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THE MARINE OBSERVER



VOL. XVI

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OCTOBER

1939

The Marine Observer

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

Vol. XVI, 1939

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MARINE SUPERINTENDENT'S NOTES

As we are now at war with Germany, meteorological activities at sea will necessarily be very much restricted. It is not possible at present to issue any definite advice or instructions to Voluntary Observers as the control of all shipping is under the Admiralty and affairs are very uncertain. For obvious reasons, W/T silence has to be largely imposed, but it is to be hoped that the steadily increased knowledge of Marine Meteorology which Voluntary Observers at sea have acquired will help them in practising the art of "single-observer" forecasting. Much can be done with an intelligent interpretation of the barometer and its tendency, hygrometer, sea temperature, wind and cloud, combined with present and past weather. The Marine Division of the Meteorological Office will continue to do whatever is possible for the benefit of shipping generally.

THE MARINE OBSERVER will not be published again until the war is over. Our Chief duty is to defeat the enemy as soon as possible—so all our activities will have to be concentrated on the war.

I would like to take the opportunity of expressing, on behalf of the Director, our thanks to all the corps of Voluntary Observers in British ships for all their ready and loyal co-operation in carrying out meteorological observations for this office. The quality of the observations has been steadily increasing as has also the number of Observers, and everybody concerned appears to have taken very great interest in the work.

We have what will probably be a long and arduous war before us, but we are facing the future with courage and confidence in the knowledge that we are fighting for something which is very precious to us as members of the British Commonwealth of Nations, our freedom, our homes, and our families as well as for the freedom of smaller friendly powers. That our enemy is ruthless is well shown by the torpedoing without warning of the S.S. "Athenia" yesterday.

It is upon our Merchant Navy, in co-operation with the Royal Navy, that we are very largely dependent for our welfare and safety, and history has shown that the British seaman of both services always gives a good account of himself. It is perhaps fitting at a time like this to remember the famous signal of the greatest of our maritime heroes:—"England expects . . ." and there is no doubt that our seamen will carry this out thoroughly, as they did in the last war.

Readers of these pages will undoubtedly encounter many and great dangers before the war is ended, as they pass on the seas upon their lawful occasions. May you have strength and courage to carry on with your many duties, and may you with God's guidance come through with safety.

MARINE SUPERINTENDENT.

4th September, 1939.

THE GENERAL DISTRIBUTION OF BRITISH REGULAR OBSERVING SHIPS.

The distribution of observing ships in the fleet list on the 15th July, 1939, using the different trade routes of the world is indicated on the chart of the world and in the table given below.

In addition to the 364 regular observing ships there were on this date no less than 615 British Supplementary Weather Reporting Ships carrying on the Selected Ships service when and where necessary in all parts of the world.

It will be noticed that the number of regular observing ships using the Trans North Atlantic route is maintained at a higher proportionate figure than in any other part of the world since here not only is the worst weather encountered by shipping but the forecast service of the British Meteorological Office is largely dependent on reports from this area, and on the land.

The publication of this chart and table yearly in the last number of each volume of THE MARINE OBSERVER is so that all concerned with organized British voluntary marine observation should be kept aware of the constant care which is taken to maintain at all times the best possible spread of the regular voluntary observing fleet which forms the nucleus and guide for organized meteorological observation in the British Merchant Navy.

"Selected Ships in proportion to World Tonnage."

When the Selected Ship Service was inaugurated on May 1st, 1930, it was agreed by the International Meteorological Organization that there should be 1,000 Selected Ships of all nations to carry on the service specified in Article 35 of the Convention for Safety of Life at sea, which was subsequently incorporated in the Merchant Shipping Act.

Under this agreement each nation subject thereto undertakes to maintain the proportionate number of Selected Ships in accordance with her proportion of the world's tonnage, this being considered the fairest and best way of dividing work and responsibility amongst the Merchant Navies and state Meteorological Institutions of the world.

At a recent meeting of the International Maritime Commission for Meteorology it was decided that the 1,000 Selected Ships should be considered a minimum number but that nothing in the agreement should prevent any Meteorological Institute recruiting and maintaining from amongst its own nationals any number of Selected Ships they desire.

The British Meteorological Office has scrupulously maintained the specified number of formally detailed Selected Ships and their names are published in the fleet list in THE MARINE OBSERVER with a number to each.

It will be noted from the table that there were on this date 343 observing ships keeping Form 911, carrying out the duties of a Selected Ship. This figure exceeds the minimum number of 276 Selected Ships required in conformity with the British proportion of World Tonnage by 67 ships, but it will be realized that it is always necessary to maintain a number above the minimum in order to allow for the constant changes which must occur from time to time in such a system.

As year by year our proportion of the world's tonnage has diminished so has our number of formally detailed Selected Ships been decreased. In accordance with practice we reproduce the table of "Total Merchant Tonnage Approximate (Steam and Motor) of the World" taken from Lloyd's Register of Shipping for 1939-40 which has just been published.

The total tonnage registered in ports of Great Britain and Northern Ireland of steam and motor vessels of over 100 tons during the past year has increased from 17,675,404 to 17,891,134 gross tons, that is by nearly 216,000 tons. Though our total tonnage has increased the combined tonnage of other countries has increased still more so that our proportionate tonnage is now 27.3 per cent. of the world's shipping as against 27.6 per cent. last year. Accordingly the minimum number of British Selected Ships to be maintained for the ensuing year is reduced from 279 to 276.

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

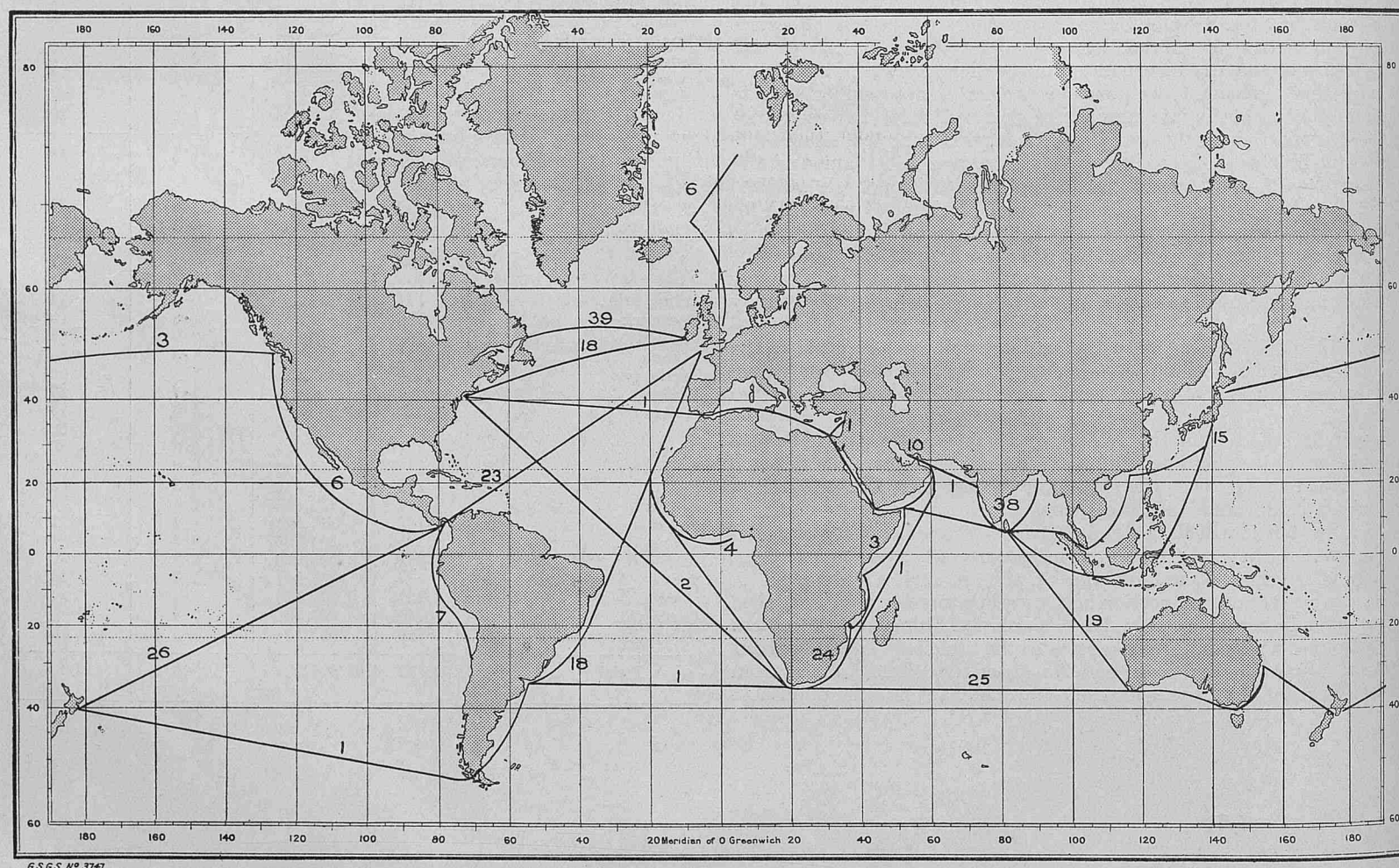
(Vessels over 100 tons, Lloyd's Register Book 1939-40) together with

Minimum Number of Selected Ships required for making W/T Weather Reports in all oceans, world wide.

Country.	Steamship and Motor Vessels.		Percentage of World Tonnage.	Number of Selected Ships Required.
	Number.	Gross Tons.		
Great Britain and Ireland	6,722	17,891,134	27.3	273
Australia and New Zealand	524	669,555	1.0	10
Canada (excluding Lakes)	618	773,105	1.2	12
Hong Kong ...	133	350,710	0.5	5
India and Ceylon ...	179	237,729	0.4	4
South Africa and other Colonies ...	627	628,836	1.0	10
British Empire Total ...	8,803	20,551,069	31.4	314
America (United States) (excluding Lakes) ...	2,450	9,038,536	13.8	138
Argentina ...	295	290,602	0.4	4
Belgium ...	200	408,418	0.6	6
Brazil ...	293	484,870	0.7	7
Chile ...	101	171,515	0.3	3
China ...	171	257,924	0.4	4
Denmark ...	705	1,174,944	1.8	18
Finland ...	402	590,254	0.9	9
France ...	1,231	2,933,933	4.5	45
Germany ...	2,459	4,482,662	6.8	68
Greece ...	607	1,780,666	2.7	27
Holland ...	1,523	2,969,578	4.5	45
Italy ...	1,227	3,424,804	5.2	52
Japan ...	2,337	5,629,845	8.6	86
Jugo Slavia ...	187	410,486	0.6	6
Latvia ...	89	191,184	0.3	3
Norway ...	1,987	4,833,813	7.4	74
Panama ...	159	717,525	1.1	11
Portugal ...	225	257,365	0.4	4
Russia (Soviet Union) ...	699	1,305,959	2.0	20
Spain ...	777	902,251	1.4	14
Sweden ...	1,231	1,577,120	2.4	24
Turkey ...	185	224,461	0.3	3
Other Countries ...	738	997,151	1.5	15
Total ...	29,081	65,606,935	100.0	1,000

**Table and Chart Indicating the Number of British Observing
Ships using the Different Trade Routes.
15th July, 1939.**

Voyage.	Form 911.	M.L.	Total.	Selected Ships.	Voyage.	Form 911.	M.L.	Total.	Selected Ships.
Canada	39	0	39	35	Arctic	6	0	6	0
United States of America	18	0	18	16	Antarctic	0	0	0	0
West Indies	23	0	23	18	Cross Channel Ships	18	0	18	0
East Coast, South America	18	0	18	14	Home Waters	4	5	9	4
West Coast, South America	7	0	7	7	World Wide	19	7	26	17
West Coast, North America	6	0	6	3	Cruising	14	0	14	14
Australia and New Zealand via Panama	25	1	26	21	Ships on Station	0	3	3	1
Australia and New Zealand via Cape	25	0	25	20	Table Bay to River Plate	1	0	1	1
Australia and New Zealand via Suez	19	0	19	19	Singapore to Mediterranean Ports	1	0	1	1
Australia and New Zealand via Horn	1	0	1	1	Persian Gulf to Australia	1	0	1	0
West Coast of Africa	4	0	4	4	South Africa to Persian Gulf	1	0	1	1
South and East Africa via Cape	24	0	24	22	New York to India via Suez	1	0	1	1
South and East Africa via Suez	3	0	3	1	New York to Cape	2	0	2	2
Persian Gulf via Suez	10	0	10	7	Stationary Ships and Stations	—	—	5	—
India via Suez	38	0	38	35					
China and Japan via Suez	15	0	15	11					
East Indies via Suez	0	0	0	0					
					Totals	343	16	364	276



292 Foreign going British observing ships indicated on
 26 Ships on world wide routes. (route.
 14 Ships on cruise.
 32 Stations and observing ships engaged in home waters
 not indicated.

Total 364

The Year's Work on Ocean Currents.

DURING the present year we have been engaged in revising and recharting the currents of the Eastern portion of the North Atlantic Ocean, and in charting for the first time the currents of the Mediterranean Basin.

Sectional charts covering the above areas have been published for each quarter in the appropriate number of *THE MARINE OBSERVER*, which completes the first part of the work of revising, from a longer period of observations, the present Atlas of Currents of the North Atlantic Ocean.

It will be seen from the new sectional charts that not only is there a large increase in the number of observations on frequented tracks, but we have also been able to compute currents in the greater part of the areas between these tracks which we had to leave blank in the atlas.

This increase in the number and distribution of observations not only ensures greater reliability of the information provided but also affords a much more complete representation of the circulation of the ocean as a whole. The charting of the Mediterranean also fulfils a long-felt want.

In the present number will be found an article by Mr. BARLOW summarizing the results of this year's work, in which the results of investigations into the seasonal variation of the currents have been made. The increased number of observations have also permitted the study of the monthly fluctuations of the Guinea and Counter-Equatorial Currents and the South Equatorial Current. The more westerly point of origin of the Counter-Equatorial Current during part of the year will be investigated subsequently when that part of the ocean is charted.

Next year we shall proceed with the charting of the western part of the North Atlantic Ocean south of Latitude 38° North and also with the eastern portion of the South Atlantic. Marine Observers are asked to pay special attention to the recording of observations of current when navigating these areas and particularly when traversing regions off the normal and more frequented routes. In addition those who have had considerable experience of the current in any particular region are asked to send in generalized information regarding the peculiarities of the current, derived from their experience.

Admiralty Sailing Directions.

COMMANDERS and Officers of the British Observing Ships are particularly asked in the interest of navigation to forward any information that may come under their notice which would be useful for the correction of the Admiralty Sailing Directions.

The establishment of, or changes of any aids to navigation, especially those which assist in the entry or departure from ports as ascertained by comparing the information given in the latest edition of the Admiralty Sailing Directions (corrected by the latest supplements) with those actually observed are especially desirable.

All information received will be forwarded to the Hydrographic Department of the Admiralty, who are not only glad to know of any amendments, but are also desirous of ascertaining if the information published still holds good.

It is felt that our Corps of Voluntary Marine Observers will gladly assist in supplying such information as opportunity offers.

Adoption of the name "Thailand" for Siam.

ATTENTION is drawn to the fact that with effect from the 24th June, 1939, the name of the country of Siam shall be officially known as "Thailand" in English and German, whilst the word "Thai" shall signify the people and nationality. In French the words "La Thaïlande" and "Thai," and in Italian "Thailandia" and "Thai" will be used accordingly.

