

Observations of ships regularly observing for the British Meteorological Office, 1910-1936.

GREATEST DRIFTS REPORTED.

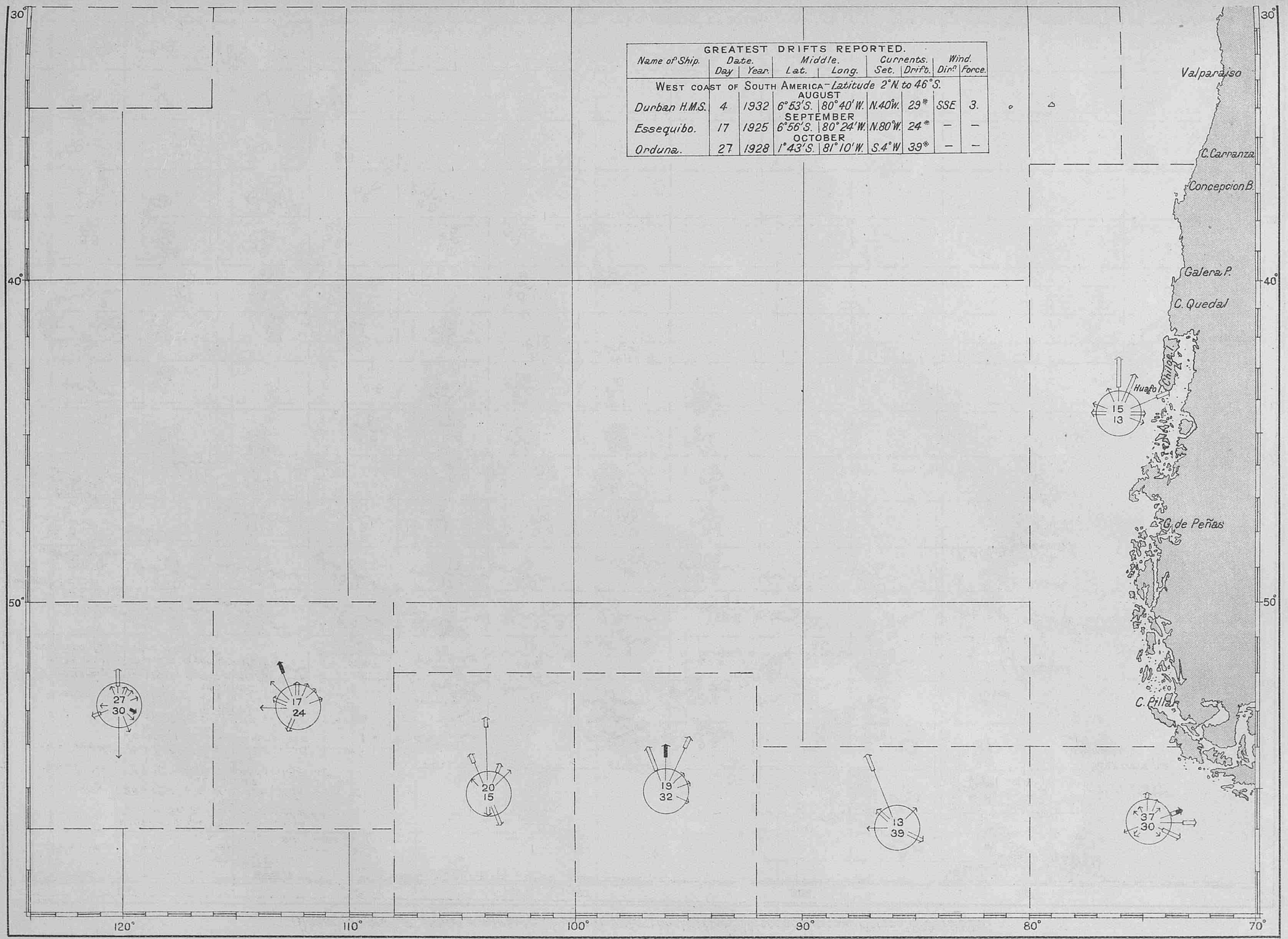
Name of Ship.	Date. Day.	Year	Middle. Lat.	Long.	Currents. Set.	Drift.	Wind. Dir.ⁿ	Force.
ROUTE PANAMA TO AUSTRALASIA. *Panama Bay to 2°N. eastward of 92°W.*								
			AUGUST					
Tacoma City	28	1931	8°00'N.	79°45'W.	S.25°W.	48*	–	–
			SEPTEMBER					
Rangitiki M.V.	12	1931	4°03'N.	82°47'W.	S.83°E.	48*	–	–
			OCTOBER					
Rangitane M.V.	11	1930	4°22'N.	82°48'W.	N.53°E.	38	SW/S	4
Equatorial Current west of 84°W.								
			AUGUST					
Tekoa.	17.	1932	0°45'N.	95°32'W.	N.79°W.	82*	–	–
			SEPTEMBER					
Stephan.	8	1923	0°24'N.	104°05'W.	N.65°W.	53*	SE/E	3
			OCTOBER					
Port Darwin	14	1933	1°12'N.	100°07'W.	N.75°W.	95*	–	–

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



GREATEST DRIFTS REPORTED.

Name of Ship.	Date. Day	Date. Year	Middle. Lat.	Middle. Long.	Currents. Set.	Currents. Drift.	Wind. Dirn	Wind. Force.
WEST COAST OF SOUTH AMERICA – *Latitude 2°N. to 46°S.*								
			AUGUST					
Durban H.M.S.	4	1932	6°53'S.	80°40'W.	N.40°W.	29*	SSE	3.
			SEPTEMBER					
Essequibo.	17	1925	6°56'S.	80°24'W.	N.80°W.	24*	—	—
			OCTOBER					
Orduna.	27	1928	1°43'S.	81°10'W.	S.4°W	39*	—	—



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 miles per day ⟹, Distance from tail of arrow to circle represents 5%. Scale 0 1p 2p 3p 4p 5p%

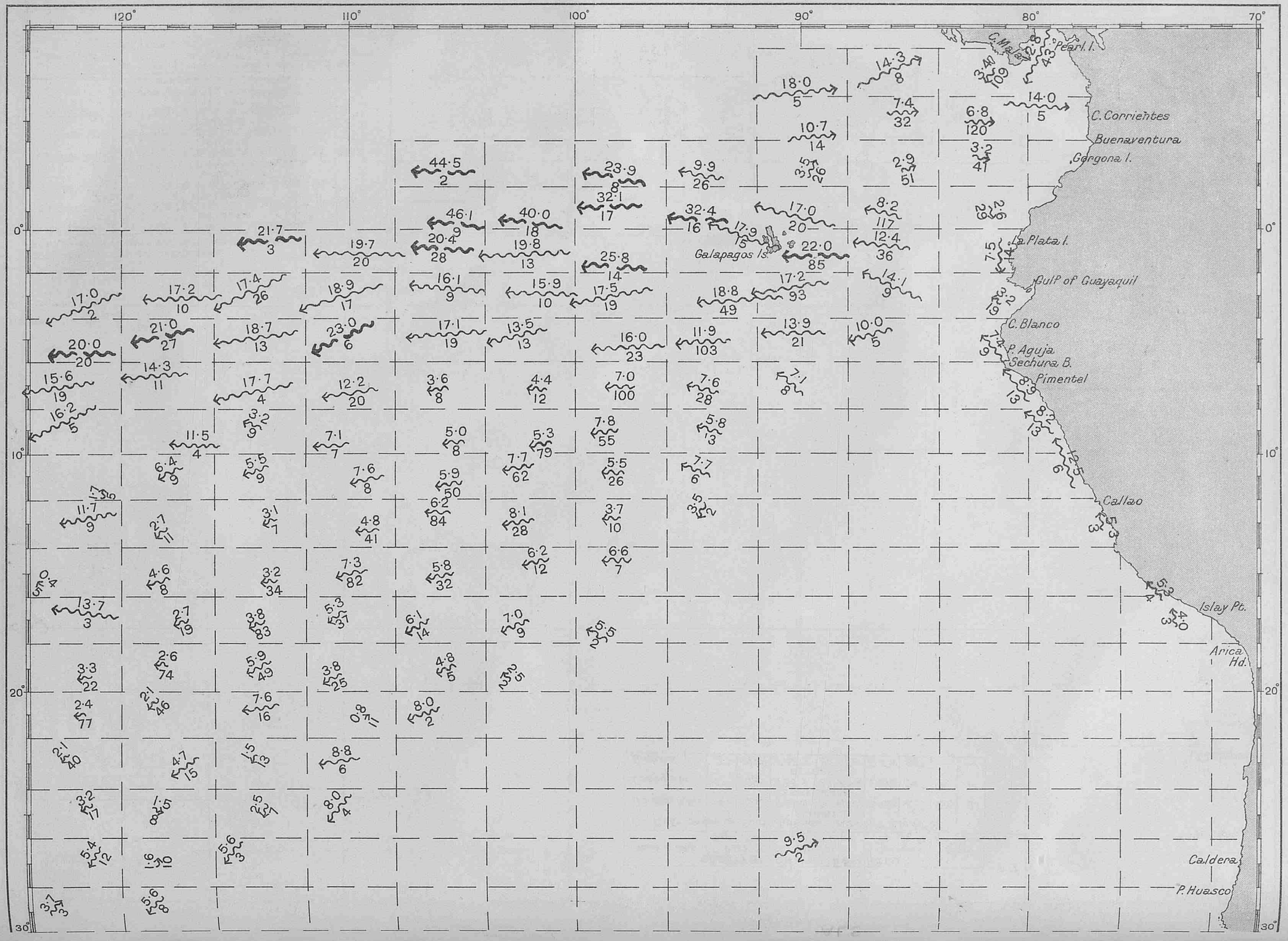
25-48 " " " , ▬▬→, 49-72 " " " ⟹

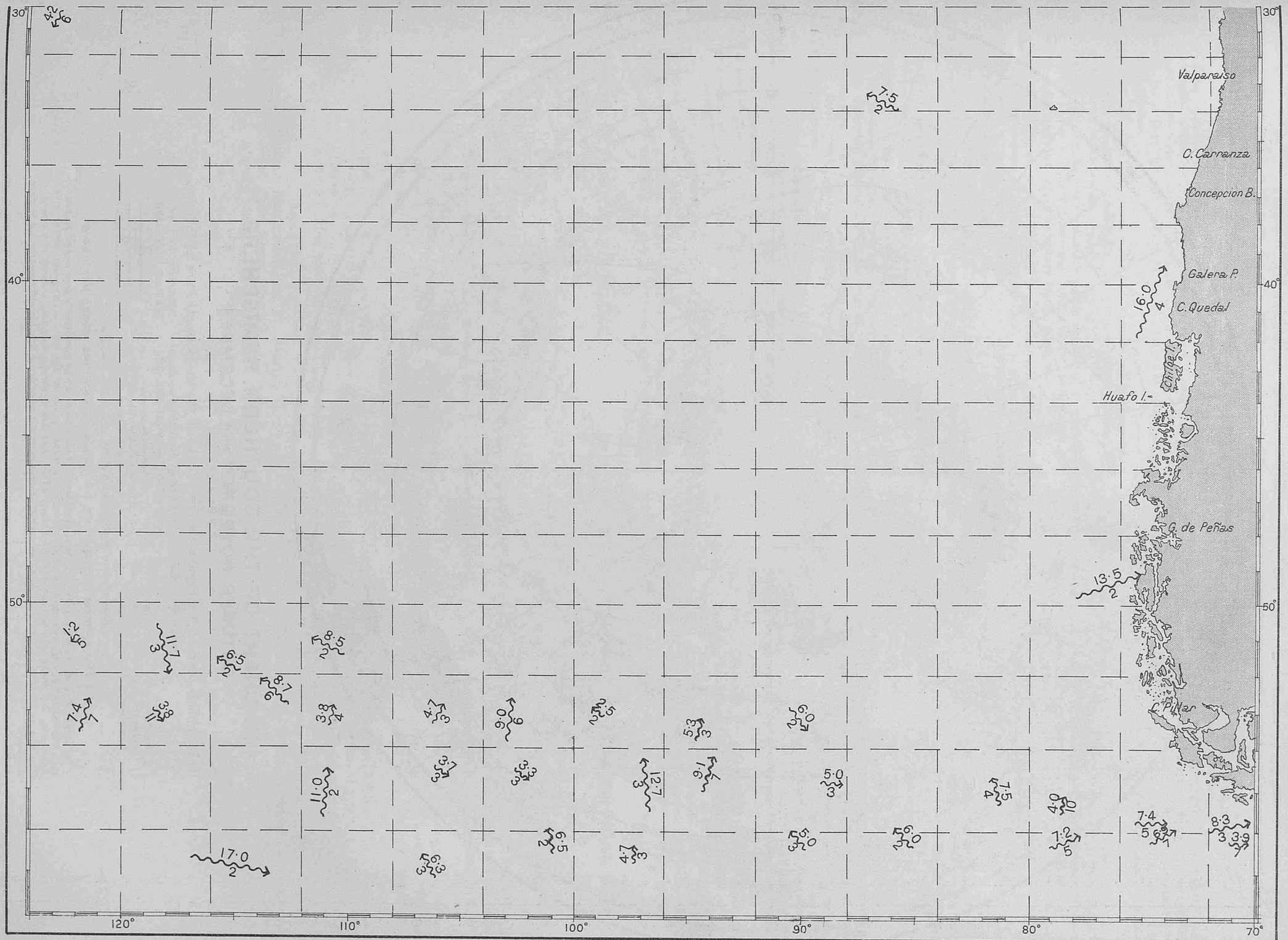
The upper figures in centre of rose gives total number of observations, the lower figures the percentage frequency of current to the nearest

CURRENTS IN THE EASTERN PORTION OF THE SOUTH PACIFIC.

AUGUST SEPTEMBER and OCTOBER.

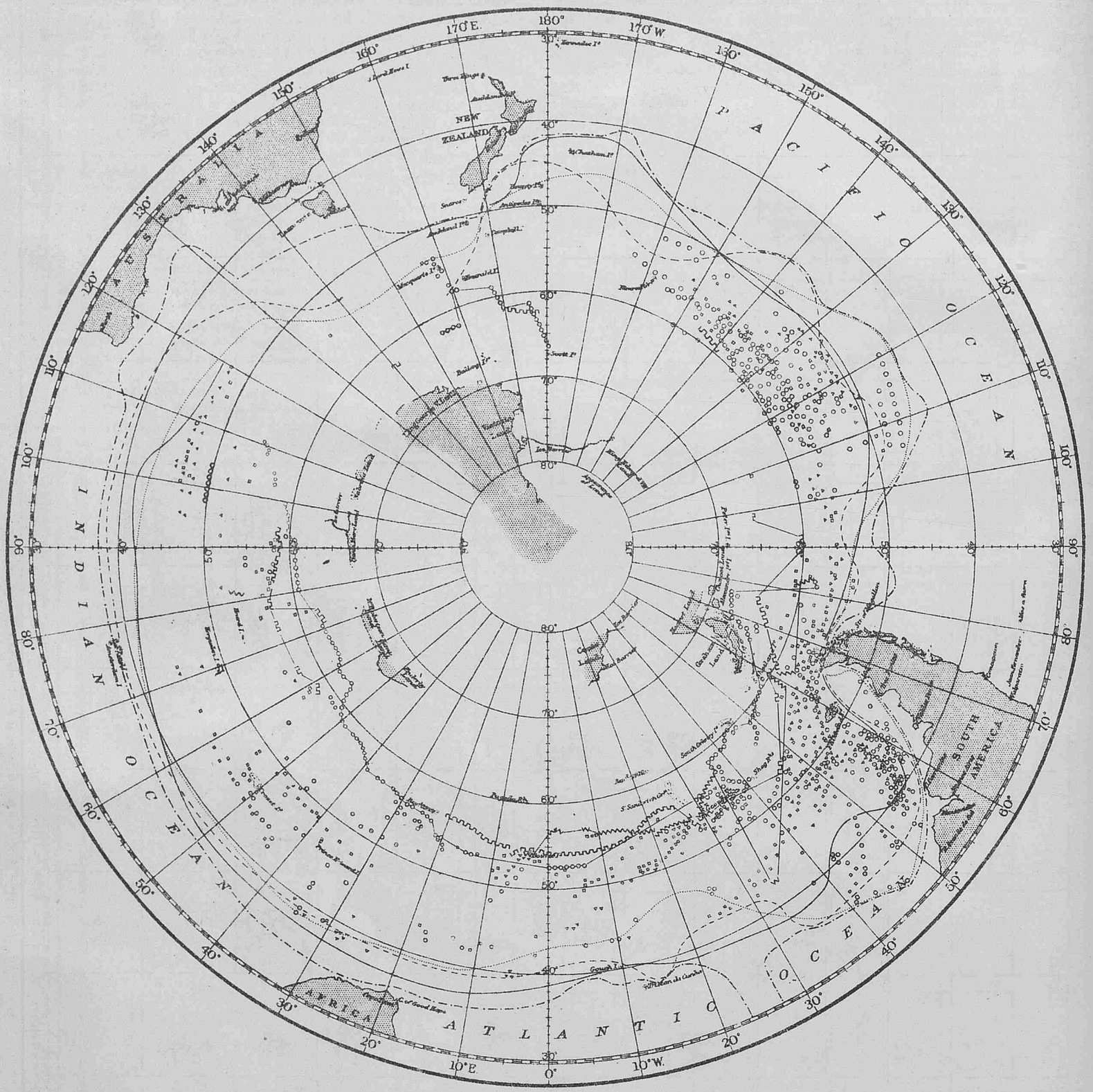
Observations of ships regularly observing for the British Meteorological Office, 1910-1936.