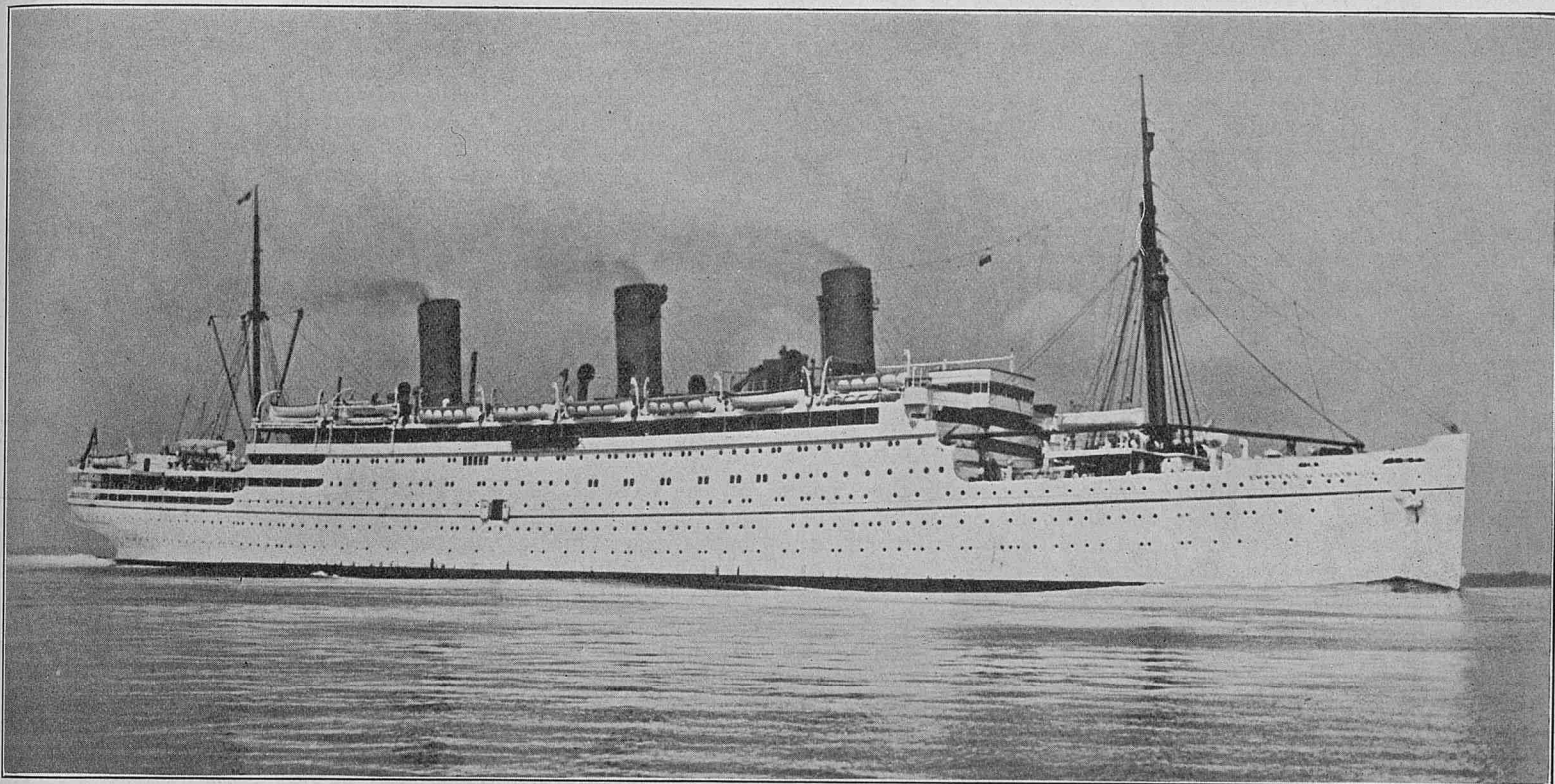


Their Majesties looking over the rail of R.M.S. "Empress of Australia" when they set out from Portsmouth to Canada.

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THE VOYAGE TO CANADA OF THEIR MAJESTIES KING GEORGE VI AND QUEEN ELIZABETH IN R.M.S. "EMPRESS OF AUSTRALIA."

BY LIEUTENANT D. E. T. NEWELL, R.N.R.



R.M.S. "Empress of Australia," Captain A. R. Meikle, R.D., R.N.R.

WHEN KING GEORGE stepped into the main square on board the *Empress of Australia* at Portsmouth on 6th May, 1939, the Royal Standard and the Lord High Admiral's flag of the British Navy were broken at the mast heads, the Blue Ensign previously flying at the stern was replaced by the White, and the British Merchant Service received one of the greatest, if not the greatest, honour ever paid to it. It was a memorable occasion for all the members of the ship's company who were so fortunate as to be serving in her.

Nine days previously the ship had been lying peacefully at Southampton waiting the time for her to resume the summer season running to Canada after cruising most of the winter; suddenly she had become a hive of activity. A complete new coat of white paint, decks holystoned until they were white and any interior alterations to the accommodation that was to be used as the Royal party's private apartments kept a large gang of men fully occupied. In the lounge, furniture not needed for the trip was removed, the smoke room was changed into a dining room for the royal passengers, with the table and chairs from the royal yacht installed, and the suites and main cabins were completely renovated. When the ship arrived at Portsmouth the day previous to embarkation, she looked a picture both inside and out.

In perfect weather the actual departure from alongside the Southern Railway jetty and the leaving harbour were occasions long to be remembered. With the crowded streets gaily decorated and both sides of the harbour black with cheering people, there could be no doubt in the mind of anyone of the place their MAJESTIES occupy in the hearts of their people.

Precisely at 2.45 p.m. the car bringing the KING, QUEEN and the two Princesses from the Portsmouth Guildhall, drew up at the foot of the gangway to be welcomed by the Commander-in-Chief of

Portsmouth and many others before going on board to rejoin QUEEN MARY and other members of the Royal family, there to see them off and wish them "Bon Voyage." At 3.00 p.m. the ship, under the command of Captain A. R. MEIKLE, R.D., R.N.R., slowly pulled away from the jetty, and to the strains of "God Save The King," played by the band on the quay side, the "White Empress" steamed slowly out of Portsmouth harbour led by the Trinity House yacht *Patricia*. As she passed the Southsea forts, a royal salute of 21 guns was fired, and on drawing near to Spithead the two cruisers *Southampton* and *Glasgow* and the battle-cruiser *Repulse*, which were to form the escort across the Atlantic, saluted with their guns before taking up their positions in line. Their MAJESTIES stood on the promenade deck throughout, waving to the fleet of yachts of all sizes and descriptions that surrounded the ship as she passed out through the channel to Spithead, not going into the lounge for afternoon tea until the ship had stopped off the Nab tower to discharge the pilots and the Portsmouth Marine Band that had accompanied her from the harbour pier. As soon as the ship was under way again, the *Empress of Australia* took up the duties of flagship of the squadron, the orders being passed by flags handled by six signal ratings from the Royal Yacht, especially carried for the trip, to the two cruisers ahead and *Repulse* astern. After steaming south into the channel for 12 miles, course was altered to west in order to intercept part of the Home Fleet which was approaching from the opposite direction to give the KING and QUEEN a final farewell. About 5.00 p.m. the Home Fleet came in sight right ahead, in two lines, one on either bow, and word was sent down from the bridge to inform the KING. Just as the ship was nearing the lines, the KING and QUEEN climbed up to the flying bridge where they could be plainly seen and were very impressed by the imposing sight that greeted them. As each ship drew abreast,

her crew, lined along the rails, gave three cheers, and then, as the last in the line passed, the whole fleet turned outward from the Royal Squadron and formed up again in two lines on either side of the *Empress of Australia*, escorting her as far as the western end of the Isle of Wight before giving a final salute and departing. Soon after the fleet had cheered the KING, the aeroplanes from the Fleet Air Arm flew by overhead and, as each plane passed, dipped low by the bridge in salute. It was plain to all that KING GEORGE and QUEEN ELIZABETH were deeply moved by the farewell that had been accorded them by the personnel of His Majesty's Navy, both by the cheering and the signals of good wishes flying from the signal yard of each ship as she departed while the royal squadron passed on down the channel and out on to the Atlantic. Just at midnight that night, the ship was met off Plymouth by a destroyer, where final letters were lowered into a boat from her. Early the next morning the Scilly Isles were passed and the royal passengers and their party settled down into the peaceful, quiet life aboard ship. At noon, "Abandon Ship" stations were exercised by everyone on board. The KING and QUEEN stood at their station on the promenade deck with their lifebelts on throughout and, when an officer approached them, enquired if they were standing at the proper place. That evening, as we neared the edge of the Hurd Bank off the south coast of Ireland, we passed a fleet of fishing trawlers and immediately they sighted us they drew in as close as possible to the position where we would pass and blew their whistles until we were almost out of sight over the western horizon. Their MAJESTIES stood on deck waving to each trawler as she passed and later the KING sent a message thanking them and wishing them "Good Fishing."

After dinner each night moving pictures, selected by the QUEEN during the afternoon, were shown in the Dining Saloon. The first night only the staff of the ship attended with the royal party, but the next day the QUEEN requested that all members of the ship's company be allowed to attend. That night was a packed house. Every man was in his best suit of clothes and every face was shining as if the owner had spent hours washing it. When the KING and QUEEN came down from dinner and walked into the saloon they were visibly pleased to see so many there. They always smiled to all as they came in and at the conclusion smiled a good-night to everyone. Their thoughtfulness and endeavours to make everyone feel at ease had made itself felt almost from the time they had come on board, and the radiant personality and graciousness of her MAJESTY were a continual source of pleasure to all. The KING and his equerries rarely missed their daily game of deck tennis and QUEEN ELIZABETH was usually sitting at the side of the court.

By Tuesday morning the weather had changed from the brilliant sunshine that had been experienced until then into a sullen leaden sky with a strong wind from the south-east. At eight o'clock the Captain decided to alter course more to the southward than had been originally intended, as the ice report from other ships passing through the ice track and from the ice patrol ship showed that the conditions were unusually bad for the time of the year, and field ice and icebergs were extending down as far as the latitude of 41° N., completely covering the Canadian routes in that vicinity. Reports from ships bound east that had passed through the ice track in clear weather had shown that there was no field ice further south than 44° N., and the new course set insured the ship passing south of this area, as far as was known. During the forenoon it was decided that H.M.S. *Repulse* was no longer required for escort duty and should take her departure at noon. She requested permission that, before leaving, she might be allowed to close with us and cheer ship. A barrel was prepared to be thrown overboard, containing letters from all on board, to be picked up by *Repulse* and taken back to England. Just before noon the two cruisers took up station on the port beam of the *Empress of Australia* and speed was reduced accordingly to allow *Repulse* to overtake and pass us close to windward on the starboard side. By this time a moderate gale was blowing and quite a heavy sea running which made it doubtful as to the barrel being picked up successfully. As the speed was reduced, *Repulse* slowly came up on the weather side as close as she could and the sight she made will not be forgotten by those who witnessed it. She was plunging quite heavily into the seas at times, heaving herself up and throwing spray high into the air to be carried across the ship by the wind. All the ship's company were lined up as high up on the superstructure as was possible in order to keep reasonably dry and the marine band was standing just forward of the break at the quarter deck playing a lively tune. As she drew abreast her crew gave three cheers for their MAJESTIES. The cheers

were plainly audible, being carried down to the *Australia* by the wind. Even the order, "Stand by to give Three Cheers," given over the loudspeakers could be heard. Then, after playing "God Save The King," she slowly turned away into the wind. The KING and QUEEN stood at the rail on the promenade deck the whole time, acknowledging the cheers and taking moving pictures of *Repulse*. As she turned away, KING GEORGE and QUEEN ELIZABETH went to the after deck to watch the operation of placing the mail in the barrel, sealing it, and throwing it overboard. As *Repulse* came around under the stern again, the order was passed to throw over the barrel to which were attached two flags as markers, and five minutes later those on board the *Australia* who had witnessed the procedure were rewarded by seeing it safely hauled aboard the ship astern. It was a remarkable piece of work and KING GEORGE immediately signalled his congratulations and pleasure. Then she turned around again and was soon lost to view in the flying spray. After lunch the weather had become so bad that speed of the squadron had to be reduced in order to make the going easier in the cruisers astern. A high sea was running and at tea-time a British tanker, *British Freedom*, was passed close by, hove to in the gale. As we passed, the captain of the tanker sent a message to their MAJESTIES expressing the loyalty and good wishes of all those on board and ended by saying, "You have just passed a most imposing sight." This subtle remark was immediately appreciated. This message of good wishes was one of many received from ships of all nationalities. During the bad weather the QUEEN showed that she also was a good sailor by apparently not being in the slightest indisposed, and by enjoying walks around the deck with the KING. On Wednesday, during the forenoon, at the request of their MAJESTIES, all the members of the ship's staff were presented to them on the promenade deck, and they stopped to chat with each one in turn.

Early on Thursday morning the gale had abated and the squadron, having reached the southernmost part of the route, altered course to the westward to take the ship across the most dangerous part of the journey where the Labrador current carrying the ice comes down the side of the Grand Banks and meets the northern side of the Gulf Stream. At the time of altering course the temperature of both sea and air was 52°, and within an hour the sea temperature had dropped to 43° and it was not long before the warm southerly wind blowing over the cold water had enveloped the ships in a dense fog blanket. The order was given immediately to stop engines as we were in the known proximity of reported ice and to carry on was out of the question. Throughout the day the ships lay stopped and about five o'clock in the evening a sudden shift of wind lifted the fog from the northern horizon, providing us with maximum visibility on that side and revealing a large iceberg a few miles away and several pieces floating nearby. The ships were immediately got under way with all possible speed to make up as much of the lost time as possible. Shortly after it had cleared, the KING and QUEEN came on to the bridge to get a good view of the iceberg and the course was altered slightly to give them as close a view as possible. QUEEN ELIZABETH spent a long time taking pictures of the berg and the people on the bridge until the KING discovered that she had the wrong setting on the camera and that her time had probably been wasted. He quickly adjusted it for her in time to get another picture of the ice before the ship had drawn too far away. The spell of clear weather was short-lived, however, and hopes were soon shattered when after an hour or so at full speed the visibility once more became impaired, which necessitated going at a reduced speed and, shortly afterwards, it became so thick again that the squadron was once more brought to a full stop, which lasted throughout the night. All hope of reaching Quebec at the appointed time had now been abandoned and arrangements were made that, should the weather clear by morning, the ships would arrive in Quebec early Tuesday morning instead of Monday.

All day Friday and Saturday it was a flat calm, with dense fog most of the time. About three o'clock on Saturday afternoon a message came from H.M.S. *Glasgow* addressed to the King's surgeon on board the *Australia* saying that an immediate operation was necessary on an appendicitis case. She came in close to us through the fog, feeling her way, until each was visible to the other, a distance of about two cables. A boat was manned, lowered and pulled across to the *Australia* where the two surgeon captains in the royal party were awaiting. As soon as the boat was alongside the ladder they climbed down and were taken over to the cruiser from which they returned about two hours later, having performed a successful operation. Had it not been for the fact that the squadron was lying stopped in a flat calm sea, it might have been impossible to board the cruiser and things

might have taken a different turning. Toward night the weather cleared sufficiently to disclose a large field of loose pack ice to the northward but it did not remain clear long enough for the ships to get under way again. No progress was made during the night, but at daybreak Saturday morning the visibility improved sufficiently for the ships to proceed at a reduced speed, part of the time passing through loose field ice. At noon the ice had been cleared and suddenly at 4.00 p.m. the mist lifted from the horizon, maximum speed was ordered and the course shaped for Cabot Strait between Newfoundland and Cape Breton Island. From that moment the weather remained perfect until the squadron anchored below Quebec. It seemed as though Mother Nature was trying to make amends for the treatment she had given us during the previous three or four days. Almost three days time had been lost in the fog, the ships averaging about fifty miles a day in the temporary clearances that were offered during that time.

Monday afternoon at 5.30, as the ships cleared Cabot Strait and entered the Gulf of St. Lawrence, we were met by two Canadian destroyers, *Skeena* and *Saguenay* who, as they passed down our starboard side from the opposite direction to which we were steaming, manned ship and cheered the KING and QUEEN, then turning about came back, one on either side, and took station on either bow, to escort the *Empress of Australia* the rest of the way to Quebec. At the same time the two cruisers took up a position one on each quarter,

and the squadron remained in that formation for the rest of the trip up the river.

At 2.30 on Tuesday afternoon we reached Father Point, the pilot station, and were greeted by the pilot boat crowded with pilots, who, when their MAJESTIES appeared at the rail, cheered and waved until after the pilot had been embarked and the boat had left the ship's side. That night the ships were brought to an anchor about twelve miles below Quebec and at eight o'clock next morning proceeded to the harbour of Quebec, arriving off the Citadel which stands on the heights above the harbour just at 9.30. The shores on both sides of the river were crowded with people, cheering and waving flags, and every whistle in the harbour blew until the ship was off her berth in Wolfe's Cove. As we passed the Citadel a 21-gun salute was fired from the heights. The welcome that was accorded their MAJESTIES by the people of Quebec was tremendous. Above the dock on the heights and around the pier as close to the ship as possible the crowds were dense. At the end of the shed a platform had been erected, and at one side of the gangway a guard of honour was standing waiting to receive their MAJESTIES. At 10.30, after saying good-bye to the Captain and the ship's officers who were stationed at the gangway, KING GEORGE and QUEEN ELIZABETH stepped ashore to be greeted with wild cheering by the people who, for the first time in history, were welcoming their KING and QUEEN.