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



ICE CHART OF THE SOUTHERN HEMISPHERE,

OCTOBER NOVEMBER and DECEMBER

EXPLANATION.

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

	Bergs, 1902-1936.	Position of northernmost pack ice actually observed 1885-1936	Extreme limit of all ice, 1772-1936.
October	△	~~~~~	———
November	□	⊓⊓⊓⊓⊓	– – – – –
December	○	○–○–○–○–○	.....

Extreme limit of all ice, all months. —·—·—·—

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 Nº 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.

H.M.Stationery Office Press, Kingsway, W.C.2.

Ps.402/3336. Wt.19.A. D.20. Gp.948. 1225. 9/36.

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 in the case of "Selected Ships," the wireless operators also. 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 "Selected 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. As far as possible the Merchant Navy Agents will visit British foreign going ships registered in Great Britain and Northern Ireland, and give assistance and advice if desired.

This supplementary service to that of Selected Ships is particularly desirable in the regions and seasons of tropical revolving storms, and at present on the more northern routes across the North Atlantic and in far northern waters.

A pamphlet entitled "Decode for use with the International Code for Wireless Weather Messages from Ships", M.O. 329, Fourth Edition, can be obtained from H.M. Stationery Office. This gives a description of the world wide system of voluntary Selected Ships routine wireless weather telegraphy, the Tables for decoding reports received from Selected Ships, and notes for the guidance of the masters of British ships.

"A Handbook of Weather, Currents and Ice for Seamen" published by H.M. Stationery Office, may be obtained from the Stationery Office or through any bookseller, price 4s. This provides information of the elements named, the Laws of Storms, and gives guidance for weather forecasting at sea. It also gives some information of Ocean Pilotage and is intended as a guide for making use of the services specified in Article 35 of the Convention for Safety of Life at Sea.

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

LONDON ... ... Captain L. A. BROOKE SMITH, R.D., R.N.R., Marine Superintendent.
Commander J. HENNESSY, R.D., R.N.R., Senior Nautical Assistant.
Room 117A, Adastral House, Kingsway, W.C.2. (*Telephone No.: Holborn 3434 Extension 421*).
Nearest station, Temple, District Railway.

THAMES ... ... Commander C. H. WILLIAMS, R.N.R., Port Meteorological Officer, P.L.A. Building, King George V Dock (south side), London, E.16. (*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*).

Agents.

BRISTOL CHANNEL Captain EDWARD HALL, 21, Dowlais Buildings, West Bute Street, Cardiff. (*Telephone No.: Cardiff 1268*).

Agents (*contd.*).

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*).

HONG KONG, China. Lieut. Commander M. V. KEOGH, R.N., Chart Depot, H.M. Dockyard. (*Telephone No.: 108 Dockyard*).

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.

SYDNEY, New South Wales. Captain N. G. ROSKRUGE.
Captain G. B. MERCER.
Customs House. (*Telephone No.: B6421*).

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

CHART OF THE WESTERN NORTH ATLANTIC.

Showing the North Atlantic Lane Routes in force during OCTOBER 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 64 and 65 of the April, 1937 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 OCTOBER is given. Ice sighted between SEPTEMBER 1st and 23rd, 1937 is indicated by symbol in the position reported, the figure giving the day of the month in September. 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 (#)

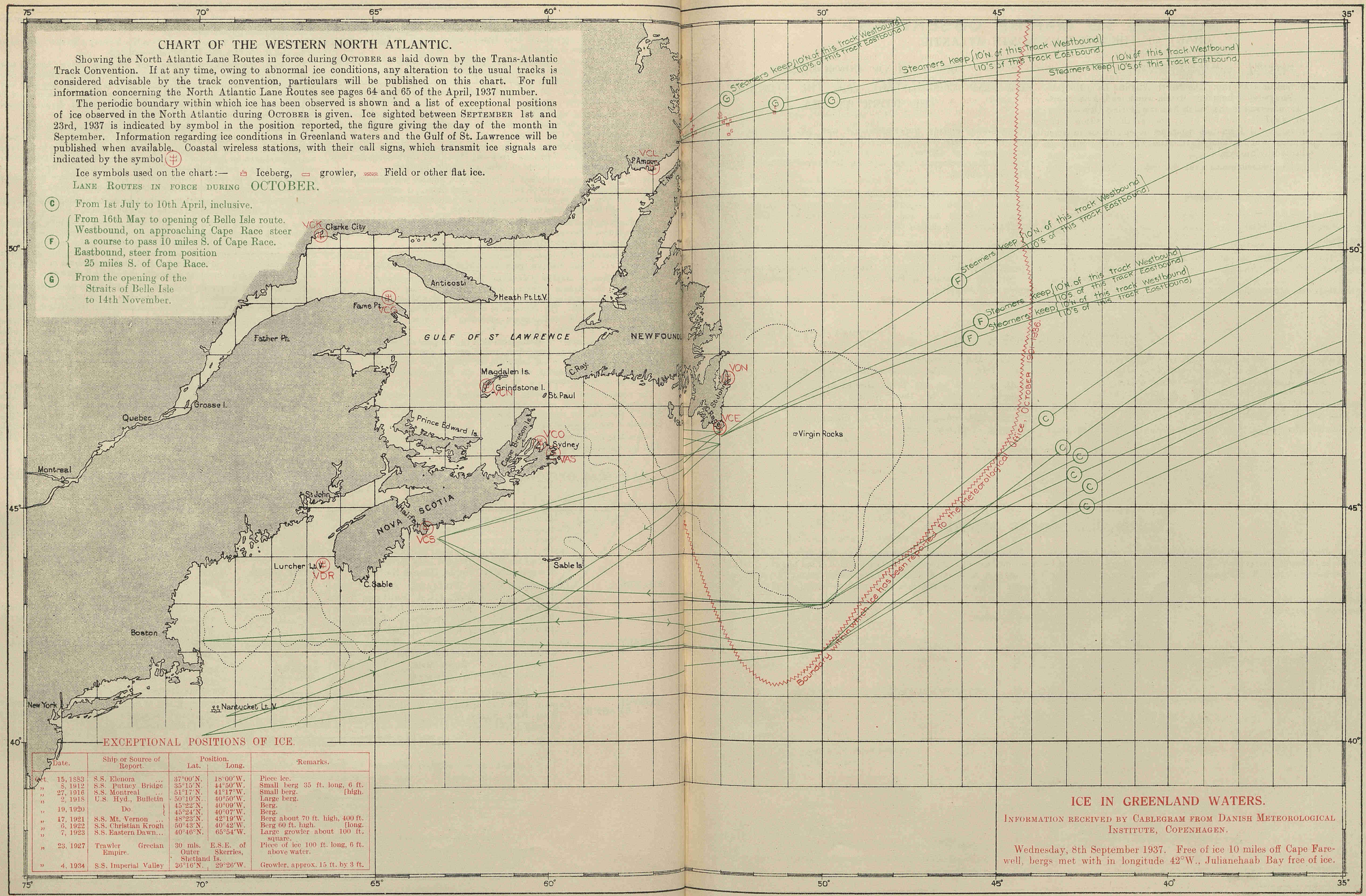
Ice symbols used on the chart:— Iceberg, growler, Field or other flat ice.

LANE ROUTES IN FORCE DURING OCTOBER.

(C) From 1st July to 10th April, inclusive.

(F) From 16th May to opening of Belle Isle route. Westbound, on approaching Cape Race steer a course to pass 10 miles S. of Cape Race. Eastbound, steer from position 25 miles S. of Cape Race.

(G) From the opening of the Straits of Belle Isle to 14th November.



EXCEPTIONAL POSITIONS OF ICE.

Date.	Ship or Source of Report.	Position. Lat.	Position. Long.	Remarks.
Apr. 15, 1883	S.S. Elenora ...	37°00'N.	18°00'W.	Piece ice.
„ 8, 1912	S.S. Putney Bridge	35°15'N.	44°50'W.	Small berg 35 ft. long, 6 ft. high.
„ 27, 1916	S.S. Montreal ...	51°17'N.	41°17'W.	Small berg.
„ 2, 1918	U.S. Hyd., Bulletin	50°10'N.	40°50'W.	Large berg.
„ 19, 1920	Do	45°22'N.	40°09'W.	Berg.
		45°24'N.	40°07'W.	Berg.
„ 17, 1921	S.S. Mt. Vernon ...	48°23'N.	42°19'W.	Berg about 70 ft. high, 400 ft. long.
„ 6, 1922	S.S. Christian Krogh	50°43'N.	40°42'W.	Berg 60 ft. high.
„ 7, 1923	S.S. Eastern Dawn...	40°46'N.	65°54'W.	Large growler about 100 ft. square.
„ 23, 1927	Trawler Grecian Empire.	30 mls. Outer Shetland Is.	E.S.E. of Skerries,	Piece of ice 100 ft. long, 6 ft. above water.
„ 4, 1934	S.S. Imperial Valley	36°16'N.	29°26'W.	Growler, approx. 15 ft. by 3 ft.

ICE IN GREENLAND WATERS.

INFORMATION RECEIVED BY CABLEGRAM FROM DANISH METEOROLOGICAL INSTITUTE, COPENHAGEN.

Wednesday, 8th September 1937. Free of ice 10 miles off Cape Farewell, bergs met with in longitude 42°W., Julianehaab Bay free of ice.

H.M. Stationery Office Press, Kingsway, W.C.2

OCTOBER M.O., 1937. Pt. 402/3336. Wt. 19A. D.20. Gp. 948. 525. 9/37.

NOTICES TO MARINE OBSERVERS.

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 REPORTS (FORM 912).

Ice Report Forms are supplied with the MARINE OBSERVER or Supplement each month to all regular observing ships employed in the Trans North Atlantic and Southern Ocean trades. They may also be obtained by any British Ship on application to the Port Meteorological Officers or Agents, addresses of whom are given on the front page of this Ice Chart.

Commanders of ships in these trades are asked to have this form completed and returned without delay at the end of each passage, A nil return is desired should no ice be sighted.

Selected Ships on the Trade Routes of the Southern Ocean are requested to add to their routine Wireless Weather reports information of floating ice seen or reported within the last 24 hours so that this information may be disseminated to the utmost advantage of all concerned.

COVER FOR MARINE OBSERVER.

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

The arrangements for assembling the numbers for binding is described in this number page 130.

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

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.	Date.	Position.		Description.
	Latitude.	Longitude.			Latitude.	Longitude.	
BAY OF BISCAY.				**MEDITERRANEAN.**			
6.9.37	45°05′N.	4°20′W.	Large red conical buoy.	8.9.37	31°29′N.	32°10′E	Floating fishing vessel about 53 ft. long.
BALTIC.				**GULF OF MEXICO.**			
10.9.37	54°36′N.	12°35′E.	Part of raft, with apparently naval target.	10.9.37	28°11′N.	94°11′W.	Submerged wreck of small sailing vessel with mast projecting 15 ft. out of the water.
NORTH ATLANTIC.				**NORTH PACIFIC.**			
1.9.37	34°15′N.	51°07′W.	Lifeboat No. 4 of the sunken steamer *Sandgate Castle.*	1.9.37	15°05′N.	146°50′E.	Tree trunk about 35 ft. long and 2 ft. in diameter.
2.9.37	29°00′N.	60°53′W.	Large rusty conical whistle buoy.	1.9.37	21°14′N.	107°41′W.	Log about 20 ft. long and 3 ft. in diameter.
3.9.37	48°10′N.	5°29′W.	Small conical buoy.	6.9.37	30°50′N.	133°15′W.	Tree trunk about 50 ft. long and 4 ft. in diameter with roots attached.
3.9.37	33°52′N.	71°02′W.	Rusty gas buoy.	6.9.37	29°21′N.	79°48′W.	Floating object, apparently a capsized derelict about 60 ft. long and showing about 5 ft. out of water.
3.9.37	43°00′N.	67°09′W.	Large piece of wreckage, apparently wooden poop with awning about 20 ft. square, painted white.	7.9.37	19°25′N.	107°17′W.	Large tree trunk with roots projecting out of water
3.9.37	41°56′N.	29°48′W.	Class A red whistle buoy.				
4.9.37	50°12′N.	11°28′W.	Telegraph buoy.				
8.9.37	45°13′N.	8°23′W.	Large black cylindrical buoy.				

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LIST OF PLATES PRODUCED BY LITHOGRAPHIC PROCESS, INCLUDING CHARTS AND OTHER LARGE DIAGRAMS WHICH APPEAR IN EACH NUMBER

Lithographic illustrations after page 48 in January number :—
- Ships' Wireless Weather Signals, Chart of the World.
- Currents in the South Pacific, Eastern Portion, November, December and January.
- Ice Chart of the Southern Hemisphere, January, February and March.

Lithographic illustrations after page 78 in April number :—
- Ships' Wireless Weather Signals, Chart of the World.
- Currents in the South Pacific, Eastern Portion, February, March and April.
- Chart of Limits of Ice, Western North Atlantic.
- Chart of Exceptional Positions of Ice.
- Ice Chart of the Southern Hemisphere, April, May and June.

Lithographic illustrations after page 126 in July number :—
- Ships' Wireless Weather Signals, Chart of the World.
- Marsden Charts Nos. I and II, showing number of sets of observations extracted between 1st April, 1920, and 31st March, 1937, and recovery of arrears of extraction of observations from logs received prior to 1920 for North Atlantic and Pacific Oceans.
- Chart III.—Chart of the World, showing positions of British Selected Ships at Sea on 1st June, 1936.
- Currents in the South Pacific, Eastern Portion, May, June and July.
- Ice Chart of the Southern Hemisphere, July, August and September.

Lithographic illustrations after page 170 in October number :—
- Ships' Wireless Weather Signals, Chart of the World.
- Currents in the South Pacific, Eastern Portion, August, September and October.
- Ice Chart of the Southern Hemisphere, October, November and December.