The Return Voyage in R.M.S. "Empress of Britain."

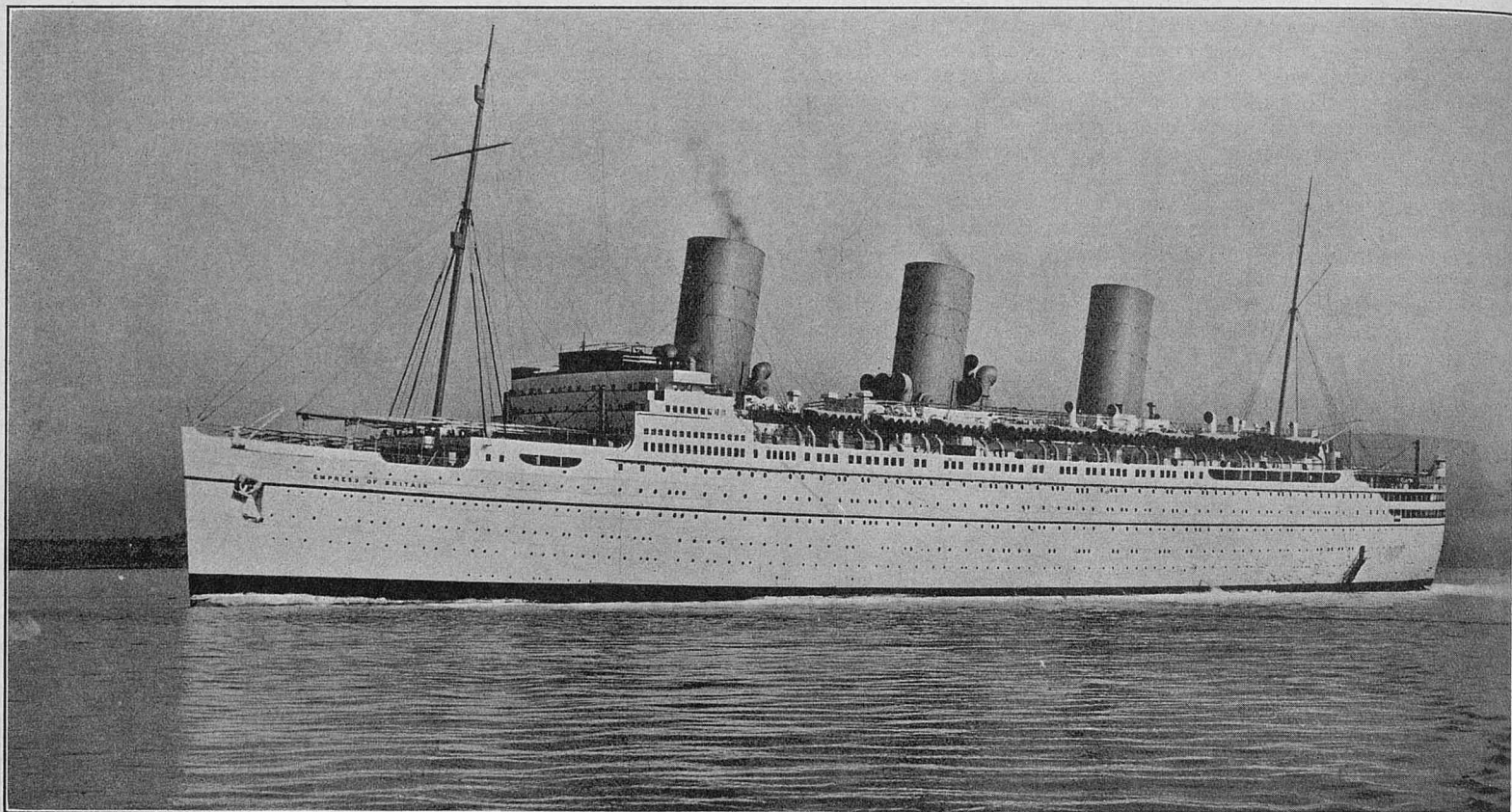
THE tremendous send-off accorded to their MAJESTIES when the *Empress of Britain*, under the command of Captain C. H. SAPSWORTH, steamed slowly out of picturesque Halifax harbour was, if anything, greater than that which had welcomed them to the Canadian shores but a few weeks before.

After a night of wind and heavy rain on 14th June, which must have caused a great deal of anxiety to the greatly increased populace of Halifax, who had gathered from all corners of the province to greet their KING and QUEEN and to cheer them on their way with all good wishes for the future, the morning brought a perfectly clear sky and glorious sunshine which could not have been more suitable for the great event which was to take place.

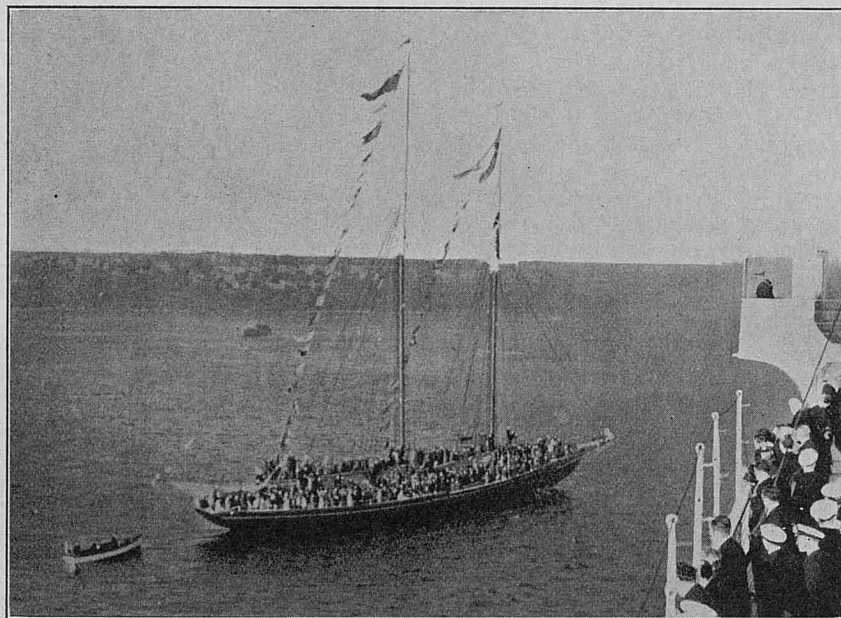
Precisely at 6.45 p.m., the royal car drew up in the square in front of the pier at which the *Empress of Britain* was lying and, after inspecting the naval guard of honour and making their final farewells, their MAJESTIES walked through the shed packed tightly with cheering people and up the gangway of the ship that was to take them triumphantly home. The actual departure was perfect, with KING GEORGE and QUEEN ELIZABETH standing out in the wing of the bridge. The giant liner flew the Red Ensign, the first time, I believe, that it has ever been flown by a ship carrying the KING and QUEEN of England and which the KING as Master of the Merchant Navy and Fishing Fleets desired. The ship slowly pulled away from the quay and,

after steaming a short distance up the harbour, turned around and headed out for sea. As she completed the half-circle the two escorting cruisers took up station astern while the two escorting Canadian destroyers came in ahead and led the way out of the harbour. With the sun slowly sinking out of sight behind the hills and surrounded by numerous craft of all descriptions, one being the famous fishing and racing schooner *Bluenose*, which the KING and QUEEN crossed the bridge especially to wave to, the whole squadron passed slowly by the whole length of the waterfront, black with cheering people, and out to sea. Their MAJESTIES were visibly moved and deeply impressed by the tremendous ovation and deep sincerity of the Canadian people in wishing them "God Speed" and remained on the upper bridge waving until the harbour was almost out of sight, then, after waving good-bye to the two destroyers, retired below to a much needed and well-earned rest.

The next day the weather was just as perfect. The KING and QUEEN spent the afternoon sitting in the warm sunshine on the tennis court, and acquainting themselves with the ship. After passing Cape Race late in the afternoon and when the ship was opposite the entrance to St. John's harbour, H.M.S. *Berwick*, flagship of the America and West Indies squadron, was sighted ahead, steaming on a parallel but opposite course to greet us and escort the squadron into Conception Bay where, for the week previously, she had been carrying out a survey



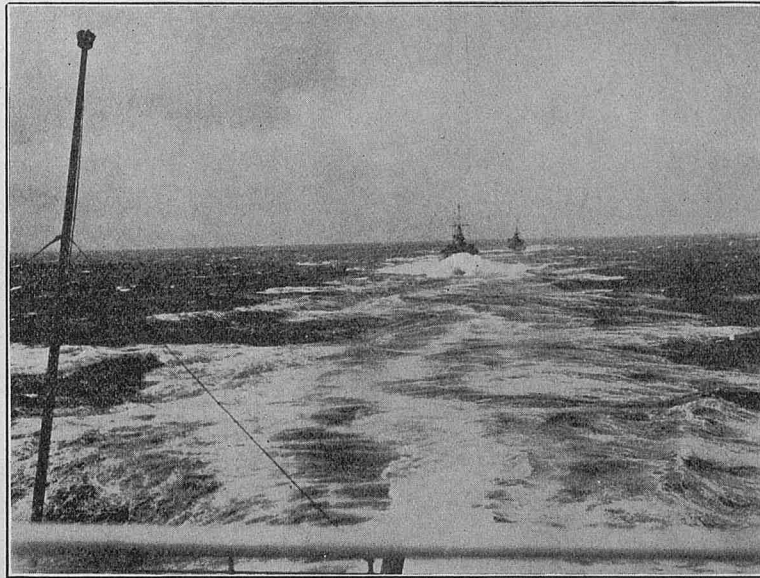
R.M.S. "Empress of Britain," Captain C. H. Sapsworth.



Schooner "Bluenose."

of the Bay and determining the position of icebergs in the vicinity in case the weather should become foggy. As she drew near she manned and cheered ship then swinging around, took up station astern of the two cruisers. After anchoring halfway up Conception Bay for the night, the whole squadron weighed anchor at dawn and proceeded to a position about five miles from Holyrood harbour at the head of the bay, where at 9.00 a.m. the royal party was conveyed by the Admiral's barge to the landing at Holyrood and then by car to the city of St. Johns. As soon as the barge left the ship's side the ships returned

to their former anchorage of the night before, not far from Portugal Cove, where, at 5.00 p.m., H.M.S. *Gloucester* embarked the KING and QUEEN and brought them out to the rest of the squadron. After going on board each cruiser in turn and inspecting the ship's company, they finally returned to the *Empress of Britain*, which got under way almost immediately and, followed by the three cruisers, proceeded out of Conception Bay and part way down the coast towards St. Johns so that their MAJESTIES would be able to see the bonfires lit by the people of their oldest colony in commemoration of their visit and to wish



H.M.S. "Southampton" and H.M.S. "Glasgow" escorting R.M.S. "Empress of Britain."

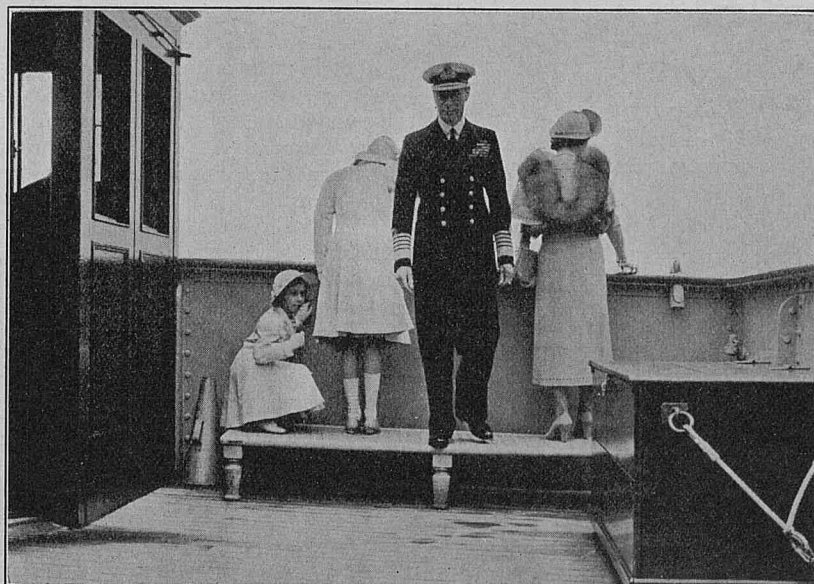
them "Bon Voyage." It had been one of the great days in the lives of those who had been so fortunate as to see their MAJESTIES during their short visit to their country.

The trip across the North Atlantic was mainly uneventful. A sigh of relief was heaved by all as the ships cleared the vicinity of icebergs without encountering fog and, until entering the English Channel, better weather could not have been wished for. Their MAJESTIES carried out much the same routine as had been carried out in the *Empress of Australia* on the outward trip, except possibly resting more. They attended boat drill with the rest of the ship's company and were introduced to all the ship's staff.

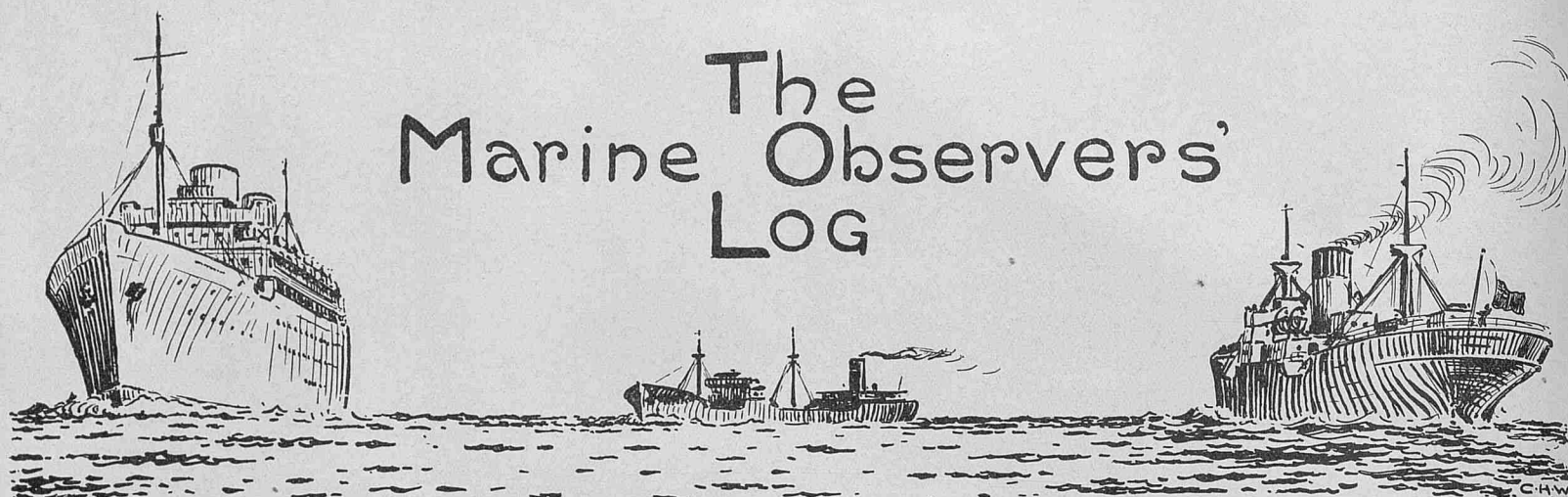
Shortly after midnight on 22nd June, the squadron stopped off Plymouth and a destroyer came close alongside and launched a boat containing letters from home for all on board and then proceeded slowly up the channel towards Southampton. Unfortunately, just at daybreak the weather turned to mist and rain, causing the reception which had been prepared by the Home Fleet to be cancelled owing to the poor visibility, but fortunately it was not bad enough to delay the

ships' arrival in the Solent. As the Needles were approached the weather cleared considerably and the squadron swung into the Solent, visible to the watching crowds that lined the shores anxious to see the end of a historic trip and a triumphant return. Stopping off Yarmouth roads, a naval launch drew alongside and their MAJESTIES were standing on the gangway to greet the two Princesses as they ran up the ladder, their arms soon around the necks of their parents, so happy to have them home with them once more.

The actual welcome home that England gave to their KING and QUEEN was a wonderful and inspiring sight. The route from Calshot to the dockside in Southampton was bordered by one continuous line of small craft of all descriptions, their crews madly cheering and sounding their whistles and horns. The Royal Family stood in the wing of the bridge almost the whole way until the ship was fast in the berth, waving to a cheering multitude who were anxious to show their appreciation of England's Royal Ambassadors, at the end of one of the most successful trips in history. All were glad to have them home once more.