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FLEET LIST.

VOLUNTARY OBSERVING SHIPS.

The following is a complete list of British observing ships regularly carrying out voluntary services of marine meteorology with the guidance of the Marine Division of the Meteorological Office.

The names of the Captains and observing officers of observing ships, and the Senior Wireless Operators of Selected Ships are given, as ascertained from the last written return received.

Meteorological Logs, Records, and W/T Weather Registers received between the dates specified at the head of the seventh column are acknowledged by Form number, with commencing and ending dates of period covered by the returns; the date when the last return was received being given in the eighth column.

The Captains of observing ships are requested to take this acknowledgment in cordial thanks and grateful recognition to them and their observing officers and wireless operators for the returns made and the voluntary service rendered in all parts of the world.

The classification of meteorological logs, records and registers will be notified to the Captains by post card Form 1343. Only in exceptional cases will individual letters be sent to the Captains of observing ships.

The Port Meteorological Officers and Merchant Navy Agents at the ports are advised as necessary, and they will, as necessary, communicate such advice verbally by personal call upon the Captain.

Excellent Awards will be made at the end of the financial year. The names of the Captains and Principal Observing Officers gaining these awards will be published in a special list in the Marine Observer.

It is requested that prior notification of changes of service, probable periods of lay up, transfer of Captains, or other circumstances which may prevent the continuance of voluntary meteorological service at sea, may be made to the appropriate Port Meteorological Officer or Merchant Navy Agent.

Ships not making the appropriate written returns within a reasonable period will be removed from the list, steps taken to recover any instruments lent, and the free issue of the Marine Observer discontinued.

The number of voluntary observing ships is limited to a maximum total of 360.

The number of Selected Ships detailed to carry out the voluntary service provided for in Clause (C) of Article 35 of the Convention for Safety of Life at Sea, Merchant Shipping (Safety and Load Line Conventions) Act, 1932, is determined by the British proportion of the world's tonnage; and is at present 279.

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

Explanation of Abbreviations.

The number appearing before the name of an observing ship in this list is her number for the time being as a British Selected Ship.

†† indicates fitted with wireless telegraphic apparatus for long range, long wave, continuous wave transmission and reception.

*† indicates fitted with wireless telegraphic apparatus for transmission and reception; fitted for reception only of long range, long wave, continuous wave.

M.S. = Motor Ship.

(t-e) = Turbo-electric.

S.T. = Steam Trawler.

(tank) = Tanker.

Ships having no such letters after their names are steamships.

Abbreviations in Equipment Column.

M.L. = Equipped with a complete set of tested instruments lent by the Meteorological Office for keeping the meteorological log.

M. = Ships' own mercurial barometer, found to be sufficiently accurate and reliable for the purpose of observation for making wireless weather reports.

S. = Partly or wholly equipped with tested instruments lent by the Meteorological Office for the purpose of carrying out the duties of a Selected Ship, when detailed to do so.

A. = Ships' own aneroid.

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 11.6.37 to 9.9.37		Date Last Return Received.
275 †† *Abosso*, M.S. ...	A. H. Crapper	D. D. Jones, R. Inglis, K. Elkin.	G. Arrowsmith	M.-S.	Elder Dempster Lines, Ld.	Fms. 911 & 138	2.6.37 to 2.9.37	7.9.37
122 †† *Accra*, M.S. ...	P. Sola, D.S.O., Lt.-Commr., R.N.R.	P. M. Ralston, C. R. Kerr.	R. J. Dowling ...	,,	,, ,,	,, ,,	20.5.37 to 19.8.37	25.8.37
123 †† *Adda*, M.S. ...	E. V. Davies, D.S.O. ...	P. Jenkins, W. Williams ...	A. J. L. Edwards	,,	,, ,,	,, ,,	6.5.37 to 7.8.37	12.8.37
273 *† *Adrastus* ...	A. Shaw	S. J. Weller, E. A. H. Gepp, N. B. Jones.	G. B. Price ...	M.L.	A. Holt & Co. ...	Fm. 915	3.3.37 to 12.7.37	1.9.37
090 *† *Aeneas*	J. Hatfield	T. S. Hardy, W. K. Hole, A. S. Barclay.	H. G. Nuttall ...	S.	,, ,, ...	Fms. 911 & 138	20.4.37 to 7.8.37	16.8.37
166 *† *Agamemnon*, M.S.	J. G. Reynard	G. A. C. Barnard, A. Harrison, E. B. Sandon.	A. C. Nevin ...	,,	,, ,, ...	,, ,,	3.5.37 to 2.8.37	21.8.37
065 †† *Akaroa*	W. G. Summers ...	A. G. Mackenzie, W. Hill, E. H. Vaughan.	J. A. McAskill ...	,,	Shaw, Savill & Albion Co., Ld.	,, ,,	20.3.37 to 28.6.37	7.7.37
032 †† *Alaunia*... ...	R. J. Finlow, R.D., Capt. R.N.R.	S. W. Howell, A. Mackellar, J. F. Drake.	C. Wood ...	,,	Cunard White Star, Ld.	,, ,, Fm. 912	7.6.37 to 20.8.37 7.6.37 to 20.8.37	24.8.37 24.8.37
129 †† *Alcantara* ...	T. J. C. Buret, D.S.C.	H. A. Wright, W. Williams, G. M. Fletcher.	T. Preston ...	M.-S.	Royal Mail Lines, Ld.	Fms. 911 & 138	19.5.37 to 13.8.37	17.8.37
178 *† *Alipore*	L. Parfitt	J. S. G. Christian, E. F. Ferraby, L. H. Howard.	A. G. Hastings...	M.	P. & O. S.N. Co.	,, ,,	18.5.37 to 3.8.37	23.8.37
175 †† *Almanzora* ...	H. P. Womersley ...	T. Davies, S. T. Whiteside, K. Drake.	J. Caldwell ...	S.	Royal Mail Lines, Ld.	,, ,,	2.5.37 to 14.6.37	16.6.37
086 †† *Almeda Star* ...	H. C. Howard	R. Bobson, J. L. Anson, G. S. Dodds.	R. N. Austin ...	M.-S.	Blue Star Line, Ld.	,, ,,	6.6.37 to 27.7.37	3.8.37
022 *† *Alynbank*, M.S.	D. Gillies	A. C. Glover, J. W. Jackson, E. P. Stephens.	P. T. Brown ...	S.	A. Weir & Co. ...	,, ,,	10.4.37 to 12.8.37	6.9.37
160 *† *Amarapoora* ...	J. F. Burke	R. Treasurer, W. D. Tullock, J. P. Waugh.	A. M. Douglas...	,,	P. Henderson & Co.	,, ,,	19.4.37 to 27.6.37	30.6.37
*† *Amsterdam* ...	B. M. Stone	F. B. Allen, E. Gould ...	D. T. Wright ...	,,	L. & N. E. Rly....	,, ,,	2.6.37 to 31.8.37	4.9.37
006 †† *Andalucia Star*	R. Vernon	G. E. Barnard, F. Stokes, C. Moreland.	R. V. Gregory ...	M.-S.	Blue Star Line, Ld.	,, ,,	17.5.37 to 7.7.37	10.7.37
113 *† *Andania* ...	F. J. Burd	J. G. Bradley, M. Joubert, R. Youd.	J. L. Blanchard	S.	Cunard White Star, Ld.	,, ,, Fm. 912	6.6.37 to 20.8.37 6.6.37 to 20.8.37	27.8.37 27.3.37

	Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 11.6.37 to 9.9.37.		Date Last Return Received.
	*† *Anselm*	F. P. Barlow	N. Caris, S. Pollock, G. E. Freeman.	J. O'Sullivan ...	S.	Booth S.S. Co., Ld.	Fms. 911 & 138	9.5.37 to 26.8.37	2.9.37
259	*† *Antonia* ...	W. S. Quinn	K. M. Nicholson, W. J. Foster, H. G. Hayward.	W. F. Fay ...	,,	Cunard White Star Ld.	,, ,,	23.5.37 to 6.8.37	9.8.37
							Fm. 912	23.5.37 to 6.8.37	9.8.37
209	†† *Aorangi*, M.S. ...	T. V. Hill	T. Germein, D. Blacklaws, C. Woods.	C. F. G. Taylor	M.L.	Canadian-Australasian Line, Ld.	Fm. 915	15.4.37 to 6.6.37	31.8.37
120	†† *Apapa*, M.S. ...	J. H. Lawson	B. C. Haigh, C. Shand ...	J. Rea	M.-S.	Elder Dempster Lines, Ld.	Fms. 911 & 138	17.6.37 to 23.7.37	29.7.37
017	†† *Aquitania* ...	R. B. Irving, O.B.E., R.D., Capt., R.N.R.	W. C. Warwick, W. L. P. Cox, S. Tayne.	J. N. Cragg ...	S.	Cunard White Star, Ld.	,, ,,	10.6.37 to 23.8.37	25.8.37
115	†† *Arandora Star* ...	E. W. Moulton ...	G. C. Case, L. S. Warren, G. Roberts.	J. T. Williams ...	M.-S.	Blue Star Line, Ld.	,, ,,	7.6.37 to 29.7.37	3.8.37
248	*† *Arawa*	T. V. Roberts, R.D., Commr., R.N.R.	G. L. Roe, C. W. Jennings, J. L. Carroll.	J. C. Mann ...	M.	Shaw, Savill & Albion Co., Ld.	,, ,,	23.1.37 to 1.5.37	11.5.37
114	*† *Ariguani* ...	A. E. Harvey	B. Coe, H. Rowstron, T. H. Bull.	B. M. Evans ...	S.	Elders & Fyffes, Ld.	,, ,,	8.6.37 to 7.8.37	10.8.37
039	†† *Arlanza*	A. Cocks, D.S.C., R.D., Capt., R.N.R.	A. J. G. Banff, C. C. Dingle, F. Thacker.	G. Hunt ...	,,	Royal Mail Lines, Ld.	,, ,,	31.5.37 to 11.7.37	16.7.37
233	†† *Ascania* ...	A. C. Greig, O.B.E., R.D., Capt., R.N.R.	A. G. Cuthill, J. H. Kenworthy, J. T. Marr.	J. W. Haynes ...	,,	Cunard White Star, Ld.	,, ,,	25.5.37 to 3.9.37	6.9.37
							Fm. 912	25.5.37 to 3.9.37	6.9.37
013	†† *Asturias* ...	A. Purvis	J. Fox, L. D. Jennings, R. J. Finch.	T. Bradfield ...	,,	Royal Mail Lines, Ld.	Fms. 911 & 138	16.6.37 to 16.7.37	20.7.37
091	†† *Athenia*	W. Rennie	A. M. Mackinnon, L. T. Napier, J. R. Henderson.	D. Don	,,	Donaldson Atlantic Line.	,, ,,	16.5.37 to 3.7.37	9.7.37
							Fm. 912	16.5.37 to 3.7.37	9.7.37
028	†† *Athlone Castle*, M.S.	A. Barron	S. Thompson, G. H. Pickering, E. Harvey.	H. Oliver ...	,,	Union-Castle Mail S.S. Co., Ld.	Fms. 911 & 138	6.6.37 to 21.7.37	27.7.37
102	†† *Atlantis*	F. R. Miles, R.D., Capt., R.N.R.	D. R. Walker	W. H. Chick ...	M.-S.	Royal Mail Lines, Ld.	,, ,,	7.6.37 to 13.7.37	17.7.37
240	*† *Aurania* ...	S. E. Stubbs, O.B.E., R.D., Commr., R.N.R.	W. Austin, H. G. Morgan, H. L. Pryse.	W. E. Thompson	,,	Cunard White Star, Ld.	,, ,,	31.5.37 to 13.8.37	18.8.37
103	*† *Ausonia* ...	W. C. Battle, D.S.C., R.D., Capt., R.N.R.	J. D. Armstrong, J. W. Tone, W. F. Dennison.	V. Newton ...	,,	,, ,,	,, ,,	13.6.37 to 27.8.37	30.8.37
							Fm. 912	13.6.37 to 27.8.37	30.8.37
046	*† *Australia Star*, M.S.	T. Williams	J. Davis, N. Wilson, F. H. Smith.	J. St. C. Smart	M.	Blue Star Line, Ld.	Fms. 911 & 138	9.5.37 to 18.8.37	21.8.37
133	†† *Avelona Star* ...	G. E. Hopper	M. B. M. Tallack, P. A. Clark, S. H. Waters.	S. J. J. Scott ...	M.-S.	,, ,,	,, ,,	2.3.37 to 16.4.37	22.4.37
045	†† *Avila Star* ...	R. J. Thomas	S. Ranson, E. Baker, J. Taylor.	H. Varley ...	,,	,, ,,	,, ,,	5.7.37 to 24.8.37	26.8.37
068	†† *Balmoral Castle*	E. A. Comley	H. E. Macmillan	J. H. Summers	S.	Union-Castle Mail S.S. Co., Ld.	,, ,,	15.5.37 to 4.9.37	7.9.37
110	*† *Balmoralwood* ...	L. C. Cockerell, D.S.O.	J. W. Pacey, J. C. Nicholson	S. N. Bissit ...	,,	Constantine Steamships, Ld.	,, ,,	23.5.37 to 19.6.37	25.6.37
							Fm. 912	23.5.37 to 19.6.37	25.6.37
037	*† *Baronesa* ...	R. W. Compton ...	J. R. Faulkner, F. W. Kent, S. W. Howell.	... ...	M.	Furness Lines, Ld.	Fms. 911 & 138	19.4.37 to 24.6.37	29.6.37
180	*† *Beaverbrae* ...	E. Jones	P. Locke, A. Mackie, G. Geddes.	F. A. Evans ...	M.-S.	Canadian Pacific Steamships, Ld.	,, ,,	13.6.37 to 4.9.37	8.9.37
							Fm. 912	13.6.37 to 4.9.37	8.9.37
130	*† *Beaverburn* ...	A. S. Phillips	E. V. Glennie, W. E. Halberr, R. J. Hyland.	S. J. Taylor ...	,,	,, ,,	Fms. 911 & 138	5.6.37 to 7.8.37	10.8.37
138	*† *Beaverdale* ...	A. Rothwell	W. Whitfield, G. M. Ball, H. G. Waugh.	J. Ormiston ...	,,	,, ,,	,, ,,	29.5.37 to 28.8.37	31.8.37
							Fm. 912	29.5.37 to 28.8.37	31.8.37
279	*† *Beaverford* ...	D. Pert	R. A. Sharp, G. Billot, A. Maclachlan.	J. J. Fraser ...	,,	,, ,,	Fms. 911 & 138	22.5.37 to 21.8.37	24.8.37
							Fm. 912	22.5.37 to 21.8.37	24.8.37
	*† *Benarty*	J. Watt	J. Phillips	... ...	M.	W. Thomson & Co.	Fm. 911	24.5.37 to 9.8.37	12.8.37
	*† *Benmohr* ...	J. C. Sinclair	... ...	... ...	M.L.	,, ,,	... ...	... ...	...
111	*† *Benwyvis* ...	H. J. Small	W. M. Marshall, W. P. Gollam, C. J. Birnie.	D. H. Walker ...	M.	,, ,,	Fm. 911	5.6.37 to 15.7.37	23.8.37
069	†† *Berengaria* ...	G. Gibbons, R.D., Capt., R.N.R.	J. H. Walker, J. Nicholas, J. Law.	S. W. Brown ...	S.	Cunard White Star, Ld.	Fms. 911 & 138	14.6.37 to 26.8.37	28.8.37
145	*† *Berwickshire* ...	J. D. Matthews ...	R. A. Harris, D. W. Muir, A. MacInnes.	B. W. Simmons	,,	Turnbull, Martin & Co., Ld.	,, ,,	19.5.37 to 6.8.37	28.8.37
007	*† *Bradfyne* ...	M. O'Neill	H. F. Thomas, P. Evans, T. McKenna.	C. E. Wheeler ...	,,	Sir Wm. Reardon Smith & Partners, Ld.	,, ,,	3.10.36 to 6.4.37	26.4.37
	*† *Brighton* ...	W. Lidbetter	E. Balcombe	A. Jones ...	,,	Southern Rly. ...	,, ,,	13.6.37 to 31.8.37	4.9.37
189	†† *Britannic*, M.S.	A. T. Brown, R.D., Capt., R.N.R.	L. D. W. Rand, F. L. Williams, A. Young.	F. Clark ...	,,	Cunard White Star, Ld.	,, ,,	14.6.37 to 28.8.37	2.9.37
106	*† *British Colonel* (tank)	C. H. Fulcher	G. E. Hodgerson, C. Rennels, R. Mowbray.	N. G. Swanson	M.	British Tanker Co., Ld.	,, ,,	3.6.37 to 20.7.37	23.7.37
038	*† *British Corporal* (tank)	J. H. Bovill	D. Lyle, H. H. Burke, D. J. Hurst.	W. E. G. Rickards	,,	,, ,,	,, ,,	29.5.37 to 6.8.37	19.8.37
	*† *British Diplomat*, M.S. (tank)	R. M. Maughan ...	F. P. Newboult	... ...	,,	,, ,,	Fm. 911	17.5.37 to 14.7.37	21.7.37
	*† *British Endurance*, M.S. (tank)	R. O. Putt	J. P. Clarke	... ...	,,	,, ,,	,,	23.5.37 to 15.8.37	4.9.37
054	*† *British General* (tank)	F. O. Armstrong ...	H. F. Wood, P. E. Norton, A. I. Henderson.	F. Hardford ...	,,	,, ,,	Fms. 911 & 138	27.5.37 to 22.8.37	31.8.37
	*† *British Grenadier* (tank)	J. A. Ferrier	H. P. Finch	... ...	,,	,, ,,	Fm. 911	23.5.37 to 2.8.37	12.8.37
	*† *British Hussar* (tank)	S. D. Bumstead ...	F. M. Shipway	... ...	,,	,, ,,	,,	28.6.37 to 13.8.37	26.8.37
6	*† *British Officer* (tank)	W. Watkin-Thomas ...	C. E. Tanner, A. Wilson, A. L. Gillies.	W. Taylor ...	,,	,, ,,	Fms. 911 & 138	7.6.37 to 13.8.37	17.8.37
	*† *British Premier* (tank)	C. W. Stook	... ...	... ...	,,	,, ,,	... ...	... ...	...
	*† *British Resolution* M.S. (tank)	R. H. Farrington ...	... ...	... ...	,,	,, ,,	... ...	... ...	...
	*† *British Statesman* (tank)	J. S. Copplestone ...	A. D. R. Macdonald... ...	... ...	,,	,, ,,	Fm. 911	11.6.37 to 1.8.37	11.8.37
	*† *British Strength*, M.S. (tank)	J. C. Leybourne ...	F. W. Willis	... ...	,,	,, ,,	,,	16.6.37 to 14.7.37	19.8.37
	*† *British Workman* (tank)	A. C. Baillie	R. T. Hedley	... ...	,,	,, ,,	,,	31.5.37 to 23.7.37	31.7.37
249	*† *Buteshire* ...	C. A. I. Laird	P. McMillan, R. H. Pape, C. F. Cooke.	W. W. Whewell	S.	Houston Line ...	Fms. 911 & 138	1.1.36 to 23.5.36	24.6.36
200	*† *Cairnesk* ...	E. A. Organ	S. W. Parks	F. A. Munday ...	,,	Cairns, Noble & Co., Ltd.	Fms. 911 & 138	23.5.37 to 31.7.37	3.8.37
							Fm. 912	23.5.37 to 31.7.37	3.8.37
241	*† *Cairnglen* ...	A. W. Melling	A. Molineaux	R. A. Penny ...	,,	,, ,,	Fms. 911 & 138	30.5.37 to 7.8.37	11.8.37
							Fm. 912	30.5.37 to 7.8.37	11.8.37
159	*† *Cairnvalona* ...	A. C. Dickson ...	E. Carus, J. R. Smith, R. Armstrong.	... ...	,,	,, ,,	Fm. 911	8.8.37 to 4.9.37	7.9.37
							Fm. 912	8.8.37 to 4.9.37	7.9.37
031	†† *Caledonia* ...	A. Collie	H. L. P. King, R. M. Brown, B. S. Leiper.	J. F. Reid ...	,,	Anchor Line, Ld.	Fms. 911 & 138	13.6.37 to 28.8.37	31.8.37
							Fm. 912	13.6.37 to 28.8.37	31.8.37

	Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 11.6.37 to 9.9.37		Date Last Return Received.
139	†† *California* ...	R. W. Smart	J. D. Mackenzie, M. H. Lewis, R. Paton.	D. Thompson ...	S.	Anchor Line, Ld.	Fms. 911 & 138	23.5.37 to 4.9.37	8.9.37
	*† *Cambria* ...	E. B. Turner	F. G. J. Manning	J. Pritchard ...	,,	L.M. & S. Rly. ...	,, ,,	25.6.37 to 11.8.37	14.8.37
223	*† *Cambridge* ...	R. Williams	C. A. E. Jones, G. Dibley, R. J. Olsen.	B. Wheeler ...	,,	Federal S.N. Co., Ld.	,, ,,	13.1.37 to 24.5.37	21.6.37
042	†† *Cameronia* ...	G. B. Kelly	D. Barr, R. M. Brown, J. George.	H. McDonald ...	,,	Anchor Line, Ld.	,, ,,	30.5.37 to 14.8.37	19.8.37
							Fm. 912	30.5.37 to 14.8.37	19.8.37
252	*† *Camito*	R. J. Bostock	J. Cameron, A. W. King ...	R. E. Blizzard ...	,,	Elders & Fyffes, Ld.	Fms. 911 & 138	1.6.37 to 4.9.37	8.9.37
117	*† *Cape of Good Hope* M.S.	A. T. McGlashan ...	R. J. Carnochan, P. A. Wallace, H. Evans	G. W. Pragnell...	,,	Lyle Shipping Co., Ld.	,, ,,	29.4.37 to 10.6.37	12.7.37
266	†† *Carinthia* ...	P. A. Murchie, O.B.E., R.D., Capt., R.N.R.	F. J. Owen, R. Conway, J. Ashcroft.	R. F. Watson ...	,,	Cunard White Star, Ld.	,, ,,	7.6.37 to 17.7.37	30.7.37
							Fm. 912	7.6.37 to 17.7.37	30.7.37
092	†† *Carnarvon Castle*, M.S.	H. L. Scholefield ...	H. C. Ford, F. Marriott ...	R. Brew ...	,,	Union-Castle Mail S.S. Co., Ld.	Fms. 911 & 138	24.4.37 to 15.8.37	17.8.37
155	†† *Carthage* ...	W. S. L. Pocock ...	R. A. Gerry, M. Greasley, L. Beggs.	F. Rose ...	M.-S.	P. & O. S.N. Co.	,, ,,	10.5.37 to 11.8.37	14.8.37
184	†† *Cathay*	C. B. Roche	D. West, D. W. A. Bell, L. Porter.	H. Dawson ...	,,	,, ,, ,,	,, ,,	15.2.37 to 20.5.37	24.5.37
	Cato	—. Robinson	... ...	... ...	M.L.	Ellerman's Wilson Line, Ld.	... ...	... ...	...
127	*† *Cavina*	W. T. Forrester, O.B.E.	W. S. Chanter, G. M. Roberts	A. N. Taylor ...	S.	Elders & Fyffes, Ld.	Fms. 911 & 138	18.5.37 to 21.8.37	24.8.37
011	†† *Ceramic* ...	H. C. Elford	G. F. Cresswell, G. Hawley, H. Cartwright.	W. Ross ...	,,	Shaw, Savill & Albion Co., Ld.	,, ,,	18.1.37 to 5.5.37	7.5.37
							Fm. 912	18.1.37 to 5.5.37	7.5.37
029	*† *Cheshire*, M.S. ...	C. A. Harris	J. B. Quinn, A. N. Williamson, C. R. Lovell.	F. W. Greaves ...	,,	Bibby Bros. & Co.	Fms. 911 & 138	24.5.37 to 31.7.37	3.8.37
191	*† *Chindwin* ...	G. Paterson	J. S. Whitehead, J. A. Cole, J. M. Neitch.	A. C. Hedley ...	,,	P. Henderson & Co.	,, ,,	22.3.37 to 25.5.37	4.6.37
067	*† *Chinese Prince*, M.S.	W. Finch	W. Niven, A. H. Kent, E. J. Roberts.	E. J. Shillabeer	M.L.	Furness Lines Ld.	Fm. 915	8.1.37 to 22.4.37	1.6.37
192	†† *Chitral*	H. Elliott Smith, R.D., Lt.-Commr., R.N.R.	J. C. Langton, R. H. Turner, E. V. Lewis.	A. R. Beynon ...	M.-S.	P. & O. S.N. Co.	Fms. 911 & 138	17.4.37 to 22.7.37	30.7.37
051	*† *City of Auckland*	H. G. Jenkins, O.B.E.	E. G. O'Driscoll, D.C. Hamilton	G. B. Cleland ...	S.	Ellerman Lines, Ld.	,, ,,	23.6.37 to 5.8.37	19.8.37
135	*† *City of Barcelona*	W. Hill	R. A. Jones, A. Cran, R. J. Jeffers.	R. Stewart ...	M.	,, ,, ,,	,, ,,	5.6.37 to 4.8.37	16.8.37
265	*† *City of Baroda*	G. P. M. O'Halloran ...	W. H. Dalton, R. S. Steel, D. Crook.	G. S. Creighton	S.	,, ,, ,,	,, ,,	15.7.37 to 10.8.37	30.8.37
057	††*City of Benares* ...	A. Lee	H. H. Asher, J. Pringle, P. S. Morrison.	A. Fairweather	,,	,, ,, ,,	,, ,,	7.6.37 to 26.6.37	29.6.37
158	*† *City of Cairo* ...	A. N. Hogg	T. B. Savigny, S. E. Britt, F. C. Mason.	A. C. Gavin ...	M.	,, ,, ,,	,, ,,	13.7.37 to 12.8.37	16.8.37
215	*† *City of Canberra*	H. R. Jackson ...	A. Travis, A. Westlake, T. Coun.	T. Tolland ...	,,	,, ,, ,,	,, ,,	31.3.37 to 19.8.37	2.9.37
							Fm. 912	31.3.37 to 19.8.37	2.9.37
033	*† *City of Canton* ...	E. Scrymgeour... ...	M. W. Tyrrell, W. E. Fletcher, T. L. Vaughan.	L. J. Delaney ...	,,	,, ,, ,,	Fms. 911 & 138	15.6.37 to 28.8.37	6.9.37
157	*† *City of Delhi* ...	F. W. Penberthy ...	J. Wotherspoon, W. Nimmo, T. Lovell.	T. A. Walker ...	S.	,, ,, ,,	,, ,,	7.6.37 to 17.6.37	7.7.37
030	*† *City of Dieppe*	H. Cartwright	J. F. MacVicar, J. F. Mitchell, J. B. Muir.	W. A. Bassom ...	,,	,, ,, ,,	,, ,,	2.7.37 to 10.7.37	4.8.37
049	*† *City of Evansville*	D. O. Evans	F. P. Monkton, A. G. Freeman, F. W. Woods.	F. J. Glynn ...	M.	,, ,, ,,	,, ,,	19.3.37 to 29.4.37	5.7.37
220	†† *City of Exeter* ...	D. L. Lloyd	P. C. Wilson, R. Webber, W. H. Wilson.	L. Hugo ...	S.	,, ,, ,,	,, ,,	31.5.37 to 1.8.37	14.8.37
089	*† *City of Hereford*	W. J. Merchant ...	N. Williams, C. W. Cross, D. W. Penberthy.	W. R. Dunderdale	M.	,, ,, ,,	,, ,,	25.3.37 to 27.7.37	31.7.37
237	†† *City of London*...	J. G. Brown	W. J. Nixon, W. Dick, W. McMillan.	O. A. Read ...	S.	,, ,, ,,	,, ,,	26.7.37 to 12.8.37	7.9.37
256	*† *City of Lyons* ...	E. Mason	J. W. Cubbon, H. E. Roberts, W. James.	W. R. Beynon ...	M.	,, ,, ,,	,, ,,	17.3.37 to 7.7.37	23.8.37
066	†† *City of Nagpur*...	N. McNeil, O.B.E. ...	E. H. H. Walton	A. E. Dowe ...	S.	,, ,, ,,	,, ,,	10.1.37 to 14.3.37	5.4.37
074	†† *City of Paris* ...	D. M. Bremner ...	A. J. Barnett, W. G. Stobbs, I. McBeath.	G. Fenton ...	,,	,, ,, ,,	,, ,,	16.6.37 to 4.7.37	7.7.37
271	*† *City of Roubaix*	H. Spencer, D.S.C. ...	H. Nish, T. V. Birkett, A. H. G. Jones.	T. Sanson ...	M.	,, ,, ,,	,, ,,	26.7.37 to 15.8.37	2.9.37
272	*† *City of Singapore*	T. R. Watkins	K. B. James, G. Mathias, R. Broadbent.	J. J. Stephenson	,,	,, ,, ,,	,, ,,	24.4.37 to 1.8.37	28.8.37
035	*† *City of Sydney* ...	E. G. Hoppins	E. P. B. Bradbury, E. M. Robertson, R. M. Hall.	D. Uttley ...	,,	,, ,, ,,	,, ,,	10.6.37 to 17.7.37	10.8.37
							Fm. 912	10.6.37 to 17.7.37	10.8.37
167	*† *City of Tokio* ...	G. Burton	J. H. Aldridge, L. Hernan, R. K. Walker.	G. J. Manson ...	S.	,, ,, ,,	Fms. 911 & 138	24.7.37 to 2.8.37	10.8.37
	*† *City of Winchester*	W. S. Coughlan ...	H. Laird	... ...	,,	,, ,, ,,	Fm. 911	29.4.37 to 12.8.37	24.8.37
125	*† *City of Windsor*	F. Tibbetts	G. D. B. Davies, F. C. Dashley, N. Brading.	M. J. Hick ...	,,	,, ,, ,,	Fms. 911 & 138	14.7.37 to 2.8.37	16.8.37
027	*† *Clan Farquhar* ...	A. Low	J. Browne, J. Napier, J. Paterson.	W. J. Ferguson	M.	Clan Line Steamers, Ld.	,, ,,	19.6.37 to 30.7.37	4.8.37
050	*† *Clan Macalister*	F. J. Stenson, R.D., Capt., R.N.R.	S. M. Werrey-Easterbrook, J. Hubbard, W. C. Rodger.	C. J. Andrews ...	S.	,, ,, ,,	,, ,,	31.5.37 to 25.8.37	28.8.37
222	*† *Clan Macdougall*, M.S.	L. M. Redford ...	W. Graham, H. F. Town, J. L. Lowrey.	G. Turner ...	,,	,, ,, ,,	,, ,,	15.4.37 to 22.7.37	23.8.37
101	*† *Clan Macfarlane*	W. J. Hughes	J. E. Clayton, G. A. Fox, R. F. Carter.	T. M. Ferguson	,,	,, ,, ,,	,, ,,	5.2.37 to 23.4.37	4.5.37
118	*† *Clan Macindoe*...	H. Andrews	E. H. Pyett, A. S. Palethorpe, —. May.	D. C. Munro ...	,,	,, ,, ,,	,, ,,	4.6.37 to 23.8.37	31.8.37
082	*† *Clan Macnair* ...	R. J. W. Bennett ...	H. B. Fowler, R. W. Cook, J. B. Sparkes.	C. A. B. Scott ...	,,	,, ,, ,,	,, ,,	19.4.37 to 15.8.37	30.8.37
255	*† *Clan Macneil* ...	H. E. G. Scott Smith, O.B.E., R.D., Lieut.-Commr. R.N.R.	W. R. Thomas, E. Coultas, D. Devall.	J. Brennan ...	,,	,, ,, ,,	,, ,,	4.5.37 to 1.8.37	5.8.37
001	*† *Clan Macphee* ...	J. H. Crellin	G. S. Bullock, R. N. Johnson	W. Scott ...	,,	,, ,, ,,	,, ,,	26.4.37 to 9.7.37	17.7.37
168	*† *Clan Mactaggart*	C. C. Parfitt	C. A. Thomas, J. de Daris, T. Gilles.	J. G. Wood ...	,,	,, ,, ,,	,, ,,	18.5.37 to 2.8.37	16.8.37
261	*† *Clan Mactavish*	H. M. Rodger	A. V. Gorden, D. Brewer, C. D. Maritty.	J. Mitchell ...	,,	,, ,, ,,	,, ,,	28.4.37 to 8.6.37	12.6.37
002	*† *Clan Macwhirter*	E. E. Arthur	A. Woodall, J. V. Findlay, T. P. Cranwell.	J. Dell	,,	,, ,, ,,	,, ,,	12.4.37 to 14.7.37	13.8.37
109	*† *Clan Morrison* ...	B. A. Hardinge ...	B. Grindley, J. W. Rennie, F. B. Fairweather.	C. Ashcroft ...	,,	,, ,, ,,	,, ,,	5.7.37 to 20.7.37	9.8.37
	*† *Clement* ...	W. E. Griffiths, Lt.-Commr., R.N.R.	T. E. Williams, G. G. Roberts	... ...	,,	Booth S.S. Co., Ld.	Fm. 911	9.4.37 to 17.7.37	27.8.37
041	*† *Clydebank*, M.S.	W. Broome	C. W. Haycraft, A. Cornell, J. R. Mahon.	J. Farley ...	,,	A. Weir & Co. ...	Fms. 911 & 138	17.4.37 to 11.6.37	6.8.37

	Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 11.6.37 to 9.9.37.		Date Last Return Received.
084 ††	*Clydefield*, M.S. (tank)	D. A. Low	H. J. Humphries, R. Barry, J. Walters.	W. Gillies ...	S.	Hunting & Son, Ltd.	Fms. 911 & 138	30.5.37 to 1.8.37	24.8.37
016 *†	*Comliebank*, M.S.	V. Harper	H. S. Brown, L. W. Thorne, E. W. Dibble.	M. F. Cantillon	,,	A. Weir & Co. ...	,, ,,	28.12.36 to 31.5.37	9.6.37
185 ††	*Comorin* ...	C. W. Cartwright, D.S.C.	P. C. Reid, D. F. Lombard, N. H. Thompson.	E. Howard ...	M.-S.	P. & O. S.N. Co.	,, ,,	30.5.37 to 1.9.37	4.9.37
198 *†	*Contractor* ...	H. Collins	R. H. Platts, W. H. Allen, R. Ledgers.	G. I. Gilling ...	M.	T. & J. Harrison	,, ,,	16.5.37 to 11.7.37	19.7.37
258 ††	*Corfu*	J. H. Biggs, R.D., Commr., R.N.R. ...	J. S. Sutherland, W. T. C. Lethbridge, H. V. Williamson.	R. V. McCreath	M.-S.	P. & O. S.N. Co.	,, ,,	11.4.37 to 14.7.37	21.7.37
214 *†	*Counsellor* ...	A. H. Frew	F. Steventon, W. Moore, J. Roberts.	J. Healy ...	M.	T. & J. Harrison	,, ,,	7.2.37 to 12.3.37	21.4.37
*†	*Crispin*	A. Elliott	H. W. Taggart, J. Whayman, W. Torkington.	W. Hamersley ...	S.	Booth S.S. Co.,Lt.	,, ,,	9.1.37 to 23.5.37	25.5.37
036 *†	*Cumberland* ...	E. A. Burton	K. A. Vasey, D. H. Chadwick, D. C. M. Campbell.	E. D. Slater ...	,,	Federal S.N. Co., Ld.	,, ,,	25.2.37 to 7.7.37	29.7.37
274 *†	*Custodian* ...	T. J. Lacey	R. E. Harvey, T. B. Littlechild, W. Pemberton.	C. Dodd ...	M.	T. & J. Harrison	,, ,,	1.3.37 to 28.4.37	14.5.37
219 *†	*Dearne*	T. H. Woodhead ...	J. Clark, W. Bury	R. D. Akers ...	S.	L.M. & S. Rly. ...	Fm. 915 Fms. 911 & 138	27.3.37 to 12.6.37 19.6.37 to 21.8.37	24.8.37
*†	*Deebank* ...	J. K. Brook, D.S.O., R.D., Commr., R.N.R.	A. Cameron, J. D. Betts, M. A. Bulley.	... ...	,,	A. Weir & Co. ...	,, ,,	31.12.36 to 15.4.37	24.4.37
204 ††	*Derbyshire*, M.S.	G. L. English	A. Beharrel, G. Meggitt, T. David.	A. Rodger ...	,,	Bibby Bros. & Co.	,, ,,	20.6.37 to 28.8.37	2.9.37
061 *†	*Devon*	J. Blencowe	H. C. Turner, H. Watkins, K. Margerrison.	W. B. Charlton	M.	British India S.N. Co., Ld.	,, ,,	13.5.37 to 26.6.37	30.6.37
*†	*Diplomat* ...	J. J. Egerton	... ...	... ...	,,	T. & J. Harrison	... ...	...	...
072 *†	*Director* ...	E. Pearce	J. F. Tooth, A. A. Johnson, T. B. Littlechild.	F. E. Bayack ...	,,	T. & J. Harrison	Fms. 911 & 138	5.6.37 to 4.8.37	27.8.37
058 *†	*Dorset*, M.S. ...	J. Howell-Price ...	K. H. Barclay, H. G. Letts, E. G. Ott.	J. H. Dance ...	,,	Federal S.N. Co., Ld.	,, ,,	5.5.37 to 20.8.37	24.8.37
142 ††	*Duchess of Atholl*	W. B. Coyle, R.D., Commr., R.N.R.	F. Falconer, W. R. Thorburn, W. S. Stanley.	E. Murphy ...	M.-S.	Canadian Pacific Steamships, Ltd.	,, ,, Fm. 912	13.6.37 to 1.7.37 13.6.37 to 1.7.37	7.7.37 7.7.37
152 ††	*Duchess of Bedford.*	C. H. Sapworth ...	E. J. Oatridge, F. Roberts, C. Morris.	A. O'Sullivan ...	,,	,, ,,	Fms. 911 & 138 Fm. 912	23.5.37 to 28.8.37 23.5.37 to 28.8.37	2.9.37 2.9.37
151 ††	*Duchess of Richmond.*	H. A. Moore, R.D., Capt., R.N.R.	F. W. S. Roberts, J. Soan, F. Hicks.	D. Forster ...	S.	,, ,,	Fms. 911 & 138 Fm. 912	30.5.37 to 12.8.37 30.5.37 to 12.8.37	14.8.37 14.8.37
143 ††	*Duchess of York*	C. Richardson ...	C. H. Belton, R. Barlow ...	J. W. Potts ...	M.-S.	,, ,,	Fms. 911 & 138 Fm. 912	6.6.37 to 17.8.37 6.6.37 to 17.8.37	19.8.37 19.8.37
*†	*Duke of Argyll* ...	T. W. Richmond ...	W. Bleakley, S. Green ...	G. Poulton ...	S.	L.M. & S. Rly. ...	Fms. 911 & 138	2.6.37 to 25.7.37	5.8.37
*†	*Duke of Lancaster*	E. B. Sergeant ...	W. Cole, W. N. Greenwood...	F. Garrett ...	,,	,, ,, ...	,, ,,	20.5.37 to 6.8.37	19.8.37
*†	*Duke of Rothesay*	F. C. Raven	A. E. Willmott, J. Abram ...	G. Pilling ...	,,	,, ,, ...	,, ,,	5.6.37 to 7.8.37	11.8.37
098 ††	*Dunbar Castle*. M.S.	W. S. Colbourne, O.B.E., R.D., Commr., R.N.R.	G. W. Lawrenson	P. P. Williams...	,,	Union-Castle Mail S.S. Co., Ld.	,, ,,	25.4.37 to 26.6.37	1.7.37
*†	*Dunedin Star*, M.S.	D. Owen	J. Byrne	... ...	M.	Blue Star Line, Ld.	Fm. 911	5.4.37 to 19.7.37	5.8.37
193 ††	*Dunnottar Castle*, M.S.	A. H. Blackman ...	G. E. Stephenson, E. E. Clifton.	G. S. Lewis ...	S.	Union-Castle Mail S.S. Co. Ld.	Fms. 911 & 138	17.4.37 to 8.8.37	10.8.37
043 ††	*Dunvegan Castle*, M.S.	H. R. Northwood ...	A. D. White	W. A. Brown ...	,,	,, ,, ...	,, ,,	1.5.37 to 21.8.37	27.8.37
064 *†	*Durham*, M.S. ...	H. L. Upton, D.S.C., R.D., Capt., R.N.R.	M.W. N. Young, H. N. Lawson, R. E. Walker.	J. V. Stockman	M.	Federal S.N. Co., Ld.	,, ,,	21.12.36 to 1.5.37	13.6.37
*†	*Eastern Coast* ...	W. Quirk	R. E. Holt, W. H. Davies ...	... ...	M.L.	Coast Lines, Ld.	Fm. 915	17.7.36 to 28.12.36	15.2.37
077 ††	*Edinburgh Castle*	W. Weller	P. T. Shackell, A. J. Hart ...	A. G. Blow ...	S.	Union-Castle Mail S.S. Co., Ld.	Fms. 911 & 138	29.5.37 to 18.7.37	21.7.37
107 *†	*El Argentino*, M.S.	F. Ellis, D.S.C. ...	H. N. Sherwell, G. Brighton, R. Aldridge.	T. Cheevers ...	M.	Furness Lines ...	,, ,,	28.6.37 to 30.8.37	2.9.37
203 ††	*Empress of Australia.*	W. G. Busk-Wood, R.D., Commr., R.N.R.	E. F. Aikman, L. L. Shornton, R. Warsaw.	H. Littleot ...	S.	Canadian Pacific Steamships, Ltd.	,, ,, Fm. 912	9.6.37 to 8.7.37 9.6.37 to 8.7.37	12.7.37 12.7.37
034 ††	*Empress of Britain.*	G. R. Parry, R.D., Commr., R.N.R.	W. Stanley, W. S. Main, D. Dunn.	G. Potts ...	,,	,, ,, ,,	Fms. 911 & 138 Fm. 912	6.6.37 to 1.9.37 6.6.37 to 1.9.37	4.9.37 4.9.37
154 ††	*Empress of Canada.*	J. F. Patrick ... ... W. T. Kinby	C. F. Alltree, G. E. Murrell, J. A. Mitchell.	J. Newberg ...	M.L.	,, ,, ,,	Fm. 915	18.9.36 to 27.2.37	20.4.37
153 ††	*Empress of Japan*	L. D. Douglas, R.D., Lt.-Commr., R.N.R, W. T. Kinley.	J. Cranfield-Smythe, V. Laing, W. Sturdy.	V. McLure ...	,,	,, ,, ,,	,,	23.2.37 to 9.6.37	20.7.37
119 ††	*Erin*	R. N. Shore	W. A. Phillips, V. Hill, W. Faichney.	L. Attwood ...	S.	Erin S.S. Co., Ld.	Fms. 911 & 138 Fm. 912	14.5.37 to 24.7.37 14.5.37 to 24.7.37	29.7.37 29.7.37
010 *†	*Eros* (t-e) ...	R. C. Vigurs	H. T. Green, J. Matthews, H. E. Lascelles.	A. W. Evans ...	,,	,, ,,	Fms. 911 & 138	9.6.37 to 21.8.37	30.8.37
075 *†	*Esperance Bay*	R. McKenzie	E. Johansen, G. Houchen, H. Cartwright.	A. R. Porter ...	M.	G. Thompson & Co., Ld.	,, ,,	19.7.37 to 29.7.37	31.7.37
169 *†	*Essex*, M.S. ...	F. N. Wyatt	J. Brooke Smith, J. W. C. Pring, J. R. M. Ramsey.	N. I. Hallett ...	,,	Federal S.N. Co., Ld.	,, ,,	25.1.37 to 20.4.37	14.5.37
*†	*Explorer* ...	D. C. Sandison ...	T. R. Ness, J. Craig ...	... ...	M.L.	Scottish Fishery Board	Fm. 915	15.2.37 to 10.6.37	16.6.37
124 *†	*Fordsdale* ...	D. Christie	A. Warren, G. Sangwin, W. Dare.	D. Byrne ...	S.	Shaw, Savill & Albion Co., Ld.	Fms. 911 & 138	21.5.37 to 28.8.37	4.9.37
239 *†	*Foylebank*, M.S.	H. J. Smith	W. Blakeney, J. E. Allen, E. Bolton.	A. J. Locke ...	,,	A. Weir & Co. ...	,, ,,	7.2.37 to 22.4.37	31.5.37
173 ††	*Franconia* ...	B. H. Davies, O.B.E., R.D., Capt., R.N.R.	B. Tanner, E. W. Kent, J. V. Locke.	J. Harvey ...	,,	Cunard White Star, Ld.	,, ,, Fm. 912	4.6.37 to 28.8.37 4.6.37 to 28.8.37	2.9.37 2.9.37
186 ††	*Georgic*, M.S. ...	B. B. Oram, R.D., Commr., R.N.R.	F. E. Patchett, N. Kingscote, E. Gleave.	A. Schofield ...	,,	Cunard White Star, Ld.	Fms. 911 & 138 Fm. 912	30.5.37 to 13.8.37 30.5.37 to 13.8.37	16.8.37 16.8.37
245 *†	*Gitano*	H. R. Soulsby ...	S. Wilkinson, W. Stevens, F. Mason.	A. Hitchon ...	,,	Ellerman Wilson Line, Ltd.	Fms. 911 & 138 Fm. 912	3.6.37 to 10.8.37 3.6.37 to 10.8.37	17.8.37 17.8.37
234 *†	*Glaucus* ...	B. T. Batho	R. L. Cladingbowl, R. E. Wilks, L. R. Hill.	A. Dunn ...	M.L.	A. Holt & Co. ...	Fm. 915	1.3.37 to 20.6.37	15.2.37
026 *†	*Glenbank*, M.S.	J. Macdonald	W. J. H. Pearce, D. Morrison	H. Row ...	S.	A. Weir & Co. ...	Fms. 911 & 138	16.4.37 to 20.7.37	17.8.37
218 *†	*Harmonides* ...	F. R. Elwell	T. Paxton, J. L. Jones, V. Green.	J. E. Ellis ...	,,	Houston Line, Ld.	,, ,,	4.4.37 to 26.7.37	31.7.37
262 *†	*Hauraki*, M.S.	A. Reed	D. E. Grantham, E. A. Buckingham, J. H. Ibbotson.	D. S. Bell ...	M.L.	Union S.S. Co., of N.Z., Ld.	Fm. 915	2.12.36 to 1.4.37	10.6.37
171 *†	*Hertford* ...	J. Tuckett	J. Cree	... ...	S.	Federal S.N. Co., Ld.	Fms. 911 & 138	24.4.37 to 2.8.37	23.8.37
*†	*Hibernia* ...	J. R. Bulmer, M.B.E....	W. E. Meade	D. T. Rockey ...	,,	L.M. & S. Railway	,, ,,	30.1.37 to 17.5.37	27.5.37
182 ††	*Highland Brigade*, M.S.	R. G. Clayton, D.S.C., R.D., Capt., R.N.R.	G. A. V. Clint, F. J. Swallow, N. Seaton.	A. Reynolds ...	M.-S.	Royal Mail Lines, Ld.	,, ,,	26.5.37 to 13.7.37	17.7.37