The Royal Family on the bridge of R.M.S. "Empress of Britain"



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.

COMPASS DEVIATION.

Mediterranean Sea.

THE following is an extract from the Meteorological Record of S.S. *City of Cairo*. Captain A. J. PHILLIP. Liverpool to Calcutta. Observer, Mr. F. NUTTALL.

13th to 15th October, 1938. Between Latitude 37° 12' N., Longitude 11° 30' E. and Latitude 35° 36' N., Longitude 17° 10' E., a change in the deviation of the compass from $\frac{1}{4}^{\circ}$ W. to $3\frac{1}{2}^{\circ}$ W. was observed over a period of about 24 hours. This change has been observed during two consecutive voyages and may be due to some abnormal magnetic attraction in this vicinity; on the other hand, this may be due to the alteration of course from 81° to 109°.

South African Waters.

THE following is an extract from the Meteorological Record of M.S. *Leverbank*. Captain H. A. JONES. Calcutta to North American Ports. Observer, Mr. D. ROBERTSON.

Steaming along the coast from Cape Agulhas, bearing 365°, distant 19 miles, Latitude 35° 09' S., Longitude 24° 04' E. to Danger Point bearing 020° 16 miles. True course steered 290°, error 28° W., variation 23½° W. Excessive deviation of the compass, as much as 4½° W. was observed. For example on N. 44° W. compass the deviation usually found was only 1° W., but on approaching the above vicinity the change was very apparent and can only be accounted for as due to some unknown local attraction.

The following are the positions of several observations:—

Date.	A.T.S.	Latitude.	Longitude.	Ship's Head.	Dev.
18.10.38	9.38 p.m.	34° 21' S.	25° 09' E.	N. 88° W.	$\frac{1}{2}^{\circ}$ W.
19.10.38	3.34 a.m.	34° 30' S.	24° 03' E.	N. 77° W.	$1\frac{1}{2}^{\circ}$ E.
19.10.38	5.36 a.m.	34° 25' S.	23° 34' E.	N. 77° W.	2° W.
19.10.38	6.17 a.m.	34° 30' S.	23° 30' E.	N. 75° W.	2° W.
19.10.38	8.25 p.m.	35° 09' S.	20° 04' E.	N. 70° W.	$2\frac{1}{2}^{\circ}$ W.
19.10.38	9.14 p.m.	35° 04' S.	19° 49' E.	N. 44° W.	$3\frac{1}{2}^{\circ}$ W.
19.10.38	9.25 p.m.	35° 03' S.	19° 46' E.	N. 44° W.	$4\frac{1}{2}^{\circ}$ W.
20.10.38	0.4 a.m.	34° 55' S.	19° 17' E.	N. 44° W.	4° W.

After leaving the Cape of Good Hope true course steered N. 58° W., error 29° W., compass course N. 29° W., deviation 4° W., the ship proceeding along this course for five days, the deviation was very unsteady till eventually it settled back to that which is usually found on N. 29° W. compass, viz. $1\frac{1}{2}^{\circ}$ W. (Latitude 19° 00' S., Longitude 8° 00' W.)

FALL OF SEA TEMPERATURE.

South Pacific Ocean.

THE following is an extract from the Meteorological Record of M.S. *Rangitiki*. Captain H. BARNETT. Plymouth to Auckland. Observer, Mr. J. D. BENNETT, 3rd Officer.

In the vicinity of the Galapagos Islands the sea water temperature fell 9° F.; this is quite normal and is due to the strong westerly currents setting across from the South American Coast. Some 24 hours later, by which time the sea is normally maintaining an even temperature of approximately 70°-75° F., another and even more marked drop in temperature was recorded as shown below. The width of this area of cold water would be about 180 miles. Unfortunately clouded skies prevented the taking of both stellar and solar observations so that no information is available as to whether this fall in temperature was due to a moving stream of cold water and if so in which direction and at what rate it was setting.

Date 1938.	Time.		Air (F.)	Sea (F.)	Wind.	
2nd Oct.	8 a.m.	Observed Lat. 0° 59' S., Long. 88° 22' W.	67°	74°	S. x W. 3	Overcast and drizzle. Cloudy and showery.
	Noon		67°	71°	S. 3	
	4 p.m.	D.R. Lat. 2° 02' S., Long. 90° 12' W.	65°	67°	S.E. x S. 2	Cloudy. Overcast.
	8 p.m.		63°	65°	S.S.E. 2	
3rd Oct	Midt.	D.R. Lat. 4° 07' S., Long. 93° 35' W.	64°	65°	S.S.E. 2	Overcast Overcast and drizzle. Partly cloudy. Overcast.
	4 a.m.		65°	66°	S.E. 2	
	8 a.m.		67°	67°	S.E. x S. 2	
	Noon		68°	68°	S.E. 3	
4th Oct	4 p.m.	D.R. Lat. 4° 58' S., Long. 95° 41' W.	67°	61°	S.E. 4	Cloudy and showery. Overcast and showery
	8 p.m.		64°	58°	S.E. 4	
	Midt.	D.R. Lat. 7° 04' S., Long. 98° 56' W.	66°	68°	S.E. 3	Cloudy and drizzle. Overcast.
	4 a.m.		68°	68°	S.E. 3	
4th Oct	8 a.m.		68°	70°	S.E. 3	Overcast. Overcast.
	Noon		71°	72°	S.E. 3	

The observations above are extracted from the Deck Log Book. The sea temperature was observed at the engine-room injection valve at a depth of approximately 20 feet below the sea surface.

North Pacific Ocean.

The following is an extract from the Meteorological Log of S.S. *Bennahr*. Captain J. C. SINCLAIR. Vancouver Island to Panama. Observer, Mr. A. GRIFFITHS.

23rd November, 1938. At 02.30 A.T.S. the engineer on watch reported a sudden drop in sea water temperature from 84° to 72° F. A fresh wind was blowing out of Gulf of Tehuantepec. Air temperature 76° F. Moderate sea and swell. Density 1024. Sky eight parts covered Ast. and Steu.

At 04.00 A.T.S. sea water temperature 74°, rising slowly.

Position of ship at 02.30 : Latitude 14° 09' N., Longitude 95° 39' W.

TIDE RIPS.

South African Waters.

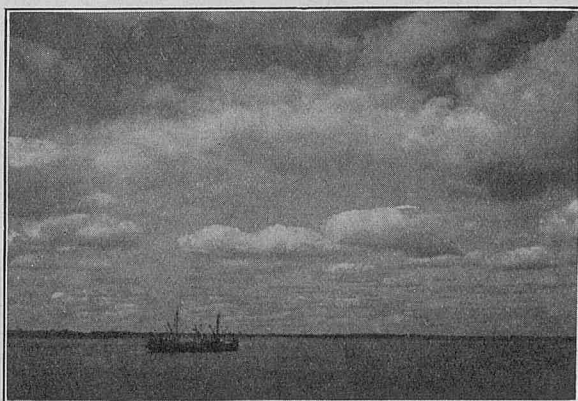
THE following is an extract from the Meteorological Record of S.S. *Westmoreland*. Captain E. R. KEMP. Dakar to Cape Town. Observer, Mr. J. M. TAYLOR, 3rd Officer.

17th December, 1938. About 9.30 a.m. the vessel passed through a series of broad tide rips extending in an E.S.E.-W.N.W. direction causing very erratic steering. Each of these rips appeared as a band of rippled water, about $\frac{3}{4}$ mile in width, whilst the sea between them was breaking heavily. Wind S.S.W., Force 6. Rough sea and heavy southerly swell.

Position of ship : Latitude 32° 55' S., Longitude 17° 17' W.

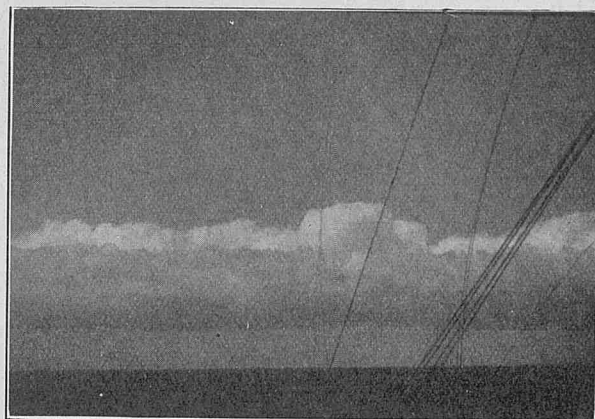
CLOUD PHOTOGRAPHS.

These cloud photographs have been received from Mr. F. H. LAMMING, 2nd Officer M. S. *Inverbank*. Captain A. C. LOADS.



Fractocumulus.

Taken at Rosario (Argentine) 16th September, 1938, about 11.00 A.T.S.

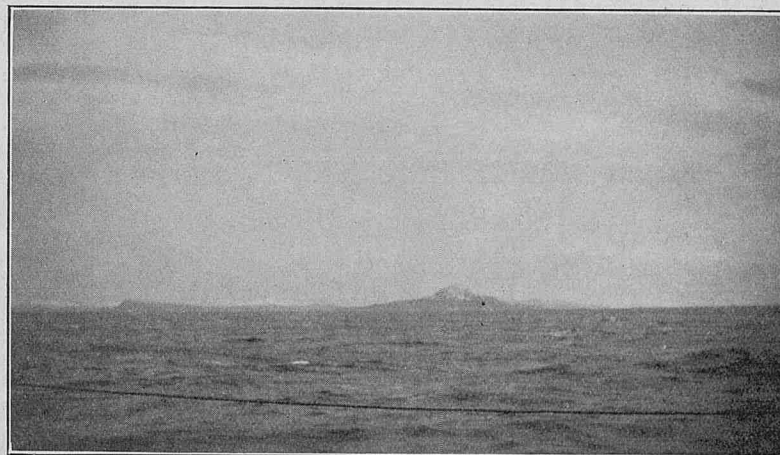


Line Squall.

Taken off Pt. de Galle, Ceylon, 17th January, 1939, at about 14.30 A.T.S.

PHOTOGRAPH OF CAPE HORN.

THE accompanying photograph was taken by Captain R. W. D. GILBERTSON, M.S. *Hopecrown*.



The picture was taken about five miles off Cape Horn.

It is not often that such conditions prevail to allow snapshots to be taken of "the Horn."

Moderate W.N.W. winds, fine and clear, current setting to the eastward at about 0.5 miles per hour.

LINE SQUALL.

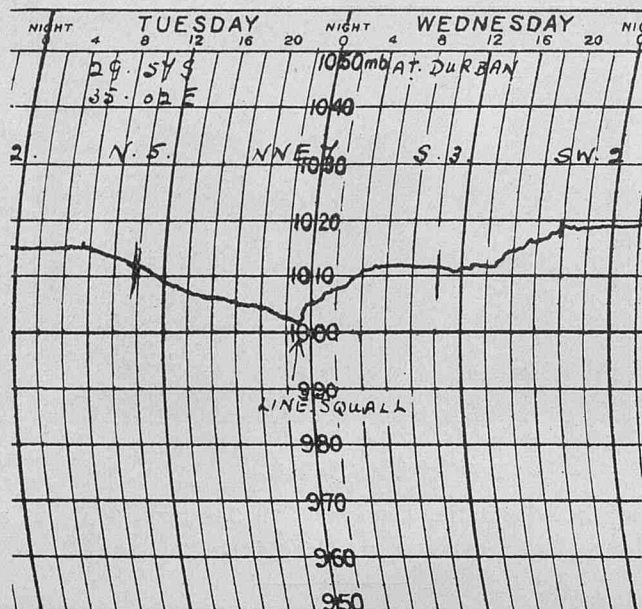
South African Waters.

THE following is an extract from the Meteorological Record of S.S. *Ceramic*. Captain H. C. ELFORD. Liverpool to Australia. Observer, Mr. J. McNICOLL, 5th Officer.

On approaching Durban on 22nd November at 2330 G.M.T., a line squall was encountered. The barometer was standing at 1008 mb. and unsteady, wind N., force 8.

The line squall had the characteristic low arch of cloud which stretched practically from horizon to horizon, the rest of the sky being comparatively clear. Not until the cloud was nearly overhead did the wind shift to S.W. and ease to force 5, but for a few minutes only, when it came away from the southward with force 8.

The barometer during this period dropped 4 mb. (see barogram) and started to rise again as the vessel left the low. An unusual feature of this squall was the second cloud which followed hard on the original cloud. Although similar in shape and length it was not so well formed. No change in the barometer or wind was apparent as it passed over the



ship. The whole phenomenon from the time the wind backed round until it came from the opposite direction lasted about five minutes. Air temperature 74° F., sea 73° F.

Position of ship : Latitude 29° 53' S., Longitude 31° 38' E.

PHOSPHORESCENCE.

South Atlantic Ocean.

THE following is an extract from the Meteorological Log of M.S. *Silverwalnut*. Captain R. CROSS. Colombo to Dakar. Observer, Mr. A. A. M. NICOLSON, 3rd Officer.

On 22nd November, 1938, at 1900 G.M.T., the vessel ran into an unusual amount of phosphorescence which continued throughout the night until approximately 2230 G.M.T., although occasional patches were observed until 0000 G.M.T.

The intensity during this former interval varied a considerable amount, as evidenced by the bow wave and wake of the vessel, the phenomenon reaching its climax at 2140 G.M.T. at which time the visibility was somewhat reduced. At this time "phosphorescent ridges" appeared which trended in a W.N.W. and E.S.E. direction, and on near inspection of the water at the vessel's stern one could see what may be described as clouds of phosphorescent "dust" churning in the wake, due no doubt to myriads of minute marine growth having luminescent organs. A large shoal of considerable sized fish were attracted by the vessel and kept company with us for some minutes, leaving spectacular trails of flashing brilliance in their wake.

It might be of interest to note that during the forenoon watch numerous patches of reddish-brown coloured water were seen.

Fine weather had been experienced for a week previously, since leaving the latitude of the Cape, with high winds from the S.E. quadrant prevailing.

Temperature of sea surface 77° F. Position of ship at 2000 G.M.T. : Latitude 2° 53' S., Longitude 7° 38' W. (D.R.).

South Australian Waters.

THE following is an extract from the Meteorological Record of S.S. *Nardana*. Captain C. E. WHITE. Fremantle to Melbourne. Observer, Mr. W. BROWN, 3rd Officer.

On 23rd November, 1938, at approximately 1513 G.M.T., a thin line of white was observed on the surface of the sea, fine on the port bow and about half a mile distant. It was especially noticed because it appeared to be moving in the opposite direction to the moderate S.E. sea which was running at the time. Suddenly the thin line formed into

a large circle of brilliant phosphorescence, apparently stationary. It remained thus for approximately one minute, after which it moved off in a N.W. direction, or rather appeared to do so. It now had the form of a broad white milky band. When it came abeam of the vessel it appeared to move off in a N.E. direction. By now it was very brilliant, being helped by the fact that it was a very dark night, no moon or stars showing. Finally it gradually faded out, its distance from the ship being now approximately two miles. At first it appeared to be a whale or some other large fish, but the band of phosphorescence was too broad for that to be the case. During the watch previous to this occurrence a considerable amount of phosphorescence was observed.

Position of ship : Latitude 36° 08' S., Longitude 123° 40' E.

Vessel's course 100°; wind S.E. by E., force 5; air temperature 58° F., sea temperature 58° F., wet bulb 54° F.; clouds, Stcu and Cu; amount of sky covered, 8/10ths.

Equatorial Atlantic Ocean.

THE following is an extract from the Meteorological Record of M.S. *Alynbank*. Captain D. GILLIES. Cairns to Capetown. Observer, Mr. J. MURRAY, 2nd Officer.

27th November, 1938 at 02.50 A.T.S., vessel began passing through brilliant lines of phosphorescence. These lines were remarkably well defined straight and evenly spaced, about 500 feet apart, being between 10 to 15 feet wide, and running in a north and south direction. Between the lines no phosphorescence showed. At 03.20 A.T.S. the lines became irregular and faint, and finally at 03.30 A.T.S. they ceased as abruptly as they began.

Sky at the time was heavily overcast with nimbostratus and light rain was falling. Wind South, force 2; sea slight; barometer 29.83 in.; air temperature 77° F., sea 80° F.

Position of ship : Latitude 1° 35' N., Longitude 11° 20' W.

THE following is an extract from the Meteorological Record of S.S. *City of Bombay*. Captain O. CHEVERTON-BROWN. Liverpool to Beira. Observer, Mr. G. R. JACKSON, 2nd Officer.

At 0523 G.M.T. on the 30th November, 1938, in Latitude 2° 14' N., Longitude 11° 38' W., whilst steering a course of 145° a huge strip of phosphorescent water was observed stretching from east to west as far as the eye could see.

The width of water measured approximately 50 to 60 feet and the surface was disturbed by surface currents, the direction of which could not be ascertained.

The weather during the previous five hours had been clear and cloudy with frequent heavy rain squalls. Wind S. to S.S.W., force 3 to 4, increasing to 5 during squalls. At the time of observation the weather was fine with moderate S.S.W. breeze, slight sea, and low southerly swell.

WATERSPOUTS.

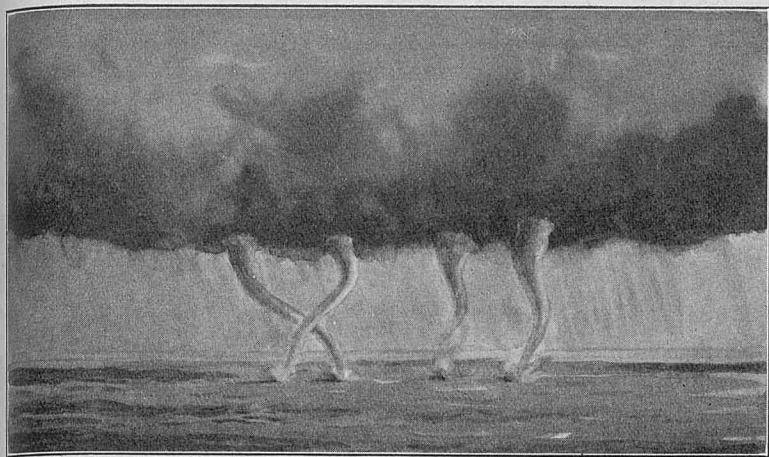
Mediterranean Sea.

THE following is an extract from the Meteorological Record of S.S. *Orama*. Captain M. J. SARSON. Gibraltar to Toulon. Observer, Lieutenant P. G. A. KING, R.N.R., 3rd Officer.

27th October, 1938, in Latitude 37° 45' N., Longitude 1° 12' E., course 053°; speed 17 knots. Wind W., force 3; barometer steady at 1008 mb.; temperature 67° F. Weather fine and clear, with intermittent sheet lightning to the eastward.

At 0500 G.M.T. a large bank of heavy cumulus cloud appeared rising over the horizon immediately ahead. At 0530 as dawn broke it was observed that heavy rain was falling from the base of this cloud and its upper edge which had by now reached an altitude of about 45° had spread out into the familiar anvil shape.

At 0545 three waterspouts formed very quickly on the northern edge of the cloudbank bearing two points on the port bow, distant about 2 miles. In a very short time the sea surface in the neighbourhood of the waterspouts had become very agitated and they were forming and collapsing in quick succession, as many as five being observed over a small area at one instant and all being exceptionally well-defined. At 0555 course was altered to starboard to avoid the disturbed area which was now close on the port side.



From a sketch by Lieut. P. King, R.N.R., 3rd Officer, S.S. "Orama."

At this moment two of the waterspouts appeared to travel towards one another as though driven by contrary gusts of wind, one crossing ahead of the other giving the appearance of a large X, before both suddenly collapsed and disappeared.

A fierce squall of wind and rain was then experienced accompanied by vivid forked lightning and several loud claps of thunder lasting 15 minutes, during which the remaining waterspouts were lost sight of.

Course was now resumed and the ship was again in fine weather, the rain area passing rapidly to the south-eastward, no more waterspouts being seen or thunder heard.

The wind remained steady in direction throughout and returned to normal force after the squall.

A fall of one millibar was shown on the barograph during the squall and no change of temperature was noticed.

The phenomena occurred at the time of sunrise.

ABNORMAL REFRACTION.

North Atlantic Ocean.

The following is an extract from the Meteorological Record of S.S. *Harmonides*. Captain H. EVANS. New York to Capetown. Observer, Mr. J. K. GARRIE, 3rd Officer.

On 22nd October, 1938, at 21.30 A.T.S. Rigel when rising at an altitude of 8° (approx.) bearing 105° was observed to be changing colour, red, green, white; green predominating until an altitude of 26° was reached. At 22 45 A.T.S. Sirius, bearing 110°, was seen to behave in a similar manner, the colours being clearly defined and of considerable brightness, green again being the predominant colour, the star at times appearing to be double.

Further observation showed that all stars bearing between 50° through 180° to 238° with altitudes less than 28° were behaving similarly. Stars in the northern sky were not affected. Wind E. by S., force 4; air temperature 76° F., sea 76° F.; cloud fractocumulus 3/10ths.

Position of ship : Latitude 22° 42' N., Longitude 43° 20' W.

South Pacific Ocean.

The following is an extract from the Meteorological Record of S.S. *Middlesex*. Captain J. STYRIN. Auckland to London. Observer, Mr. T. J. ALDERMAN, 3rd Officer.

During the 8-12 p.m. watch on 8th December, 1938, it was observed that the stars Canopus, Betelgeuse and Capella appeared to have red and green lights on each side. These additional lights were on the correct sides (port red and starboard green) as on an aircraft or ship, and if observed casually could quite easily have been mistaken for such. The observation was first made at 0320 G.M.T. and the additional lights were visible quite clearly until 0458 G.M.T. Visibility

was good. The sky was clear and blue except for light wispy cirrus cloud 2/10. It was observed that as these cirrus cloud patches were blown across the moon a halo was formed. Other stars in the heavens, not so bright as those mentioned showed no signs of anything unusual.

Barometer 1013.0 mb.; relative humidity 94 per cent.; air temperature 69° F., sea temperature 71° F. S.S.E. breeze, force 3.

Position of ship : Latitude 2° 00' S., Longitude 87° 00' W. (approximately).

NOTE.—This is a most unusual, if not unique, observation. When a star or planet is doubled near the horizon, owing to abnormal refraction, the green image is usually seen vertically above the red one. Another remarkable thing about this observation is that although the altitudes of the stars are not mentioned they cannot have been near the horizon during most of the period of observation since this lasted for 1 hour and 38 minutes. No explanation can be suggested.

ST. ELMO'S FIRE.

North Atlantic Ocean.

The following is an extract from the Meteorological Record of S.S. *Consuelo*. Captain J. L. P. SIBREE, R.D., R.N.R. Hull to Montreal. Observer, Mr. S. R. BROOKE, 3rd Officer.

16th November, 1938. At 02.00 A.T.S., during a violent wind squall accompanied by heavy hail, a seemingly white ball of fire was visible situated at the truck of the forward flagstaff. Almost immediately after becoming apparent, a similar phenomenon was witnessed at the truck of the foremast, the radio aerial of the vessel also being affected, though the phenomenon in the latter case appeared as a short line of white fire. With the passing of the squall the phenomena disappeared, the total period at which the corposants were visible being only two minutes, though during this time they remained stationary, displaying no activity. After their disappearance, a single flash of sheet lightning was observed in the north, the squall having then passed over the vessel. Barometer 997 mb.; wind, W.N.W., force 6; air temperature 37° F., sea 49° F.; visibility good immediately preceding and following the squall.

Position of ship : Latitude 57° 03' N., Longitude 32° 04' W.

Caribbean Sea.

The following is an extract from the Meteorological Record of S.S. *Middlesex*. Captain J. STYRIN. Auckland to London. Observer, Mr. T. J. ALDERMAN, 3rd Officer.

During the 8-12 p.m. watch, 12th December, 1938, the fore topmast was observed to be a blaze of light. The mast was brilliantly illuminated from the truck to a few feet above the cross trees, and had the appearance of a very powerful electric flash of a permanent nature. The topmast backstays and all adjacent stays, wireless aerial, etc., were clearly visible although it was a dark night. This condition lasted for nearly twenty minutes in various stages of brilliance, sometimes almost fading away altogether. During these fading periods it was obvious that the illumination was caused by myriad small flashing lights adhering to the mast. After the phenomenon had disappeared completely, small flashing lights were observed on the bridgedeck and some were also observed in the darkened wheelhouse and chartroom. When the chartroom light was turned on, a small bug about three-quarters of an inch in length and similar in appearance to a cockroach except that it appeared to be almost transparent, was observed walking on the chart table. This bug periodically gave off brilliant white green flashes of light. The bug escaped after observation and it was not possible to determine how the light was generated.

NOTE.—St. Elmo's Fire is an electrical discharge from terrestrial objects due to a large difference in potential between the earth's electrical charge and that of the air above. The discharge may be

either positive or negative, according to whether the air has a negative or positive charge. The negative St. Elmo's Fire is concentrated so that an object such as a ship's mast is completely enveloped by luminosity. This appears to have been the case in the above observation. The positive "Fire" takes the form of short pointed streamers, particularly proceeding from pointed objects. The insect seen was discharging electricity at the time. On mountains, where the phenomenon is especially seen on land, discharge may take place from blades of grass, etc., also from the observer's hair or clothing.

ST. ELMO'S FIRE AND LIGHTNING.

North Atlantic Ocean.

THE following is an extract from the Meteorological Record of S.S. *Beaverburn*. Captain A. S. PHILLIPS. Montreal to London. Observer, Mr. P. LOCKE, 4th Officer.

18th November, 1938. At 0000 G.M.T., during a violent rain squall accompanied by several flashes of lightning, St. Elmo's Fire was observed at fore- and mainmast trucks and along the full length of the aerial.

The phenomenon was quite brilliant for about two minutes after which it gradually disappeared leaving the aerial first, and lastly the fore truck.

Position of ship : Latitude 52° 51' N., Longitude 24° 25' W.

Between 2115 and 2133 G.M.T., six flashes of brilliant lightning were observed at intervals of about three minutes. They were so bright that each flash lit up the whole ocean as light as day for a split second, and so dazzling as to almost hurt the eyes and of such brilliance as to make one blink even with one's back towards them, and to leave one completely blinded for a moment afterwards.

This lightning originated in the southern sky but owing to its extreme brilliance I was unable to determine what type it was. Thunder was heard very faintly in the distance.

The sky was 7/10ths clouded with Cum., very threatening to the southward and a large black rain squall to the northward; weather for the previous two hours had been cloudy with occasional hail squalls. At the time of observation : wind W. by S., force 6-7; barometer 29.80 in.; temperature 50° F.

Position of ship : Latitude 51° 53' N., Longitude 15° 53' W.

BALL LIGHTNING.

Mediterranean Sea.

THE following is an extract from the Meteorological Record of T.S.S. *Viceroy of India*. Captain C. A. J. W. CARTER. Bombay to London. Observer, Mr. H. S. ROWNTREE, 4th Officer.

Wednesday, 21st December, 1938, at 11.36 A.T.S. Barometer corrected, read 29.59 in. Approaching Cape Dell Armi in Latitude 37° 48' N., Longitude 16° 04' E., the following phenomenon was observed. A ball of brilliant fire, whitish-yellow in colour, fell about a cable's length ahead of the ship and was accompanied by a terrific clap of thunder which occurred simultaneously. The preceding weather had been overcast with fierce driving rain squalls which had temporarily ceased, but immediately following the phenomenon there was a further and more fierce squall of large hail and heavy rain from the S.W.

The wind had been freshening from the S.S.W. since midnight, attaining force 6 prior to the occurrence. Barometer falling steadily 15 mb. per watch; temperature steady at 65° F. No other thunder or lightning was observed either before or after, and the weather shortly began to clear.

A further point noticed was that the outer fringe of the ball was of a reddish colour, though this may have been but the effect of the brilliant light of the nucleus momentarily causing the observer to

close his eyes. The nucleus at that distance appeared to be about the size of a small football.

NOTE.—This is an interesting observation since ball lightning, while not extremely rare, is not often seen at such close quarters. It is quite probable that the red colour actually existed on the fringe of the ball.

RAINBOW.

North Atlantic Ocean.

THE following is an extract from the Meteorological Record of M.S. *San Cirilo*. Captain F. S. BAILEY. Falmouth to San Pedro. Observer, Mr. G. TWEEDIE.

On Friday 30th December at 1845 G.M.T. a bow formed across a Cum. cloud with a low base, beginning at sea level and gradually increasing upwards until the bow was completed. No visible rain was falling from the cloud at the time and none was felt when the cloud passed over the vessel. Maximum altitude of the violet band was 25½° (sun's altitude at time being 14½°) and the visible colours were, starting from the outside, orange, yellow, green, blue, violet, green, violet, the latter two being very faint. The band of orange colour had the greatest width, while the violet band was of greatest intensity.

NOTE.—In this observation the colour of greatest intensity was violet. In the majority of rainbows the greatest intensity is in the red or orange. This observation emphasizes the fact that all rainbows do not look alike, their appearance depending on the size of the raindrops forming them. The purity of the colours varies, as also do the relative widths of each colour band, and the relative intensity of the colours. Such differences may even be observed between different parts of the same rainbow, or the character of a rainbow may change during its duration.

TOTAL LUNAR ECLIPSE.

South Atlantic Ocean.

THE following is an extract from the Meteorological Log of M.S. *Javanese Prince*. Captain C. S. SMITH. Colombo to Dakar. Observer, Mr. N. GALE, 3rd Officer.

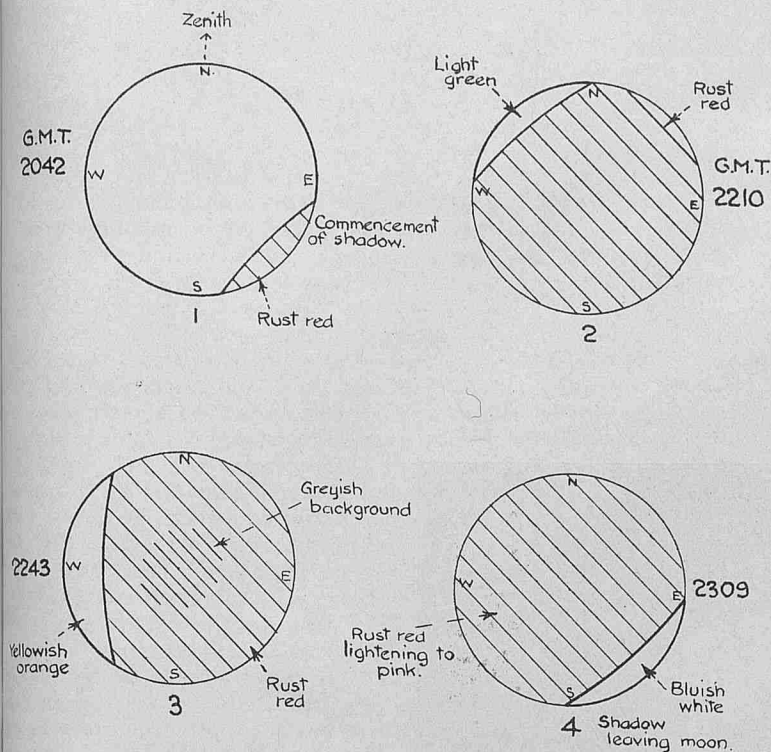
On 7th November, 1938, at 2042 G.M.T. the commencement of a total lunar eclipse was observed. Throughout the eclipse the sky was between 5 and 7 tenths clouded with cumulus passing fairly quickly from the S.E., wind was S.E., force 3; visibility 9.

The earth's shadow appeared to commence on the S.E. quadrant of the moon. (The letters N.E.S. & W. have no relation to the compass, and are used as indicated in the sketches to facilitate description only). Between 2100 and 2130 the eclipse was obscured by clouds.

- 2145. Shadow assumed a rust red colour and appeared to be total. The side at which the shadow commenced was darker than the rest.
- 2210. Rust red colour very definite and covered all the moon except for a small segment on the rim of the N.W. quadrant which appeared light green (see sketch No. 2).
- 2220. Green segment turned to a yellowish orange and the red became a little lighter. The light coloured segment appeared to be moving round the rim of the moon in an anti-clockwise direction, and increasing slightly in size.
- 2243. Light segment now stretched from N. by W. to S.E. on moon's rim. Red portion sometimes gave the appearance that it was palpitating as at times it appeared to decrease and then expand once more. Centre of the moon appeared to have a grey background to the red colour.
- 2302. Light segment growing lighter on S.E. side.
- 2309. Shadow clearing off moon at S.E. quadrant. As light progressed the rust red part assumed a rose pink hue.
- 2315. Moon once more obscured by clouds.

During the eclipse the phosphorescence in the sea was very bright and the ship's wake was visible for at least half a mile.

Position of ship : Latitude 0° 30' S., Longitude 8° 38' W.