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 11.6.37 to 9.9.37.		Date Last Return Received.
116 †† *Highland Chieftain*, M.S.	A. R. Murley	W. R. Moore. W. E. Gilling, N. C. Hearsee,	T. Desboro ...	M.-S.	Royal Mail Lines, Ld.	Fms. 911 & 138	28.4.37 to 22.8.37	27.8.37
099 †† *Highland Monarch*, M.S.	S. Weller	W. B. Ovison, S. R. Lloydd	E. F. Weatherhead.	,,	,, ,, ,,	,, ,,	24.6.37 to 10.8.37	19.8.37
230 †† *Highland Patriot*, M.S.	R. H. Robinson ...	W. D. Orde, G. E. Leach, W. B. Tennant.	M. J. Carpenter	,,	,, ,, ,,	,, ,,	9.6.37 to 25.7.37	20.8.37
250 †† *Highland Princess* M.S.	A. E. Cornich	H. V. Todd, H. Davies, H. Bowker.	C. P. Thayne ...	,,	,, ,, ,,	,, ,,	10.5.37 to 27.6.37	2.7.37
*† *Imperial Star* M.S.	D. R. Macfarlane ...	H. H. Arton, G. W. D. Davies, L. Laurenson.	C. North ...	M.	Blue Star Line, Ld.	Fm. 911	3.3.37 to 9.6.37	19.6.37
260 *† *Inanda*	W. H. Gibbings ...	P. B. Jones, E. P. Simmons, R. P. Jones.	E. J. Cook ...	,,	T. & J. Harrison	Fms. 911 & 138	1.5.37 to 27.8.37	4.9.37
*† *Inkosi*	J. T. Ling	F. G. La Hive, F. E. Steel, H. C. Gowan.	C. Harrison ...	S.	,, ,,	,, ,,	20.6.37 to 30.7.37	3.8.37
144 *† *Inverbank*, M.S.	A. C. Loads	L. C. Smith	J. T. Jupp ...	,,	A. Weir & Co. ...	,, ,,	30.6.37 to 12.7.37	24.7.37
*† *Isle of Guernsey*	F. W. Hodges, R.D., Commr., R.N.R.	C. E. Darley, A. Howe ...	H. Sturdy ...	,,	Southern Rly. ...	,, ,,	24.5.37 to 15.7.37	27.7.37
*† *Isle of Jersey* ...	H. H. Golding	G. Grant, H. Wellan	F. Barron ...	,,	,, ,, ...	,, ,,	16.4.37 to 25.8.37	2.9.37
*† *Isle of Sark* ...	R. J. Large	H. F. Breville	T. Stubbs ...	,,	,, ,, ...	,, ,,	11.6.37 to 1.9.37	2.9.37
*† *Ixion*	W. A. Turner ...	J. Gould, W. I. Symes, G. A. C. Barnard.	... ...	M.L.	A. Holt & Co. ...	Fm. 915	11.12.36 to 3.3.37	13.4.37
226 *† *Javanese Prince*, M.S.	C. S. Smith	H. Patterson, W. O. Young, J. T. Gray.	J. A. Campbell	,,	Furness Lines ...	,,	30.12.36 to 16.6.37	28.7.37
*† *Jeypore*	R. B. Beck	P. Brett, C. T. Halliday, A. G. Starsfield.	J. Glaister ...	M.-S.	P. & O. S.N. Co.	Fm. 911	7.6.37 to 29.6.37	19.7.37
188 †† *Kaisar-i-Hind* ...	L. F. Edwards ...	G. A. Wild, E. R. Rose ...	J. D. Downie ...	,,	,, ,,	Fms. 911 & 138	29.11.36 to 20.5.37	24.5.37
206 *† *Karamea*, M.S....	E. T. Grayston, D.S.C., R.D., Commr., R.N.R.	L. B. Miller, N. S. Milne, J. H. Stroud.	W. S. Davies ...	S.	Shaw Savill & Albion Co., Ld.	,, ,,	14.2.37 to 2.6.37	5.6.37
096 *† *Kelso*	A. H. Best	F. E. Lovern, J. B. Dunkley G. S. Anderton.	J. R. Dixon ...	,,	Ellerman Wilson Line Ld.	,, ,,	28.5.37 to 25.8.37	4.9.37
						Fm. 912 ,,	28.5.37 to 25.8.37	4.9.37
*† *Kemmendine* ...	W. C. C. Plage ...	E. J. D. Turner, J. McLachlan, G. McCallom.	W. C. Clarke ...	M.	P. Henderson & Co., Ld.	Fms. 911 & 138	17.3.37 to 15.5.37	20.5.37
190 *† *Kenbane Head* ...	T. F. Milner, R.D., Lt.-Commr., R.N.R.	G. A. Moore, W. A. Haddock, W. Sculby.	A. McCartney ...	S.	G. Heyn & Sons	,, ,,	23.7.37 to 21.8.37	24.8.37
						Fm. 912	23.7.37 to 21.8.37	24.8.37
112 *† *Kent*	J. V. Williams ...	J. W. Coen, A. Weatherall, E. Hutchinson.	A. S. Crocker ...	,,	Federal S.N. Co., Ld.	Fms. 911 & 138	16.2.37 to 30.3.37	14.4.37
*† *Kyno*	A. H. Best	S. Hutton, R. V. Turner, R. J. Dalgleish.	R. D. Bristy ...	,,	Ellerman Wilson Line, Ltd.	,, ,,	8.5.37 to 8.6.37	11.6.37
						Fm. 912	8.5.37 to 8.6.37	11.6.37
147 †† *Laconia* ...	P. R. Vaughan, D.S.C., R.D., Commr., R.N.R.	P. L. Butcher, G. T. Kavanagh, G. H. Morris.	R. M. Shore ...	,,	Cunard White Star, Ld.	Fms. 911 & 138	24.5.37 to 4.9.37	8.9.37
						Fm. 912	24.5.37 to 4.9.37	8.9.37
062 †† *Lancastria* ...	J. G. P. Bisset, R.D., Commr., R.N.R. ..	J. T. Jones, J. Ashcroft, A. B. Hastings.	S. J. Ashgold ...	,,	,, ,, ,,	Fm. 911 & 138	23.5.37 to 13.6.37	15.6.37
						Fm. 912	23.5.37 to 13.6.37	15.6.37
267 *† *Lassell*, M.S. ...	W. W. Watson ...	D. R. Matheson, T. J. Sweeney, B. Green.	T. Allen ...	,,	Lamport & Holt Line, Ld.	Fms. 911 & 138	28.3.37 to 22.6.37	26.6.37
083 *† *Lautaro*, M.S. ...	H. B. Reece, R.D., Capt., R.N.R.	B. Skellorn, A. Turner. K. Barkley.	P. O'Sullivan ...	M.	Pacific S.N. Co. ...	,, ,,	4.12.36 to 23.3.37	15.4.37
251 *† *Levernbank*, M.S.	H. A. Jones	A. E. Newton, T. J. Howell	H. S. Matheson	S.	A. Weir & Co. ...	,, ,,	25.5.37 to 8.7.37	30.7.37
093 *† *Llandaff Castle*...	J. C. Brown, R.D., Capt. R.N.R.	R. S. Davies	E. H. Pitt ...	,,	Union-Castle Mail S.S. Co., Ld.	,, ,,	12.6.37 to 19.8.37	27.8.37
094 *† *Llandovery Castle*	C. E. H. Aylen, R.D., Commr., R.N.R.	J. G. P. Lewis	A. E. Hunter ...	,,	,, ,, ,,	,, ,,	30.11.36 to 31.1.37	9.2.37
097 †† *Llangibby Castle*, M.S.	R. W. Goodacre, R.D., Commr., R.N.R.	J. S. Higham	A. Sutton ...	,,	,, ,, ,,	,, ,,	18.4.37 to 17.6.37	28.6.37
216 *† *Llanstephan Castle*	B. Ray	C. W. Armstrong	... ...	,,	,, ,, ,,	Fm. 911	5.6.37 to 14.8.37	17.8.37
137 *† *Logician* ...	E. B. Curphey ...	W. C. Johnston, W. S. Eustance, G. H. Howard.	A. J. Leingley ...	,,	T. & J. Harrison	Fms. 911 & 138	26.4.37 to 14.7.37	17.7.37
*† *Loriga* M.S. ...	A. C. Taylor	J. Williams	... ...	M.	Pacific S.N. Co. Ld.	Fm. 911	19.6.37 to 3.7.37	7.7.37
008 *† *Losada*, M.S. ...	M. Armstrong, D.S.O....	R. J. G. Goodwin	D. A. Craine ...	,,	,, ,, ,, ,,	Fms. 911 & 138	2.2.37 to 5.6.37	9.6.37
232 *† *Madura*... ...	J. A. Wright	D. A. Jones, G. Suter, R. A. Bidmead.	H. O. Francis ...	,,	British India S.N. Co., Ld.	,, ,,	15.3.37 to 2.4.37	3.5.37
*† *Mahia*	W. T. Thompson ...	D. Ashley, R. A. Costa, N. Banks.	D. Irwin ...	S.	Shaw, Savill & Albion Co., Ld.	Fm. 911	28.3.37 to 21.7.37	30.7.37
140 *† *Mahratta* ...	W. Hill	W. Nuttall, A. G. Gorham ...	B. J. Smith ...	M.	T. & J. Brocklebank, Ld.	Fms. 911 & 138	24.3.37 to 22.8.37	2.9.37
014 *† *Mahronda* ...	L. T. Owen	W. F. Harris, J. B. Newman, A. E. Austin.	W. Ritch ...	,,	,, ,, ,,	,, ,,	13.5.37 to 13.8.37	6.9.37
015 *† *Mahsud* ...	H. D. Fulcher... ...	P. D. McKenzie, H. Simpson, H. Fosbrooke.	R. Burton ...	,,	,, ,, ,,	,, ,,	2.5.37 to 15.7.37	30.7.37
018 *† *Makalla* ...	J. Greenall	G. E. Jones, H. Gillespie, J. P. Hewitt.	W. Fallowfield	,,	,, ,, ,,	,, ,,	8.6.37 to 30.8.37	2.9.37
236 *† *Malayan Prince*, M.S.	W. Irvine	J. A. Reeves, A. A. Spilman, J. A. Taylor.	J. S. Sharp ...	M.L.	Furness Lines ...	Fm. 915	16.4.37 to 25.7.37	8.9.37
195 †† *Maloja*	R. C. Dene	J. Simms, R. G. Wood, L. J. Cook.	A. Macbeth ...	M.-S.	P. & O. S.N. Co.	Fms. 911 & 138	2.5.37 to 4.8.37	16.8.37
009 *† *Manchester Brigade*	J. Barclay	H. Hancock, G. S. Swales, R. Hoffmann.	P. Francis ...	S.	Manchester Liners Ltd.	,, ,,	30.5.37 to 6.8.37	10.8.37
060 *† *Manchester Citizen*	J. M. Mitchell	O. A. Mayer, W. W. King ...	R. W. Garnham	,,	,, ,,	,, ,,	25.7.37 to 20.8.37	27.8.37
187 *† *Manchester Division*	E. W. Raper	W. E. Todd, L. A. Muir, A. Starmer.	D. O'Leary ...	,,	,, ,,	,, ,,	17.7.37 to 14.8.37	21.8.37
						Fm. 912	11.6.37 to 14.8.37	21.8.37
179 *† *Manchester Port*	P. Linton	N. E. Bewley, J. C. Briggs ...	J. J. Hand ...	,,	,, ,,	Fms. 911 & 138	24.5.37 to 29.7.37	5.8.37
						Fm. 912	24.5.37 to 29.7.37	5.8.37
253 *† *Manchester Producer.*	J. Makin	W. H. Downing, R. O. Venn, T. Lewis.	C. Morton ...	,,	,, ,,	Fms. 911 & 138	16.6.37 to 18.8.37	20.8.37
197 *† *Manchester Regiment*	C. H. Stott	E. W. Espley, C. H. Harrington, W. Quirck.	D. D. Cochrane	,,	,, ,,	,, ,,	19.6.37 to 28.8.37	2.9.37
						Fm. 912	19.6.37 to 28.8.37	2.9.37
146 *† *Mandasor* ...	G. Shaw	G. McL. Reid, S. Broughton, A. E. Evans.	C. C. Dicker ...	M.	T. & J. Brocklebank, Ld.	Fms. 911 & 138	21.5.37 to 30.7.37	9.8.37
*† *Maron*, M.S. ...	E. Marriott	A. C. Gravelle, A. F. Fry, M. J. Case.	... ...	M.L.	A. Holt & Co. ...	Fm. 915	7.11.36 to 23.2.37	4.4.37
213 †† *Mashobra* ...	J. L. Beatty	L. Osborne, N. Lucas, C. Bennett.	J. D. Lovelock...	M.-S.	British India S.N. Co., Ld.	Fms. 911 & 138	15.5.37 to 17.6.37	9.7.37
235 †† *Mataroa* ...	A. McIntosh	E. B. Macfarren, J. Wildsmith, G. C. Greenham.	J. Harvey ...	S.	Shaw, Savill & Albion Co., Ld.	,, ,,	21.2.37 to 1.6.37	7.6.37

	Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 11.6.37 to 9.9.37		Date Last Return Received
023	*† *Matheran* ...	W. T. King	A. L. Austin, R. Penston, W. Spencer.	J. D. Jones ...	M.	T. & J. Brocklebank, Ltd.	Fms. 911 & 138	22.3.37 to 31.5.37	4.6.37
024	*† *Matra*	N. P. Cornish	E. L. Jones, H. G. Allan, F. F. Eggleston.	E. R. Capps ...	,,	,, ,,	,, ,,	18.5.37 to 3.8.37	4.9.37
126	*†*Melmore Head* ...	T. M. Heddles	... ...	... ...	S.	G. Heyn & Son ...	... ...	... ...	...
278	*† *Middlesex* ...	H. T. Wilde	A. Brown, A. H. Martin, H. A. Porter.	S. Jones ...	,,	Federal S.N. Co., Ld.	Fms. 911 & 138	15.2.37 to 18.7.37	21.7.37
194	†† *Moldavia* ...	R. R. Burge	H. R. Prowse, F. Collinson, J. M. Grover.	J. S. Skinner ...	M.-S.	P. & O. S.N. Co.	,, ,,	30.5.37 to 19.8.37	23.8.37
199	†† *Mongolia* ...	W. L. Pope, R.D., Capt., R.N.R.	E. J. Spurling, E. L. Rose, G. MacLean.	R. E. Hammond	,,	,, ,, ,,	,, ,,	20.3.37 to 5.8.37	9.8.37
070	†† *Montcalm* ...	H. J. Ferguson ...	W. J. P. Roberts, A. D. Morison, L. Hill.	J. Biggins ...	S.	Canadian Pacific Steamships, Ld.	,, ,, Fm. 912	24.6.37 to 2.9.37 24.6.37 to 2.9.37	4.9.37 4.9.37
149	†† *Montclare* ...	W. S. Brown	J. Roche, R. McKillop ...	H. A. Bowman	M.-S.	,, ,,	Fms. 911 & 138 Fm. 912	27.5.37 to 15.7.37 27.5.37 to 15.7.37	19.7.37 19.7.37
150	†† *Montrose* ...	A. R. Meikle, R.D., Capt., R.N.R.	R. V. Burns, E. A. G. Davis, J. Sargent.	G. Warren ...	S.	,, ,,	Fms. 911 & 138 Fm. 912	30.5.37 to 24.8.37 30.5.37 to 24.8.37	25.8.37 25.8.37
164	†† *Mooltan*... ...	F. E. French, R.D., Capt., R.N.R.	J. D. Strike, R. B. Webster, W. H. C. Wood-Roe.	H. Williamson	M.-S.	P. & O. S.N. Co.	Fms. 911 & 138	4.4.37 to 8.7.37	13.7.37
196	†† *Mulbera*... ...	W. A. Grant-Pyves ...	J. L. Richardson	P. T. McKinlay	,,	British India S.N. Co., Ld.	,, ,,	26.4.37 to 26.5.37	28.6.37
078	*† *Myrtlebank*, M.S.	C. S. Holbrook ...	G. E. Linfield, T. H. Welton, S. Dowdeswell.	A. W. Mosley ...	S.	A. Weir & Co. ...	,, ,,	28.4.37 to 14.7.37	6.9.37
201	†† *Naldera* ...	E. F. Hannan, R.D., Commr., R.N.R.	M. H. D'Aeth, F. W. J. Pearce, E. R. Physick.	R. T. Soans ...	M.-S.	P. & O. S.N. Co.	,, ,,	20.1.37 to 7.4.37	27.4.37
	*† *Nankin*	T. H. Scott White ...	J. Plant, G. Reed, W. N. Swan.	... ...	M.L.	Eastern and Australasian S.S. Co., Ld.	Fm. 915	13.2.37 to 4.5.37	30.7.37
227	*† *Nardana* ...	C. Dorkin-White ...	T. Braidwood, H. Goater, D. W. Austin.	S. V. Knight ...	M.	British India S.N. Co., Ld.	Fms. 911 & 138	3.11.36 to 22.2.37	16.3.37
202	†† *Narkunda* ...	H. G. M. Williams, Lt. Comr., R.N.R.	W. W. Gow, W. N. Eade, W. R. Stockdale.	C. W. Herbert ...	M.-S.	P. & O. S.N. Co.	,, ,,	7.3.37 to 9.6.37	12.6.37
	†† *Nascopie* ...	T. F. Smellie	A. H. Dobson	... ...	S.	Hudson's Bay Co.	Fm. 911	14.7.36 to 1.10.36	22.10.36
257	*† *Natia*	E. A. Bridges	R. Hart, T. A. Buckney, W. Thomas.	D. Chalmers ...	M.	Royal Mail Lines, Ld.	Fms. 911 & 138	24.3.37 to 21.5.37	25.5.37
	*† *Nellore*	H. C. Stratford ...	K. Dawson, A. Wilcox, S. McNeil.	... ...	M.L.	Eastern and Australasian S.S. Co., Ld.	Fm. 915	13.3.37 to 3.6.37	5.8.37
162	*† *Nestor*	J. J. Power	J. H. Higson, H. Graham, I. Skurray.	C. Townsend ...	S.	A. Holt & Co. ...	Fms. 911 & 138	1.2.37 to 27.5.37	3.6.37
136	*† *Newfoundland* ...	T. H. Webber	J. E. Wilson, J. L. Macklin, C. H. Kenyon.	W. C. Brock ...	,,	Furness Lines ...	,, ,, Fm. 912	8.5.37 to 8.8.37 8.5.37 to 8.8.37	17.8.37 17.8.37
	*† *New Zealand Star*, M.S.	J. B. Hall	R. H. Soloman, J. J. Dickson, D. Greenhorn.	J. A. Bradley ...	M.	Blue Star Line, Ld.	Fm. 911	5.2.37 to 21.5.37	28.5.37
210	*† *Niagara*... ...	W. Martin	A. H. S. Gell, A. J. McKenzie, F. S. Bowman.	G. M. Power ...	M.L.	Canadian-Australasian Line, Ld.	Fm. 915	19.3.37 to 3.7.37	1.9.37
	*† *Northern Coast*...	H. Cameron	P. Miller, E. Greenall, W. Grogan.	... ...	,,	Coast Lines, Ld.	,,	26.1.37 to 28.6.37	6.7.37
	*† *Northern Gem*, S.T.	W. R. A. Hicks ...	... ...	... ...	S.	Mac Line Ltd. ...	... ...	... ...	...
181	*† *Nova Scotia* ...	J.W. Murphy	W. Lutyens, R. Handley, E. E. Sainty.	J. D. Murphy ...	,,	Furness Lines ...	Fms. 911 & 138 Fm. 912	26.5.37 to 25.8.37 26.5.37 to 25.8.37	28.8.37 28.8.37
243	*† *Opawa*, M.S. ...	H. G. B. Field ...	S. Jarvis, J. McCulloch, J. Monterief.	W. Jackson ...	M.	New Zealand Shipping Co., Ld.	Fms. 911 & 138	17.2.37 to 4.6.37	26.7.37
172	†† *Orama*	E. P. Cameron, R.D., Capt., R.N.R.	H. R. Treseder, W. H. Barker, P. G. A. King.	F. W. Helman ...	S.	Orient S.N. Co., Ld.	,, ,,	24.5.37 to 24.8.37	4.9.37
080	*† *Orari*, M.S. ...	J. G. Almond	C. J. Cordran, H. R. Smith, J. Cree.	W. E. Fordham	M.	New Zealand Shipping Co., Ld.	,, ,,	23.12.36 to 25.1.37	2.4.37
246	†† *Orbita*	J. H. Kirkwood ...	D. Jones, D. W. Hutchison, F. Williams.	D. H. Sinclair ...	M.-S.	Pacific S.N. Co.	,, ,,	16.3.37 to 22.5.37	29.5.37
087	†† *Orduna*	E. H. Large, R.D., Commr., R.N.R.	R. D. Eckford, E. C. Hicks, J. Lumpner.	W. G. Sutherland	,,	,, ,,	,, ,, Fm. 912	14.5.37 to 9.7.37 14.5.37 to 9.7.37	12.7.37 12.7.37
081	†† *Orcades*	F. R. O'Sullevan ...	... ...	... ...	,,	Orient S.N. Co. ...	... ...	... ...	...
148	†† *Orford*	A. E. Nicholls	J. N. Hulse, G. R. Grandage, R. J. Craddock.	J. Macdonald ...	,,	,, ,,	Fms. 911 & 138	1.3.37 to 1.6.37	4.6.37
019	†† *Orion*	A. L. Owens, R.D., A.D.C. Capt. R.N.R.	P. Sargent, E. M. Mackay, G. M. Croghan.	A. F. Edwards	,,	,, ,,	,, ,,	14.1.37 to 7.5.37	7.6.37
174	†† *Ormonde* ...	N. Savage	C. Edgcombe, L. Sly, A. E. Coles.	A. Seaton ...	,,	,, ,,	,, ,,	28.3.37 to 29.6.37	2.7.37
055	†† *Oronsay* ...	C. G. Matheson, D.S.O., R.D., Commodore, R.N.R.	J. K. Johnson, C. Pinckney, T. S. Hardy.	P. T. Darby ...	,,	,, ,,	,, ,,	26.4.37 to 27.7.37	4.8.37
085	†† *Orontes*	G. G. Thorne, R.D., Capt., R.N.R.	R. W. Roberts, D. Williams, E. B. Rhead.	R. B. Knights ...	,,	,, ,,	,, ,,	27.6.37 to 26.8.37	30.8.37
	*† *Oropesa* ...	R. E. Dunn, O.B.E. ...	G. Gerrety, F. J. Leicester, R. H. Sissons.	G. Penketh ...	M.	,, ,,	Fm. 911	25.5.37 to 1.8.37	5.8.37
156	†† *Otranto*	L. V. James, D.S.C. ...	S. Ayles, J. C. Stratford, F. R. F. Wilson.	J. L. Curry ...	M.-S.	,, ,,	Fms. 911 & 138	15.2.37 to 16.5.37	26.5.37
	*† *Oxfordshire* ...	P. G. Cooper	C. A. Gibson	... ...	S.	Bibby Bros. & Co.	Fm. 911	25.4.37 to 4.7.37	6.7.37
044	*† *Pacific Exporter*, M.S.	—. Reaveley	E. Jones, S. Lavis, S. J. Hardy.	W. J. Moore ...	,,	Furness Lines ...	Fms. 911 & 138	10.2.37 to 12.5.37	19.5.37
	*† *Paris*	C. G. G. Munton ...	E. W. Smith	W. Kelley ...	,,	Southern Rly. ...	,, ,,	1.6.37 to 29.8.37	2.9.37
040	*† *Port Adelaide* ...	R. Williams	F. R. Gorman, E. G. Jones, R. Aylward.	J. L. Stewart ...	,,	Commonwealth & Dominion Line, Ld.	,, ,,	9.9.36 to 18.2.37	1.3.37
238	*† *Port Alma*, M.S.	J. Jack	G. Puttick, T. L. Kidwell, F. W. Elgar.	J. Ballance ...	,,	,, ,, ,,	,, ,,	2.4.37 to 17.7.37	28.7.37
128	*† *Port Auckland*	C. A. Robinson ...	E. C. Read, F. Taylor, J. G. Thorn.	H. Workman ...	,,	,, ,, ,,	,, ,, Fm. 912	21.1.37 to 24.5.37 21.1.37 to 24.5.37	2.6.37 2.6.37
268	*† *Port Bowen* ...	E. O. Thomas	R. E. Garner, E. W. Young, D. N. Harries.	A. Naylor ...	,,	,, ,, ,,	Fms. 911 & 138	16.10.36 to 16.3.37	23.3.37
131	*† *Port Darwin* ...	T. H. Rigden	L. B. Philpott, J. L. Porter, P. Stansbury.	A. S. Bassi ...	,,	,, ,, ,,	,, ,, Fm. 912	11.6.37 to 14.7.37 11.6.37 to 14.7.37	4.8.37 4.8.37

	Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 11.6.37 to 9.9.37.		Date Last Return Received
095	*† *Port Dunedin*, M.S.	A. H. Brown	R. C. H. Webb, W. B. Craig, E. G. Jones.	W. J. B. Craig ...	S.	Commonwealth & DominionLine,Ld.	Fms. 911 & 138	4.3.37 to 13.6.37	23.6.37
163	*† *Port Gisborne*, M.S.	W. G. Higgs	N. J. Dedman, H. Clinch, R. Scott.	E. Mooney ...	,,	,, ,, ,,	,, ,,	10.2.37 to 14.5.37	19.5.37
	*† *Port Jackson*, M.S.	S. W. Hayter	L. W. Cady	... ...	,,	,, ,, ,,	Fm. 911	2.2.37 to 18.5.37	25.5.37
177	*† *Port Wellington*	R. Needham	W. D. Henderson, G. F. Pannett, R. A. Wight.	R. D. Waterhouse	,,	,, ,, ,,	Fms. 911 & 138	29.4.37 to 18.8.37	26.8.37
003	*† *Port Wyndham*, M.S.	W. Gilling	D. F. Morgan, C. J. Gorley, C. Stone.	W. Baldwin ...	,,	,, ,, ,,	,, ,,	19.2.37 to 26.5.37	15.6.37
	*† *Prague*	F. E. Beeching, D.S.C.	R. Wright, F. Woods ...	A. Potter ...	,,	L. & N.E. Rly. ...	,, ,,	1.6.37 to 30.8.37	4.9.37
063	*† *Queen City* ...	J. C. Cornwell	M. Williams, D. Boynon ...	J. Moore ...	,,	Sir Wm. Reardon Smith & Partners, Ld.	Fm. 911	5.5.37 to 12.7.37	30.7.37
183	†† *Queen Mary* ...	J. C. Townley, R.D., Capt., R.N.R.	E. A. Divers, F. G. Watts, H. O. Clarke.	A. H. Farman ...	,,	Cunard White Star, Ld.	Fms. 911 & 138	4.6.37 to 29.8.37	2.9.37
165	*† *Radnorshire*, M.S.	D. E. Evans	H. D. Hayes, J. A. A. Evans, H. Andrews.	I. T. Davies ...	,,	A. Holt & Co. ...	,, ,,	12.7.37 to 5.8.37	6.9.37
205	†† *Rajputana* ...	W. A. Cotching ...	I. M. Sinclair, R. W. Richardson, R. B. Nowell.	W. Banbury ...	M.-S.	P. & O. S.N. Co.	,, ,,	26.2.37 to 2.6.37	8.6.37
228	†† *Ranchi*	J. A. Smith	G. M. Farmiloe, J. MacArthur	W. Lewis ...	,,	,, ,, ,,	,, ,,	22.5.37 to 26.8.37	2.9.37
224	†† *Rangitane*, M.S.	A. W. McKellar, R.D., Capt., R.N.R.	M. L. Warren, E. O. Quick, D. Newman.	T. G. Bedford ...	,,	New Zealand Shipping Co., Ld.	,, ,,	6.3.37 to 6.6.37	21.6.37
217	†† *Rangitata*, M.S.	E. Holland	P. M. Church, R. A. Belfield, F. Jones.	H. R. Dedman	,,	,, ,, ,,	,, ,,	6.2.37 to 8.5.37	24.5.37
105	†† *Rangitiki*, M.S.	H. Barnett	H. Baddeley, J. Ormsby ...	L. Horn ...	,,	,, ,, ,,	,, ,,	9.1.37 to 17.4.37	22.4.37
207	†† *Ranpura* ...	J. M. Legg	P. C. Chorley, C. H. Stokes, G. Randall.	J. R. C. Johnson	,,	P. & O. S.N. Co.	,, ,,	22.11.36 to 24.2.37	31.3.37
071	†† *Rawalpindi* ...	M. G. Draper, R.D., Commr., R.N.R.	L. A. Hill, M. G. Morris, A. P. Godfrey.	S. W. Sharp ...	,,	,, ,, ,,	,, ,,	18.4.37 to 13.8.37	6.9.37
247	*† *Recorder* ...	J. J. Egerton	G. McGuinness, L. Harriman, G. H. Jolly.	G. Morriss ...	M.	T. & J. Harrison	,, ,,	4.4.37 to 26.6.37	29.6.37
132	*† *Reina del Pacifico*, M.S.	A. Ridyard, O.B.E. ...	H. Matthews, J. K. Campbell, A. P. Powell.	J. B. Stone ...	,,	Pacific S.N. Co. ...	,, ,,	20.6.37 to 14.8.37	21.8.37
276	†† *Remuera* ...	F. W. Robinson, R.D., Commr., R.N.R.	J. D. Bennett, R. S. Warren, J. D. Paterson.	E. Lawrence ...	S.	New Zealand Shipping Co., Ld.	,, ,,	15.4.37 to 21.7.37	4.8.37
	*† *Rhexenor* ...	R. C. Neville J. P. Williams	W. Ross, P. Dusine, T. Arch	C. G. Brawny ...	M.L.	A. Holt & Co. ...	Fm. 915	21.10.36 to 12.2.37	23.3.37
	*† *Rockflower* (S.T.)	L. D. Romyn	... ...	... ...	S.	Pickering & Haldane Steam Trawling Co., Ld.	Fm. 911	1.8.37 to 18.8.37	21.8.37
	*† *Rotorua* ...	C. B. Lamb	R. H. Carter, L. W. Fulcher.	... ...	M.	New Zealand Shipping Co., Ld.	Fm. 915	1.3.36 to 28.6.36	15.8.36
	*† *Ruahine* ...	G. Kinnell	J. E. Clarke, C. W. Roberts, J. A. Matthews.	... ...	S.	,, ,, ,,	Fm. 911	28.2.37 to 13.6.37	22.7.37
	*† *St. Helier* ...	R. Pitman	W. B. Williams	R. Little ...	,,	G.W. Railway ...	Fms. 911 & 138	10.7.37 to 31.8.37	2.9.37
	*† *St. Julien* ...	L. Richardson	G. Cartwright	E. Trapnell ...	,,	,, ,,	,, ,,	20.7.37 to 14.8.37	4.9.37
	*† *St Patrick* ...	H. C. Bond	T. D. Thomas	L. M. Wilmott	,,	,, ,,	,, ,,	1.6.37 to 12.8.37	4.9.37
100	†† *Samaria* ...	J. McRostie	W. J. Law, B. Harrison, J. C. Dawson.	R. A. J. Owlett	,,	Cunard White Star, Ld.	,, ,,	30.5.37 to 14.8.37	17.8.37
	*† *San Adolfo*, M.S. (tank)	L. P. Emmott	D. Skinner	... ...	M.-S.	Eagle Oil & Shipping Co., Ld.	Fm. 911	3.6.37 to 2.8.37	2.9.37
108	*† *San Alberto*, M.S. (tank)	C. Vidot	E. A. Holloway, R. E. Kirkley, C. W. Baker.	S. Shelley ...	M.	,, ,,	Fms. 911 & 138	14.6.37 to 14.8.37	18.8.37
	*† *San Alvaro*, M.S. (tank)	F. A. Kennett	C. H. Munday, R. R. Griffiths	... ...	M.-S.	,, ,,	Fm. 911	12.6.37 to 31.7.37	5.8.37
073	*† *San Arcadio*, M.S. (tank)	S. Perry	J. H. Gay, W. S. Smith, T. Chilman.	N. J. Leitch ...	M.	,, ,,	Fms. 911 & 138	27.5.37 to 3.8.37	28.8.37
	*† *San Casimiro* M.S. (tank)	H. Paterson	... ...	... ...	,,	,, ,,	... ...	... ...	...
	*† *Scotia*	W. T. Griffith	N. Lloyd Williams	J. H. Rockey ...	S.	L.M. & S. Railway	Fms. 911 & 138	24.5.37 to 28.8.37	31.8.37
170	†† *Scythia*	E. Edkin, O.B.E., R.D., Capt., R.N.R.	W. L. S. Warwick, R. G. Roberts, A. Thompson.	R. Greenall ...	,,	Cunard White Star, Ld.	Fms. 911 & 138 Fm. 912	8.6.37 to 22.8.37 8.6.37 to 14.8.37	25.8.37 25.8.37
211	*† *Shropshire*, M.S.	R. S. Evans, O.B.E. ...	G. W. Dobson, A. E. Evans, A. E. Young.	G. C. Talbot ...	,,	Bibby Bros. & Co.	Fms. 911 & 138	27.3.37 to 2.6.37	7.6.37
121	*† *Siamese Prince*, M.S.	E. Hardcastle	R. Jones, E. A. Parfitt, C. Blakey.	A. Frazer ...	M.L.	Furness Lines ...	Fm. 915	23.3.37 to 19.6.37	5.8.37
	*† *Silverwalnut*, M.S.	C. S. C. Cherry ... J. Smith ...	H. J. Pursey, S. G. Dakers, J. Eccleston.	A. Johnston ...	,,	S. & J. Thompson, Ld.	,,	28.7.36 to 2.2.37	7.4.37
141	*† *Somerset* ...	C. R. Pilcher	H. Hile, C. C. Wilson, J. A. C. Knott.	S. G. Peeling ...	S.	Federal S.N. Co., Ld.	Fms. 911 & 138	31.12.36 to 20.5.37	31.5.37
052	*† *Spero*	W. A. Dossar	C. Hodgson, J. R. Atkinson	A. Fairbairn ...	,,	Ellerman Wilson's Line, Ld.	Fm. 915 Fms. 911 & 138	3.4.37 to 19.6.37 26.6.37 to 14.8.37	4.9.37
	*† *Staffordshire*, M.S.	W. L. Foster	A. A. Mackenzie	... ...	,,	Bibby Bros. & Co.	Fm. 911	20.5.37 to 13.8.37	6.9.37
134	†† *Stirling Castle*, M.S.	A. O. Morgan, R.D., Commr., R.N.R.	E. L. Cooper, J. F. Trickey...	H. E. Cooper ...	,,	Union-Castle Mail S.S. Co., Ld.	Fms. 911 & 138	8.5.37 to 26.8.37	28.8.37
020	*† *Stirlingshire*, M.S.	A. Mackinlay	G. Mathieson, R. E. Smallbone, D. P. Wright.	P. B. Allison ...	,,	Turnbull, Martin & Co., Ld.	,, ,,	26.4.37 to 12.7.37	16.7.37
	*† *Stockport* ...	H. S. Brown	... ...	... ...	,,	L. & N.E. Rly ...	... ...	... ...	...
270	†† *Strathaird* (t-e)...	J. M. M. Tickell ...	G. R. Peters, H. Bush' M. Kent.	A. Morris ...	,,	P. & O. S.N. Co.	Fms. 911 & 138	6.6.37 to 22.7.37	19.8.37
277	†† *Strathmore* ...	R. Harrison, D.S.O., R.D., Capt., R.N.R.	G. V. Legassick, K. S. Renshaw, C. Beddoe.	S. W. Mitchell ...	M.-S.	,, ,, ,,	,, ,,	22.5.37 to 2.9.37	4.9.37
059	†† *Strathnaver* (t-e)	E. P. Lyndon, R.D., Lt.-Commr., R.N.R.	P. H. G. Rind, A. J. McHattie, P. Hopkins.	P. R. Hobbs ...	,,	,, ,, ,	,, ,,	16.5.37 to 17.8.37	19.8.37
229	*† *Tactician* ...	A. J. Meek	T. O. Jones, E. Bennet, R. Myles.	J. Walker ...	M.	T. &. J. Harrison	,, ,,	20.4.37 to 14.6.37	21.6.37
021	†† *Tamaroa* ...	W. Dawson	C. Carroll, M. Foster, G. Simmers.	P. Maloney ...	M.-S.	Shaw Savill & Albion Co., Ld.	,, ,,	21.4.37 to 26.7.37	4.8.37
264	*† *Tanda*	E. T. Pilcher, Lt.-Cmmr., R.N.R.	G. E. Walker, E. J. B. Wright, G. D. Clark.	W. H. Harris ...	M.L.	Eastern and Australasian S.S. Co., Ld.	Fm. 915	14.4.37 to 8.7.37	2.9.37
047	*† *Taranaki*, M.S.	W. West	D. W. Campbell, A. J. Tillott, D. MacLean.	A. J. Rice ...	S.	Shaw, Savill & Albion Co., Ld.	Fms. 911 & 138	17.4.37 to 6.8.37	21.8.37

	Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 11.6.37 to 9.9.37.		Date Last Return Received
048 ††	*Themistocles* ...	C. Wood, D.S.C. ...	R. F. Hamilton, J. G. Lindhardt, J. Downs.	V. Murphey ...	M.-S.	Shaw, Savill & Albion Co., Ld.	Fms. 911 & 138	15.2.37 to 15.6.37	19.6.37
*†	*Thistleglen* ...	G. A. Whitfield, O.B.E.	W. A. Wilson, L. C. Forth, L. H. Williams.	T. C. Rodgers ...	M.	Allan, Black & Co.	Fm. 911	4.6.37 to 7.8.37	28.8.37
*†	*Tinhow*	D. I. C. Robertson ...	W. P. Wheeler	... ...	,,	A. Weir & Co. ...	,,	20.3.37 to 12.6.37	21.7.37
161 *†	*Titan*	P. J. Pycraft	N. Wellis, F. Gray, G. Willoughby.	H. James ...	S.	A. Holt & Co. ...	Fms. 911 & 138	9.5.37 to 6.6.37	5.7.37
242 *†	*Tongariro* ...	P. B. Clarke, D.S.C. ...	C. E. Enneven, N. A. Thomas, J. S. Hugh.	J. F. McNeill ...	,,	New Zealand Shipping Co., Ld.	,, ,,	18.3.37 to 11.8.37	27.8.37
	Torcello ...	A. Hinchcliff	... ...	... ...	M.L.	Ellerman's Wilson Line, Ld.	... ...		...
025 ††	*Transylvania* ...	D. W. Bone	R. L. Robertson, A. Colquhoun, D. Barclay.	J. McDonald ...	S.	Anchor Line, Ld.	Fms. 911 & 138 Fm. 912	6.6.37 to 21.8.37 6.6.37 to 21.8.37	24.8.37 24.8.37
088 *†	*Tudor Star* ...	G. C. H. Noakes, Lt.-Commr. R.N.R.	F. W. Grist, A. McDougall, G. Brunton.	H. Pickles ...	,,	Blue Star Line, Ld.	Fms. 911 & 138	18.4.37 to 20.7.37	27.7.37
104 ††	*Tuscania* ...	J. B. Caithness ...	H. A. P. Martin Ross, F. Caldwell.	J. Harvey ...	,,	Anchor Line, Ld.	,, ,, Fm. 912	28.6.37 to 26.8.37 28.6.37 to 26.8.37	2.9.37 2.9.37
221 ††	*Tynefield*, M.S. (tank)	M. Manthorpe	A. D. Lombard, R. F. Murray, G. Paterson.	D. Edwards ...	,,	Hunting & Son, Ld.	Fms. 911 & 138	16.6.37 to 30.8.37	2.9.37
176 *†	*Vancouver City*, M.S.	H. C. Egerton	J. K. Robson, H. David, D. C. MacLeay.	C. S. Watson ...	,,	Sir Wm. Reardon Smith & Partners, Ld.	,, ,,	4.5.37 to 16.7.37	21.7.37
231 ††	*Vandyck* ...	P. Symons	J. A. Baragwanath, A. N. Blundell.	W. Holden ...	,,	Lamport & Holt, Ld.	,, ,,	18.7.37 to 25.8.37	2.9.37
079 ††	*Viceroy of India* (t-e)	E. A. J. W. Carter, R.D., Capt., R.N.R.	B. D. H. Thomson, K. H. Cummins, M. A. Trenfield.	W. S. Horn ...	M.-S.	P. & O. S.N. Co.	,, ,,	14.3.37 to 13.5.37	2.6.37
*†	*Vienna*	H. Pickering	R. Greenfield, D. A. Williams	G. Madle ...	S.	L. & N.E. Rly. ...	,, ,,	30.6.37 to 20.8.37	4.9.37
269 ††	*Voltaire* ...	V. E. Gore-Hickman ...	E. W. Hardie, D. P. Woods...	W. Barnett ...	,,	Lamport & Holt Ld.	,, ,,	30.5.37 to 31.8.37	6.9.37
263 *†	*Waiotapu* ...	J. Rankine	C. Carter, C. H. George, T. B. Dymock.	G. Maxwell ...	M.L.	Union S.S. Co. of N.Z., Ld.	Fm. 915	29.8.36 to 30.11.36	18.3.37
004 ††	*Waipawa*, M.S.	J. W. Johnson ...	N. E. Wood, R. Barns, J. W. Paine.	H. A. Bloxham	S.	Shaw, Savill & Albion Co., Ld.	Fms. 911 & 138	10.5.37 to 15.8.37	18.8.37
254 ††	*Wairangi*, M.S.	H. R. Gordon	I. Collins, H. Anderson, E. Sainsbury.	J. Mein	,,	,, ,, ,,	,, ,,	15.1.37 to 1.5.37	5.5.37
225 *†	*Wairuna* ...	A. W. Gray	R. D. Scotchmer, G. Kent, R. H. Duffner.	S. Waters ...	M.L.	Union S.S. Co. of N.Z., Ld.	Fm. 915	16.12.36 to 1.5.37	30.7.37
212 ††	*Waiwera*, M.S.	J. H. Gaskell, R.D., Lt.-Commr., R.N.R.	R. Grant, R. G. James, R. Whiteford.	W. L. Starr ...	S.	Shaw, Savill & Albion Co., Ld.	Fms. 911 & 138	10.5.37 to 10.6.37	15.6.37
005 ††	*Warwick Castle*, M.S.	E. S. Vincent, R.D., Commr., R.N.R.	A. D. Underdown, D. A. MacDonald.	J. Hodgson ...	,,	Union-Castle Mail S.S. Co., Ld.	,, ,,	23.5.37 to 11.7.37	13.7.37
056 *†	*Westmoreland* ...	E. R. Kemp	A. S. Frost, R. C. Robinson... P. A. Brendon.	R. Glover ...	,,	New Zealand Shipping Co., Ld.	,, ,,	20.4.37 to 5.8.37	20.8.37
*†	*Willandra* ...	A. D. Williamson ...	T. F. Symons, P. Nicholson, A. J. Tyrrell.	E. J. Glaisher ...	M.L.	William Crosby & Co.	Fm. 915	24.4.37 to 9.7.37	2.9.37
††	*William Scoresby*, R.R.S.	R. C. Freaker, Lt., R.N.R.	... ...	... ...	,,	Discovery Committee	... ...		...
208 ††	*Winchester Castle*, M.S.	C. N. Bickford ...	J. D. Walker	J. Gilbart ...	S.	Union-Castle Mail S.S. Co., Ld.	Fms. 911 & 138	17.7.37 to 31.7.37	5.8.37
053 *†	*Worcestershire*, M.S.	R. P. Mann	R. L. Hagley, E. Everall, J. H. Barwick.	J. Tyson ...	,,	Bibby Bros. & Co.	,, ,,	9.5.37 to 13.7.37	22.7.37
*†	*Worthing* ...	B. Shaw	H. L. Smith	A. G. Sheppard	,,	Southern Railway	,, ,,	24.5.37 to 24.7.37	29.7.37
244 *†	*Yoma*	W. Lusk	W. C. Wilson, P. D. Barr, J. S. Grassick.	R. S. Wilson ...	M.	P. Henderson & Co.	,, ,,	29.5.37 to 12.8.37	20.8.37
012 *†	*Yorkshire* ...	F. W. L. Midgeley ...	N. F. Fitch, H. Davies ...	R. C. Wilde ...	S.	Bibby Bros. & Co.	,, ,,	7.6.37 to 13.8.37	18.8.37
	Conway, H.M.S.	T. M. Goddard, Commr., R.N.R.	The Senior Cadets	... ...	Cadets M.L.	... ...	Cadets Met. Log.	2.5.37 to 22.7.37	28.7.37
	Pangbourne Nautical College.	A. B. Greig, O.B.E., D.S.C., Capt., R.N.	,, ,, ...	... ...	,,	... ...	,, ,,	30.4.37 to 27.7.37	30.7.37
	Worcester, H.M.S.	G. C. Steele, V.C., Commr., R.N.	,, ,, ...	... ...	,,	... ...	,, ,,	15.5.37 to 29.7.37	6.8.37
	Watling Island	... ...	The Keepers	... ...	Lighthouse Register	... ...	Lighthouse Register	1.7.36 to 31.12.36	20.2.37
	Cape Pembroke... (Falkland Is.)	... ...	,, ,, ...	... ...	,,	... ...	,, ,,	1.1.37 to 30.6.37	3.9.37

SHIPS WATER SAMPLING THE NORTH ATLANTIC. FISHERIES LABORATORY, LOWESTOFT.

Name of Vessel.	Captain.	Observing Officer.	Owners.	Received at Government Chemist, London.
Dakarian	W. Baird	W. P. Baker	T. & J. Harrison	30 Water Samples, 12.7.37
Darian	A. T. Cadogan	R. F. Hart	,, ,, ...	30 ,, ,, —.8.37
Davision	E. Holloway	J. W. Henderson	,, ,, ...	30 ,, ,, 12.7.37
Daytonian	J. M. Crowley	S. Richardson	,, ,, ...	30 ,, ,, 14.5.37
Hilary	F. C. P. Harris	H. Sapsworth	Booth S.S. Co. Ld.	60 ,, ,, 29.7.37

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