NOTE.—The times at which the various stages of an eclipse of the moon begin and end are the same for all longitudes of observation. The times for the above eclipse are given in the Nautical Almanac as follows:—Moon enters umbra 20 h. 40.8 m., total phase begins 21 h. 45.0 m., total phase ends 23 h. 7.5 m., moon leaves umbra 0 h. 11.9 m. The observations agree well with these times.

The astronomical method of denoting parts of the moon's surface is rather different from that used by Mr. GALE in his description and sketches. The four cardinal points are used as Mr. Gale has done but the E. point is on the left hand side of the moon and the W. point on the right hand side. Furthermore the points denoted by N. and S. are on a great circle passing through the north and south poles of the sky. The N. point of the disc will therefore only be the highest point of the disc when the moon is on the meridian of the place of observation.

AURORAE.

Irish Sea.

The following is an extract from the Meteorological Record of S.S. *Vandyck*. Captain P. SYMONS. Madeira to Liverpool. Observer, Mr. D. P. WOODS, 1st Officer.

On 8th October, 1938, at 0430 G.M.T. off Skerries Lighthouse, aurora was observed above the northern horizon. Vertical streaks of light appeared and faded several times. Stars were visible through a thin veil of altostratus clouds, and the strong light to northward also showing through the clouds appeared as a curtain of light to a height of about 10° above the horizon.

A distinct lunar halo was observed at the same time, the moon being low over the western horizon.

North Atlantic Ocean.

The following is an extract from the Meteorological Record of S.S. *Cairnglen*. Captain A. W. MELLING. Montreal to Newcastle. Observer, Mr. F. W. FAIRLEY, Chief Officer.

23rd October, 1938. 2140 G.M.T. An auroral arc of regular shape was observed, the altitude of summit being 14° and bearing 350°. The eastern and western extremities which came down to the horizon bore 46° and 296° respectively. At the same time an arc of less intensity appeared about 3° below the main one and disappeared at 2150 G.M.T.

The colour of the arcs, when first observed, was white and, in the case of the main arc, the colour gradually intensified, becoming tinged

with yellow. At 2220 G.M.T., the altitude of the summit was observed to be 4½° and bearing the same as previously.

At 2230 G.M.T. the arc became irregular, curtaining becoming evident which gradually increased, but was more marked in the eastern segment of arc, and in which direction it was tinged with red. Stars were visible below the arc during the whole of the phenomenon.

At 2245 G.M.T. auroral arc of white colour was again observed, the altitude of the summit being 7½°, and bearing 346°, the east and west extremities at horizon bearing 11° and 306° respectively. The arc remained definite in shape until 2300 G.M.T. when it became diffused, the phenomenon overspreading the northern sky to an average altitude of 50° with little curtaining. Stars were again observed below the arc. Sky cloudless.

Position of ship : Latitude 52° 33' N., Longitude 53° 37' W.

METEORS.

Persian Gulf.

THE following is an extract from the Meteorological Record of S.S. *Nardana*. Captain C. E. WHITE. Bombay to Basrah. Observer, Mr. W. BROWN, 3rd Officer.

17th October, 1938. 1910 G.M.T. At an altitude of approximately 4° and on a bearing of 96°, the meteor was first observed, and appeared as a large ball of light, blue-white in colour. As it travelled upwards in its path across the heavens, it left a long thin milky white trail behind it. The whole phenomenon lasted for a considerable while, the duration being approximately eight seconds. The meteor finally disappeared at an altitude of approximately 50°, bearing 180°. For a considerable time before and after the occurrence numerous small meteors were observed, all in the same part of the heavens. The large one, however, was the only one which travelled upwards in its flight.

Position of ship : Latitude 30° 28' N., Longitude 48° 01' E.
Anchorage off Tuwaila Island, Shatt-al-Arab River.

North Atlantic Ocean.

THE following is an extract from the Meteorological Record of S.S. *Ruahine*. Captain G. KINNELL. Wellington to London via Panama. Observer, Mr. K. A. VASEY, 3rd Officer.

At about 0015 G.M.T. (21.09 A.T.S.) on 2nd November, 1938, a very bright meteor was observed to fall and burst with a brilliant green flash (approximate magnitude —5.0 to —6.0).

First appearing a few degrees from Polaris it travelled towards Kochab and disappeared in Declination 70° N., R.A. 14 h. 30 m. approximately.

The meteor was observed to leave a nebulous green wake behind it, which at first was plainly visible to the naked eye as a faint straight line. This line gradually became fainter and at the same time (by the aid of binoculars) was seen to be curling into the shape of a double "S."

Eventually the upper part of the "S" overtook the lower and resulted in a flat white cloud at right angles to the flight of the meteor.

The cloud faded from sight six minutes after the meteor was first sighted.

Sky cloudless; air temperature 74° F.; humidity 74 per cent.

Position of ship : Latitude 33° 40' N., Longitude 46° 27' W.

North Pacific Ocean.

THE following is an extract from the Meteorological Log of S.S. *Benmohr*. Captain J. C. SINCLAIR. Vancouver Island to Panama. Observer, Mr. A. GRIFFITHS.

16th November, 1938. Between 04.00 and 06.00 A.T.S. an unusually large number of meteors was observed in all parts of the sky, which was cloudless. At 05.17 A.T.S. a very bright meteor was seen appearing slightly to N.E. and disappearing close to S.E. of the Pleiades. Though the duration was only two seconds, the illumination of its path showed distinctly for 15 seconds.

Position of ship : Latitude 32° 11' N., Longitude 119° 27' W.

NOTE.—The large number of meteors would probably be those of the Leonid shower which appears annually between 12th and 18th November. It does not, however, give as many meteors in some years as in others. In some years quite a definite shower is observed over a period of a few hours, in longitudes where it is night at the time.



Captain Charles H. Brown, F.R.S.G.S.

CAPTAIN CHARLES H. BROWN, F.R.S.G.S.

In 1901 a young man with a very promising career at sea gave up that career and started teaching navigation and its kindred subjects in the Dundee Technical College. That young man was Captain C. H. BROWN, who to-day is recognized as one of the leading nautical educationists in this country.

Charles H. BROWN started his career at sea in 1887. In that year he joined the barque *Queen Mab*, and when he finally left her in 1898 he had served in her in all grades from apprentice to master. On leaving the *Queen Mab* he said farewell to sail and transferred to steam in order to gain a greater knowledge of nautical affairs and by 1901 he certainly had had a very varied experience. This stood him in good stead in his new sphere of activities and was of great help to hundreds of young officers who studied under him.

Of a mild and quiet disposition he yet possessed a steady determination and great strength of character. From his earliest days he was something of an idealist and, as events have proved, he was years ahead of his confreres.

As a young teacher he organized classes and examinations for fishermen and, as a direct result of his labours, the Board of Trade, in 1908, instituted examinations for, and granted certificates of competency to, fishermen. During these early years in Dundee he was the local agent for the Meteorological Office and also local honorary secretary and treasurer of the Royal National Lifeboat Institution. As local agent of the Meteorological Office he supplied the Meteorological instruments for Captain Scott's Antarctic expedition. In addition to these many duties he found time to do some exceptionally good work for the International Council for the Investigation of the North Sea. In 1904 he made two cruises in H.M.S. *Jackal* during which he made very extensive Hydrographical observations in the Faroe channel. Again, in 1906, he made two more cruises in the Fishery Cruiser *Goldseeker*. The splendid work he did on these cruises was later published in three Reports by the Fishery Board for Scotland. Professor Sir D'ARCY THOMPSON, who was then Director of the Scottish Committee of the North Sea Fisheries, described the Reports as "one of the best specimens of Hydrographical work I have ever seen." This opinion was endorsed by an eminent Professor in Copenhagen. As some slight reward for his great work Captain BROWN was made a Fellow of the Royal Scottish Geographical Society, and it is interesting to note that he is still engaged in compiling statistics on Trawling for the Fishery Board.

In 1910, when a new department, known as the School of Navigation, was opened in the Royal Technical College, Glasgow, Captain BROWN was appointed as its Superintendent. It may be that the larger city opened up a wider field for his energies. At any rate, he certainly increased his activities.

Captain BROWN was one of the first to realize that the young apprentice in the Mercantile Marine was at a great disadvantage as compared with his brothers ashore who not only were provided with specialized training before entering industry but could also attend evening classes during the winter months. He set out to improve matters for the young seafarer and was eventually responsible for organizing the first Mercantile Marine Cadet Course in this country. In this course apprentices were given specialized instruction on matters pertaining to the sea in addition to their ordinary education.

The war years might have damped the enthusiasm of a less energetic and forceful character than Captain BROWN. All his assistants were soon away on active service and, naturally, additional work fell on his shoulders. Instead of discouraging him, however, these years seemed

to spur him on to greater efforts and in 1917 he was instrumental in convening a meeting of all the heads of Navigation schools throughout the country. This meeting led to the formation of what was known as the Conference of Navigation Schools and Captain BROWN was made Honorary Secretary of the new organization. This Conference made official contact with the Board of Education and the Board of Trade, and in 1918 the latter agreed to recognize Cadet Courses in navigation schools and to allow some proportion of the time spent at school to count as qualifying sea service. This was undoubtedly a great achievement and much of the credit goes to Captain BROWN who had always contended that such a concession was overdue. Having gained his point he immediately took steps to get a cadet course formed and in 1919 such a course was officially started in the Royal Technical College, Glasgow.

The continued education of apprentices at sea was another of Captain BROWN's ideals. He firmly believed that tuition could be done by correspondence and in 1919 several Glasgow shipowners agreed to give his proposals a fair trial. He forthwith produced a booklet, "Course of Study for Cadets at Sea," in which the course was outlined and the cadet was instructed which books he ought to use. The scheme was an immediate success and by 1922 it was put on an official basis and has been most satisfactory ever since. It is interesting to note that a correspondence course for apprentices, sponsored by the Merchant Navy Officers Training Board and approved by the Board of Education and the Board of Trade, was started in 1937, just 17 years after Captain BROWN launched his pioneer effort. Truly he was years ahead of his fellow teachers.

Guide books and text books, both good and bad, have been written for seamen. Generally speaking these books were either too difficult to follow—due no doubt to the fact that apprentices left school at the age of about 16—or they were merely cram books and did little good. In an endeavour to alter this state of affairs Captain BROWN set himself the task of producing books which would belong to neither of the categories mentioned. That his efforts were successful is amply demonstrated by the great demand for his books, and it is an undisputed fact that hundreds of present-day officers owe their success in the Board of Trade examinations to a diligent study of his books.

Whilst engaged in all these activities he still continued to act as Honorary Secretary of the Conference of Navigation Schools. It was perhaps only his tact and determination which held the Conference together. As Honorary Secretary he kept in close touch with the Board of Trade, and the splendid spirit of goodwill and co-operation which to-day exists between that Board and the navigation schools is largely due to his efforts.

In 1935 the navigation schools decided to form an Association in succession to the Conference which had done such useful work. The newly formed Association paid a fitting tribute to the ability and long service of Captain BROWN by electing him its first Chairman.

Now, in 1939, age limits demand that Captain BROWN shall retire. He has had a busy and a useful life and we know that in retirement he will still continue to give of his best in advising and assisting seamen. The work he has done so far has endeared him to thousands and it is no stretch of imagination to say that his name is even more of a household word to seamen than that of the great LECKY, whose "Wrinkles" are still so much to the fore. In his retirement his many friends in all walks of life wish him health to enjoy his well-earned rest and energy to pursue his life-long passion for assisting his cloth.

W.H.

VENTILATION OF HOLDS CONTAINING GENERAL CARGO FROM THE UNITED KINGDOM TO AUSTRALIA.

BY COMMANDER J. S. METCALF, D.S.C., R.D., R.N.R., STAFF CAPTAIN R.M.S. "ORION."

THE system which has been generally adopted in the past with regard to the ventilation of general cargo compartments is to trim the ventilator cowls, weather ventilators back to the wind, to ensure a continuous supply of fresh air. As the air contains aqueous vapour which, under certain temperature conditions, is precipitated in the form of condensation, it will be appreciated that continuous ventilation could, under certain conditions, be exceedingly detrimental.

For example, saturated air at 50° F. contains 9.4 ounces of water per 1,000 cubic feet, and at 70° F. 18.4 ounces per 1,000 cubic feet. To allow this air to precipitate its quota of moisture on cargo susceptible to condensation and then to replace it with air of a similar nature would obviously be unwise.

Condensation—the counterpart of vaporization—is caused by the cooling of the atmosphere below its "dew point." In the average composition of the atmosphere there is roughly $1\frac{1}{2}$ per cent. of water vapour. This follows from the fact that 1,000 cubic feet of air weighs approximately 1,200 ounces, and the content of water vapour may be anything between 5 and 6 ounces at low atmospheric temperatures and 30 to 40 ounces at high atmospheric temperatures, as shown on the graph. The amount of water vapour, i.e. water in its invisible gaseous state, which can be held in suspension in the atmosphere is thus a variable quantity depending on temperature. The higher the temperature the greater the amount of water vapour the atmosphere can hold in suspension. The atmosphere is spoken of as being "saturated" when it is holding in suspension the maximum quantity of water vapour that it can accommodate for the given temperature. When air is not holding in suspension its maximum of water vapour we speak of its relative humidity per cent. and it can be cooled down without precipitation occurring to a temperature known as its "dew point," at which point saturation occurs and below which precipitation takes place.

Suppose for instance air at 70° F. has a relative humidity of 80 per cent. It will then contain $.8 \times 18.4$ ounces of water per 1,000 cubic feet, that is 14.72 ounces. If it is cooled down to 63° F. it becomes saturated, for air at 63° can just hold 14.7 ounces of water vapour. 63° F. is then its dew point.

Condensation in cargo compartments occurs as the result of the atmosphere precipitating its surplus moisture through coming into contact with the relatively cooler surfaces of the ship's structure or of cargo.

The two primary factors governing the deposit on cargo of condensation from the air are :—

1. The dew point of the air.
2. The temperature of the cargo.

The dew point temperature is determined by the wet and dry readings and may be taken out from the Meteorological Office Hygrometric Tables.

As an example, suppose the dry bulb reading is 70° F. and the wet bulb 66° F., representing a depression of 4° F. of the wet bulb, and the Table shows that the dew point is then 63° F. This means that contact with an object the temperature of which is below 63° F. would cause the aqueous vapour in the air to be precipitated on the object in the form of condensed moisture.

Alternatively, air of this dew point coming into contact with an object of higher temperature than 63° F. could not precipitate its moisture. So long as the temperature of the cargo remains above the dew point of the ventilating air such ventilation cannot cause condensation on the cargo.

Sea air contains a variable amount of chlorides in suspension, and these chlorides are known to be precipitated with condensed water vapour. This is well illustrated in the excessive corrosion and rusting which occurs on structural ironwork near sea coasts. As the air which is ventilated through a vessel's cargo compartments is, in the main, moist and salt laden and its condensation takes place upon exposed galvanized iron and metal, it can be understood that it is possible for corrosion to take place on the galvanized surfaces exactly similar to that which would occur if the corrosion was the result of actual contact with sea water at some period during the voyage. Minute particles of salt are capable of producing a considerable amount of corrosion at the customary cargo temperatures.

Mr. S. J. DULY, M.A., of the City of London College, has devoted considerable study of condensation in ships' holds, its causes and the means by which it might be minimized. His recommendations regarding the restriction of ventilation when atmospheric conditions are favourable to condensation have been tested with success.

These recommendations are :—

- (1) To take dew point readings of the atmosphere each watch;
- (2) To take the temperature of the cargo once a day;
- (3) To plot those readings on a graph;
- (4) To ventilate when (1) is below (2);
- (5) To cease ventilation when (2) is below (1).

It has been found that for practical purposes it is unnecessary to plot a separate graph for each compartment. A compartment in which the temperature is typical of those throughout the vessel should be selected.

The Thermometer.

Some notes on its use at sea.



C.H.W.

BY COMMANDER C. H. WILLIAMS, R.N.R.

THERMOMETERS are part of the usual equipment of deep-water ships nowadays, and have been so for many years. It may, however, be of interest to recall that for the greater part of the long period during which men have used the sea there were no means of *measuring* the temperature. In olden times heat and cold could only be felt, as they affected the comfort of an individual. Changes of temperature made little difference to a ship's progress, except of course, in regions of ice.

Countries and oceans were described as being hot, cold or temperate, for it is usually these qualities which come first to mind when thinking of the climate of a place.

Heat may be regarded as the prime mover in the circulation of the atmosphere and of the ocean currents. The measurement of the heat of the air and sea has, therefore, been a matter of importance to Meteorology and Oceanography ever since the perfection of the thermometer made such measurement possible.

The famous Italian scientist GALILEO is credited with having invented the thermometer (or rather a baro-thermoscope as it really was, for it depended on the expansion and contraction of air) in about the year 1592. A number of scales for measuring the temperature were devised later, one of them using the freezing point of water as one point and the melting of butter as the other, with half way between for neither hot nor cold. Alcohol was the liquid first employed. In a book called "The Evolution of the Thermometer" by C. H. BOLTON there is a table of no fewer than 35 different thermometer scales, some with zero at the boiling point and the greatest reading at the bottom of the tube.

Sir ISAAC NEWTON produced a graduation in 1701, and improved scales devised by FAHRENHEIT, REAUMUR and CELSIUS followed a few years later. FAHRENHEIT's thermometer in about 1714 appears to have been the first really reliable one made. His scale came into general use in English-speaking countries and has remained so. Its small degrees and its zero below freezing point made it suitable for meteorological work. The scales in general use at the present day are given in THE MARINE OBSERVERS' HANDBOOK.

SIX's registering maximum and minimum thermometer was invented about the year 1782. It seems unlikely that thermometers were often used at sea before FAHRENHEIT's time, or perhaps for many years after. There is, however, mention of one in an old book entitled "A Treatise concerning the Motion of the Seas and Winds," published in London by HENRY BROME in 1677. It was written in Latin by ISAAC VOSSINS and translated into English "for the use of the publick, but particularly such as go to sea." In it is stated "if any by a *thermoscope* shall try whether in the winter time the South East or the North West wind be coldest he will certainly find the former to be colder."

The use of the thermometer at sea, and the entry of its readings in ships' log books as a regular routine, gradually became common.

In Captain JAMES COOK's journals of his famous voyages in 1768-1771 and 1772-1775, thermometer readings are occasionally recorded. In 1773 the temperatures of the air to half a degree Fahrenheit were regularly entered in the Meteorological Journal kept by the expedition to the Spitzbergen seas in H.M. Ships *Racehorse* and *Carcass* under Captain C. J. PHIPPS, R.N.

Early log books were ruled up by hand, and in the log of H.M.S. *Glory* in 1795, there is no space marked for temperature, but it was recorded daily in the remarks.

By about 1800 some printed log books were in use both in the Royal Navy and in the merchant ships of the East India Company. In the East India Company's logs a space for temperature was provided in the noon summary. Captain WILLIAM SCORESBY and other whaling masters kept careful records of air and sea temperatures during the early years of the last century. The thermometer, then, may be said to have been included in the navigational equipment of deep-water ships for something over a hundred years.

Captain MAURY's well-known book "The Physical Geography of the Sea, and its Meteorology," published in about 1855, called the attention of seamen to the practical value of observations of the temperature of the air and the sea surface. In it he mentions "Thermal Navigation." This was a method by which ships in the North Atlantic bound for American ports could obtain some idea of their longitude by observing the sea temperature and noting when the ships left the warm waters of the Gulf Stream and entered the colder inshore water. Apparently this method was originally suggested by Doctor FRANKLIN as long ago as 1770.

Admiral SMYTH, in his "Sailor's Word Book," also mentions the method as "Thermometric Sailing" and describes it as "a scheme for detecting the approach to shoal water by the diminution of temperature, and found to be useful in some places, such as the Agulhas and the Newfoundland Banks; in the latter a difference of 20° F. has been observed on quitting the Gulf Stream and gaining soundings in 100 fathoms."

As well as being of some use to navigators in this way, the temperature of the seas through which a ship steams is an item of growing importance in the efficient carriage of cargo. This, of course, is well known to modern seamen, and in loading cargoes such as oil in bulk, allowance is made for expected changes in sea temperatures during the voyage. Graphs are made in some cargo vessels showing the temperature every watch of the holds, air and sea, during a voyage.

As sea air is generally damp and salt laden, condensation from it in holds may do damage to cargo. In some circumstances, therefore, it may be advisable to cease ventilating the holds, as is pointed out in Commander METCALF's notes on this subject published in "The Marine Observers' Log," page 146 of this number.

Modern ships having large refrigerating plant have elaborate arrangements for ensuring that the cargo is kept at the correct temperature. Some of these ships are fitted with distant reading thermometers. These instruments are generally of the electrical resistance type. With them the temperature of any of a large number of compartments may be read instantly at a central position by merely pressing a button.

With ordinary mercury in glass thermometers for use in weather observations the most important matter, providing the instruments are accurate, is to ensure good exposure, so that the correct shade temperature is obtained.

Good modern thermometers can easily be read to half a degree, or even to 0.1 of a degree, but such refinement of reading is useless if the instruments are not properly exposed.

The exposure of thermometers has always been a difficult problem, and a number of types of screen and other devices have been tried.

The first International Meteorological Conference was held at Brussels in 1853, and shortly after that official meteorological instruments, including thermometers and a standard pattern screen, were lent to those British ships whose captains and officers volunteered to assist in the collection of data. A "Weather Book," now called the Meteorological Log, was devised and observations entered in it every four hours, at the change of the watches. In some of these old weather books the temperatures were recorded to the nearest half degree.

A fixed pattern thermometer screen, an adaptation of a wall screen then used ashore, was the first kind issued to ships. In sailing ships it was generally fixed on the poop, either abaft the chart house, or on the cabin skylight, and was fairly satisfactory. In steamships, good

exposure of the screen was more difficult because of heating from the funnel and stokehold ventilators, etc.

In the absence of anything better, however, the fixed screen remained in use until 1924 when the two patterns of portable screen now in use were devised. These portable screens were designed as the result of careful study. Comparisons were made at sea between the readings of thermometers in a fixed screen and those in a portable screen. The latter was shifted to windward before readings were taken. Similar comparisons were made ashore at Kew with three screens; the old pattern fixed, the portable, and the modified portable. The results were discussed by Mr. C. S. DURST, B.A., in an article published in this journal in July, 1926. In both cases the readings of thermometers in the old pattern fixed screen showed a larger error than in either of the portables.

Hung to windward in a ship at sea, so that the free air can blow directly on it and through it, a portable thermometer screen will give reliable air temperatures. As ships' bridges differ somewhat, the best position for the screen with changing wind directions must be left to the discretion of individual observers.

The writer of these notes has seen some good "home made" screens in ships which have not been lent a Meteorological Office screen.

Ordinary mercury-in-glass thermometers are the most suitable type. Mercury has a low freezing point and a high boiling point. Spirit thermometers, though necessary for very low temperatures, are not suitable for meteorological purposes on ordinary voyages, largely because spirit is not so uniform in its rate of expansion.

With a view to overcoming the difficulty of obtaining good exposure to the free air, "sling" psychrometers were devised. The sling is whirled around for about two minutes, in the shade if possible, and the readings then taken quickly. Sling psychrometers are sometimes used at sea in H.M. ships.

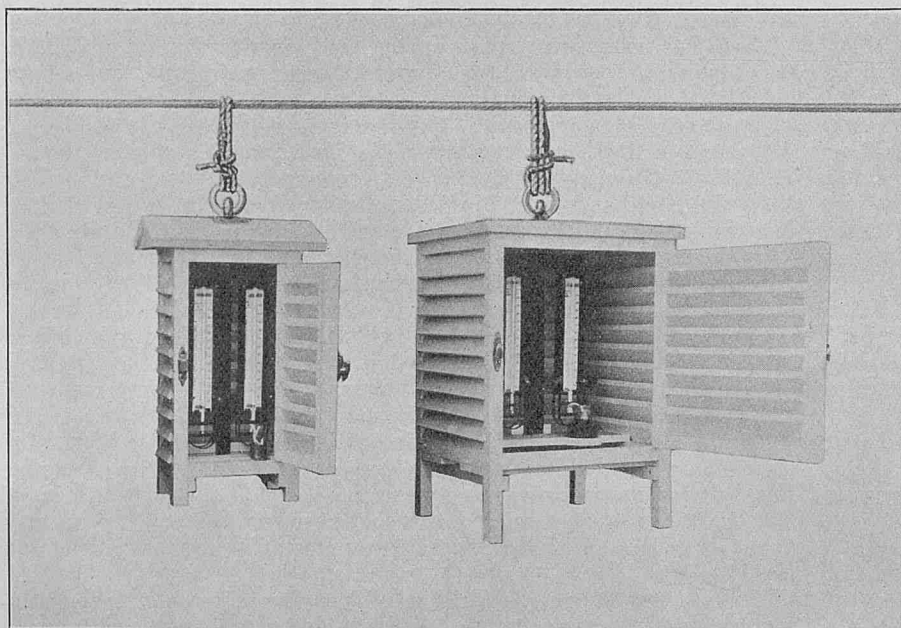


Figure 1, Meteorological Office Portable Screens.

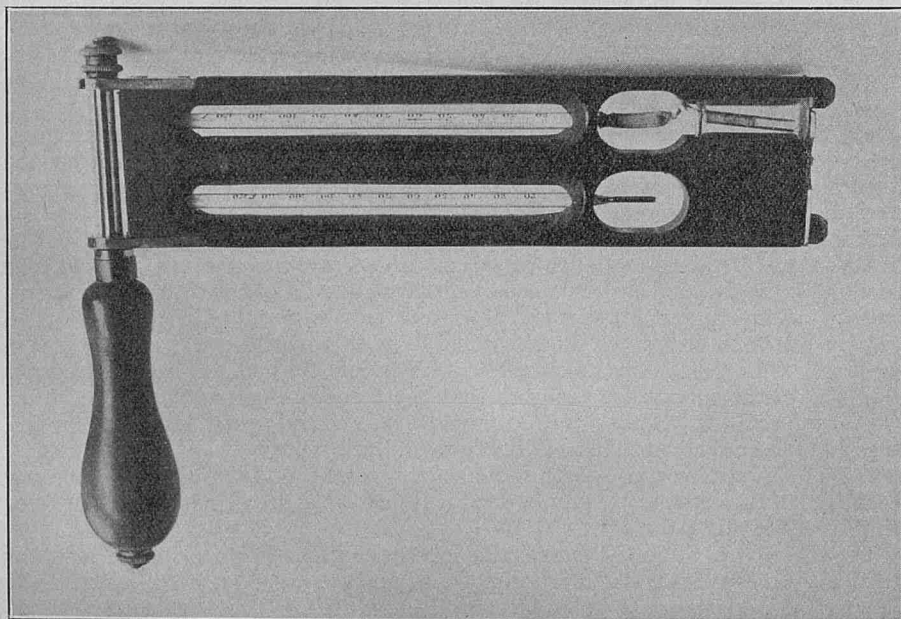


Figure 2, Sling Psychrometer.

Another device for ensuring good exposure to the air is the "Assman Psychrometer," an illustration of which is below.

Distant reading thermographs with dry and wet bulbs for obtaining the temperature and humidity of the air, and distant reading thermographs for sea temperature, are in use in some of H.M. ships.

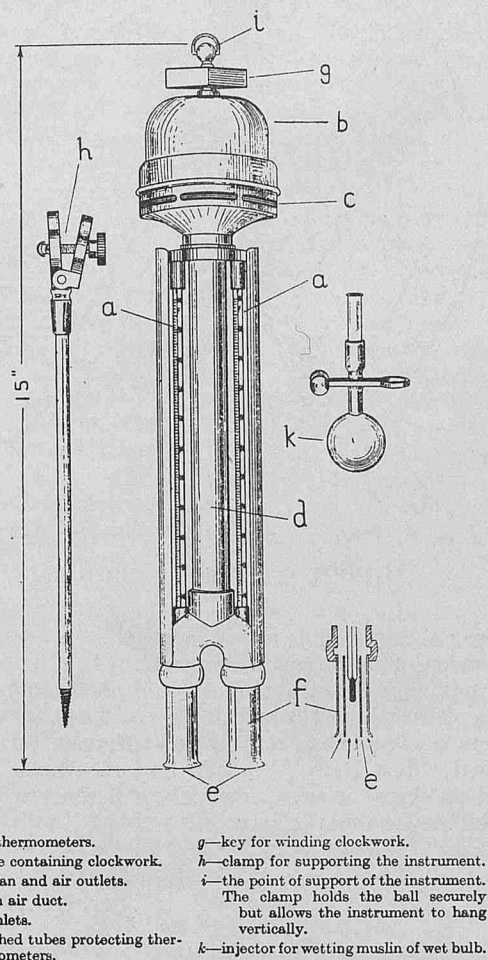


Figure 3, Assman Psychrometer.

In this instrument the air is drawn past the wet and dry bulb thermometers by means of a clockwork fan. There is also a more elaborate pattern with an electric fan, as is used in H.M. ships.

Self-recording thermometers, or thermographs, are in use in some ships, and with these instruments also the correct exposure to the air is obviously of importance.

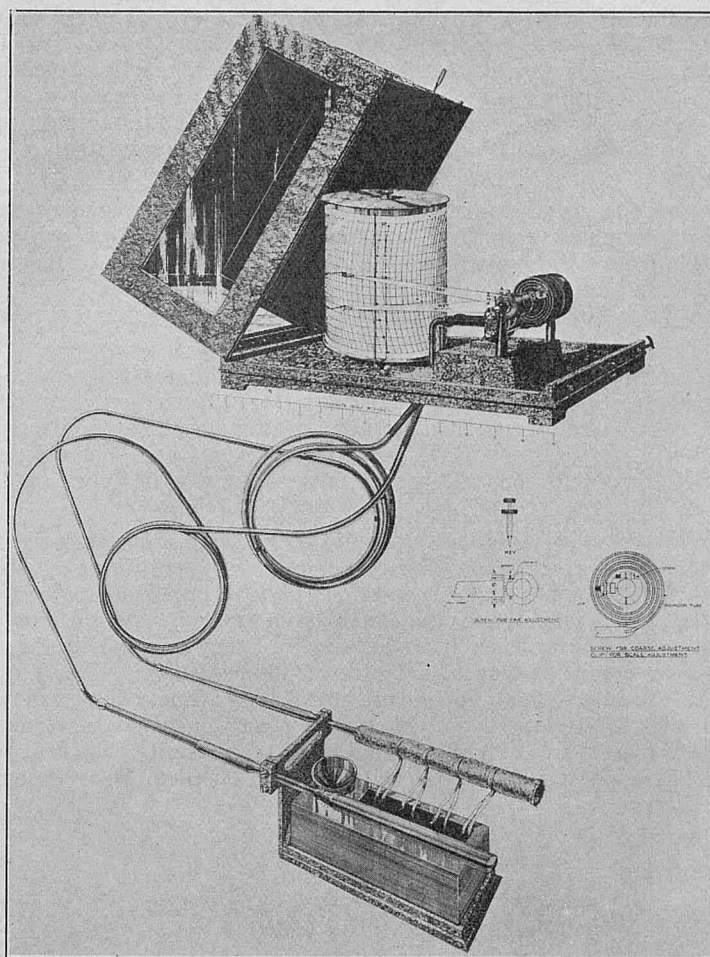


Figure 5, Distant Reading Thermograph.

Deep sea thermometers are used by oceanographical expeditions and by some survey ships. Temperatures at considerable depths are obtained by them. They are of a special type and are generally used in connection with bottles for sampling the salinity of the deep water.

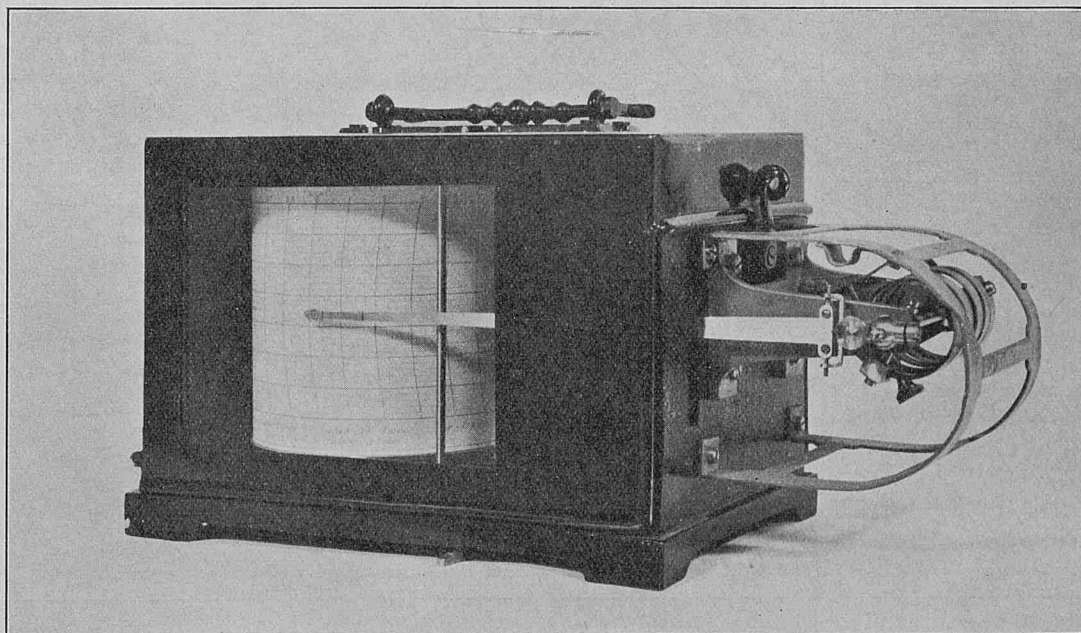


Figure 4, Thermograph.

On a few occasions the temperature of the air at several thousand feet above the sea has been obtained from ships by the use of either kites or balloons.

The thermometers used nowadays for this work are generally of a bi-metallic coil type, but with the earliest attempts small maximum and minimum thermometers (Six's thermometer) were used. In 1822 H.M.S. *Fury*, Captain PARRY, R.N., on a voyage of Arctic exploration, flew a kite with a Six's thermometer attached to a height of about 400 feet, and a few years later a similar kite and thermometer were flown to a height of 1,200 feet by H.M.S. *Terror*, Captain BACH, also in the Arctic.

During the early years of the present century kites carrying meteorological instruments were flown from merchant ships on several occasions, notably from S.S. *Commonwealth* on passage from Boston to Liverpool in 1901, and from S.S. *Romantic*, Boston to Gibraltar in 1905. Meteorological kites flown from a tug off the west coast of Scotland reached a height of 15,000 feet on one occasion.

In more recent times balloons carrying meteorographs for recording changes in air pressure and temperature have been used from H.M. ships. An account of this method, written by Commander (now Captain) L. G. GARBETT, R.N., Superintendent of Naval Meteorological Services, was published in *THE MARINE OBSERVER* in February 1924 and in May 1925.

An important modern development in the science or art of forecasting weather was propounded by Norwegian meteorologists during the war of 1914-1918. Temperature observations play an important part in this method, which is known as the Polar Front theory. Cut off from the usual sources of weather information from other countries during the war, they organized a close network of observers over Norway.

The large number of temperature observations thus collected showed, when plotted on charts, that lines of demarcation between warm and cold air masses were more common and more definite than had been generally supposed. Depressions often form on these Polar Fronts.

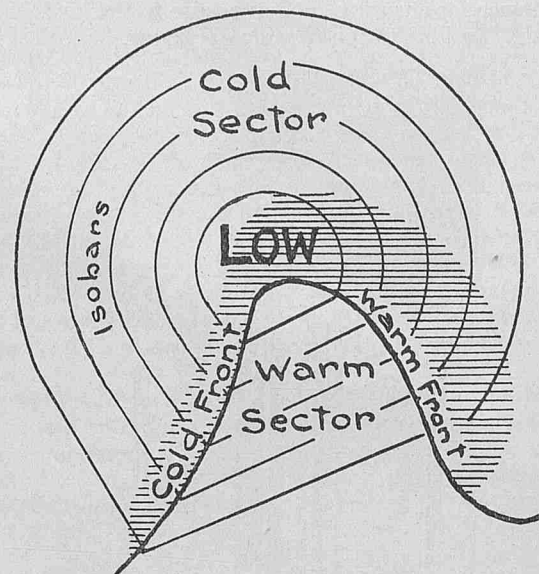


Figure 6, Depression. "Polar Front" Theory
(Shading represents rain area).

An observer at sea would not often be able to obtain a sufficiently good distribution of ship's weather reports to be able to plot "fronts" accurately, but enough data to get some idea of their approximate positions may occasionally be available.

The section of a weather chart below (FIGURE 7) copied from the Meteorological Office Daily Weather Report, shows warm and cold fronts based on ships' observations. The difference in temperature on either side of the fronts is of interest.

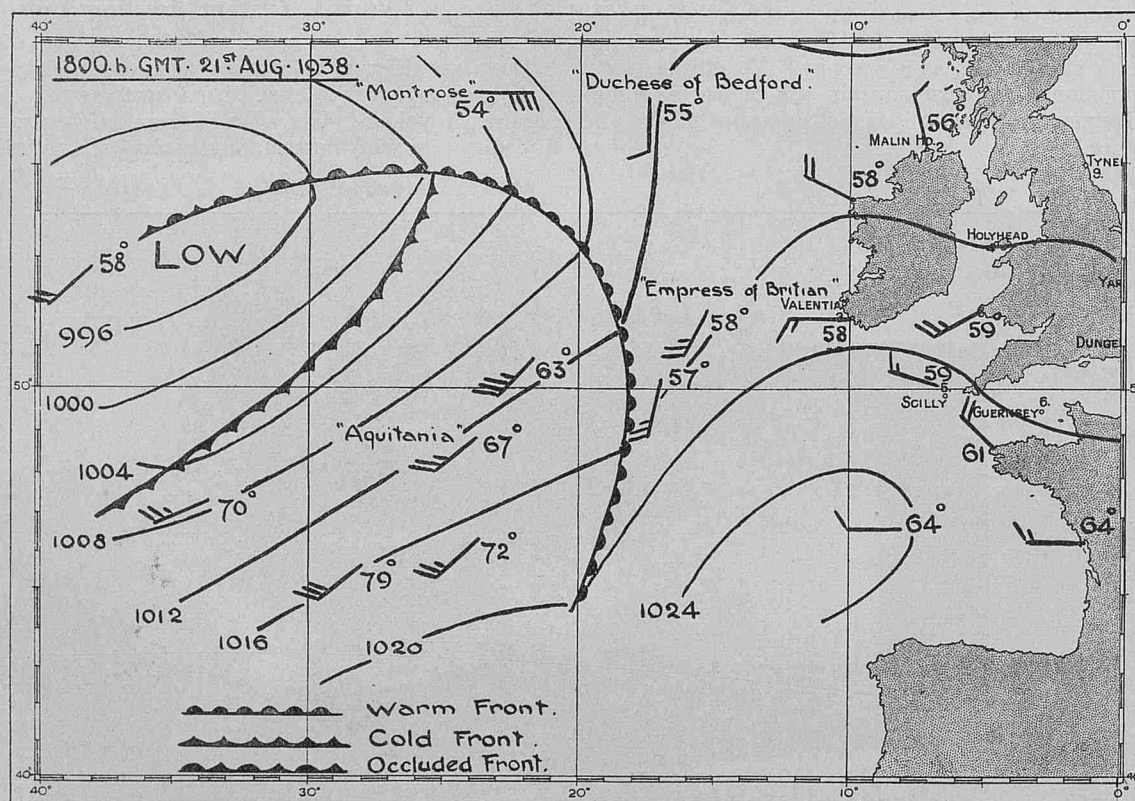


Figure 7, Section of Daily Weather Chart.

As in this article we are dealing with the use of temperature observations, only they and the wind are included in this chart, other data being left out for the sake of clarity.

A complete description of the Polar Front Theory may be read in any modern text book on meteorology. It is mentioned here merely to show the importance of reliable thermometer readings.

The temperature of the air and of the sea surface at his own ship, and in W/T weather reports from other ships, can at times be useful to a navigator by helping him to form an opinion of probable changes in visibility. It has been estimated that about 80 per cent. of sea fogs are caused by relatively warm moist air flowing over colder water. Contact with the colder sea surface lowers the temperature of the air below its dew point and causes condensation. Sometimes fog is caused by this means with quite a strong wind blowing.

A weather chart containing even a very few ships' reports may show where fog conditions are likely to occur. For instance, in the vicinity of the Grand Banks of Newfoundland a long-continued southerly wind almost invariably causes fog. The long-continued southerly wind in such a case would indicate that it is probably air of warm moist type flowing from the lower latitudes of the North Atlantic. Whether this was so or not would be confirmed by the weather chart.

Sea surface temperature is important when attempting to predict changes in visibility. The water should of course be obtained by a draw bucket and not engine room intake, which may be ten or more feet below the surface and of different temperature.

Armed with temperatures of the dry and wet bulbs, the sea surface temperature, and the "dew point" tables in THE MARINE OBSERVER'S HANDBOOK, a seaman may forecast fog or clear weather with some degree of success, particularly if he has also made a small weather chart showing conditions observed in ships in the vicinity.

Fog is likely if the sea surface temperature becomes lower than the dew point.

The "Sea Fog Forecast Diagram" printed below may also be useful. It is constructed from the dew point table (Table XII in THE MARINE OBSERVER'S HANDBOOK) and it was designed in the Naval Division of the Meteorological Office a few years ago.

The diagram can be made in any ship having the dew point table, by plotting the difference between the dry and wet bulb temperatures (shown vertically) against the difference between the air temperature and the dew point (shown horizontally) for the various values of air temperature. In this diagram curves for 40°, 50°, 60°, and 70° have been drawn. Intermediate temperatures can be interpolated.

The diagram is used by plotting a point (X) obtained by using the difference between dry and wet bulb temperatures and the difference between air and sea surface temperatures. If X falls below the appropriate line, fog is likely to occur.

Example :—Dry bulb 60, wet bulb 56, sea 51. As X falls well below the temperature curve for 60, fog is likely to occur when the air has been sufficiently cooled by the sea.

Discretion is needed in using a diagram of this sort and, as stated above, it should be used with a weather chart if one is available, because some idea of the recent history of the air mass the ship is in may then be deduced.

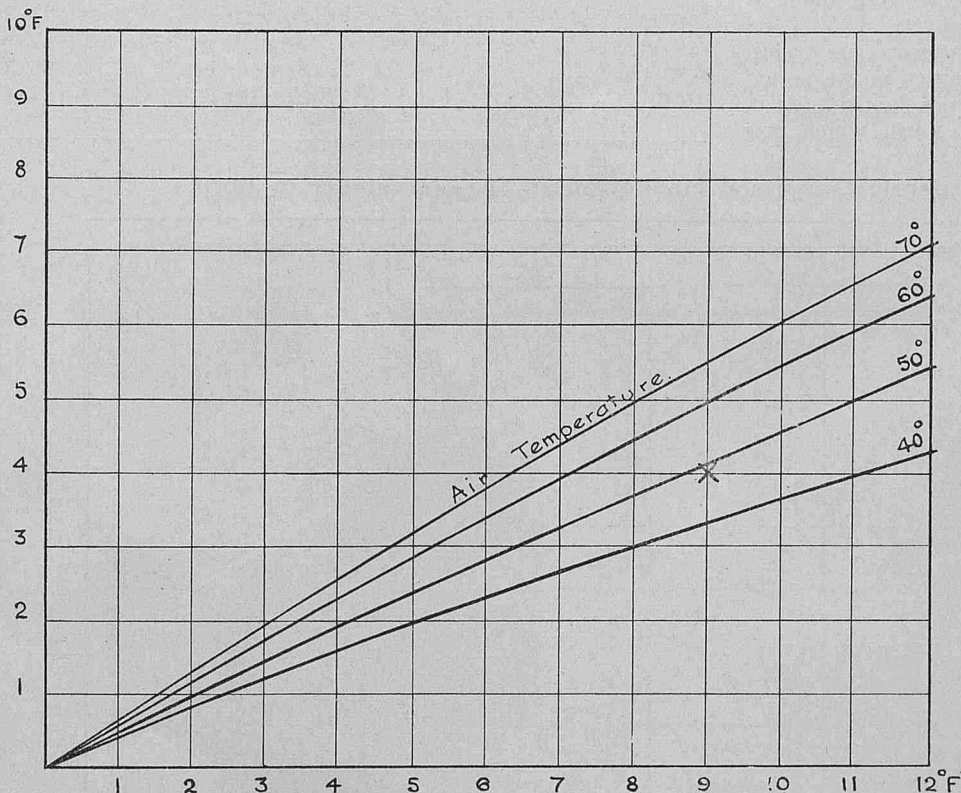
The writer of these notes acknowledges his indebtedness to the following sources of information :—"Encyclopædia Britannica," 11th Edition; "The Evolution of the Thermometer," by H. C. BOLTON.

Thanks are also due to the Librarian, National Maritime Museum, Greenwich, for permission to see a number of old ships' log books, etc.

(From THE MARINE OBSERVER'S HANDBOOK)

TABLE XII.
FOR FINDING THE DEW POINT (° F.).

Dry Bulb.	Depression of Wet Bulb.												
	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°
90	90	89	87	86	85	83	82	80	79	77	76	74	73
88	88	87	85	84	83	81	80	78	77	75	74	72	70
86	86	85	83	82	80	79	78	76	75	73	71	70	68
84	84	83	81	80	78	77	75	74	72	71	69	67	66
82	82	81	79	78	76	75	73	72	70	68	67	65	63
80	80	79	77	76	74	73	71	69	68	66	64	62	61
78	78	77	75	74	72	71	69	67	66	64	62	60	58
76	76	75	73	72	70	68	67	65	63	61	60	58	55
74	74	72	71	69	68	66	64	63	61	59	57	55	53
72	72	71	69	67	66	64	62	61	59	57	55	52	50
70	70	69	67	65	63	62	60	58	56	54	52	50	47
68	68	66	65	63	61	60	58	56	54	52	49	47	45
66	66	64	63	61	59	57	56	53	51	49	47	44	42
64	64	62	61	59	57	55	53	51	49	47	44	41	38
62	62	60	59	57	55	53	51	49	46	44	41	38	35
60	60	58	56	55	53	51	48	46	44	41	38	35	32
58	58	56	54	52	50	48	46	43	41	38	35	32	28
56	56	54	52	50	48	46	43	41	38	35	32	29	25
54	54	52	50	48	46	43	41	38	35	32	29	25	20
52	52	50	48	46	43	41	38	36	32	29	25	20	16
50	50	48	46	43	41	39	36	33	29	25	21	16	10
48	48	46	44	41	39	36	33	30	26	22	17	12	4
46	46	44	42	39	36	34	30	27	23	19	13	6	—
44	44	42	39	37	34	31	28	23	19	15	8	—	—
42	42	40	37	34	32	28	25	20	16	9	—	—	—
40	40	38	35	32	29	26	22	17	11	8	—	—	—
38	38	35	33	30	26	22	18	15	10	3	—	—	—
36	36	33	30	27	23	21	16	11	5	—	—	—	—
34	34	31	28	25	22	17	13	7	—	—	—	—	—
32	32	29	26	22	19	14	8	—	—	—	—	—	—
30	30	27	23	20	15	10	4	—	—	—	—	—	—



(Difference between Air temperature and Dew Point for construction of Diagram).
Difference between Air and Sea Temperatures
in using diagram.

Figure 8, Sea Fog Forecast Diagram

CURRENTS OF THE MEDITERRANEAN SEA AND THE SOUTH-EASTERN PORTION OF THE NORTH ATLANTIC OCEAN (MAY TO OCTOBER) AND GENERAL SUMMARY.

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

WITH the exception of the region of the Counter-Equatorial Current the directions of the currents of the south-eastern part of the North Atlantic Ocean and the Mediterranean are essentially the same in May to October as in November to April, though some variation naturally occurs.

Seasonal Variation of Currents.—The mean set and drift of current in each quarter of the year has been computed for all parts of the ocean where definite current trend can be seen on the charts. The results are given in TABLE 1, which thus shows the seasonal variation of set or drift, or both.

General Current Circulation of the North Atlantic Ocean.—Charts of the North Atlantic Ocean and Mediterranean have been prepared, on which the general flow of current, together with its relative strength in different parts of the circulation, will be shown (FIGURES 1 and 2). The general flow in the region comprised in this year's work has been inserted and the remainder will be added gradually as the work is done. The general outline of the circulation is more readily seen on these charts than on the main charts.

The Canary Current.—This is a steady flow throughout the year, in respect of its mean set. The mean set is particularly steady from May to October, 204° , north of Latitude 28° N., and 234° south of that parallel. Throughout the year the set south of latitude 28° N. is more to the westward. The mean drift is not strong at any season but is somewhat greater in summer and autumn than in winter and spring.

The predominating sets range from S. to W. and the current is not steady in the sense that throughout the region occupied by it sets in any other direction may be experienced. These total to an appreciable proportion of the whole, as shown by the roses on the main charts. For this reason the actual currents met with are stronger than might be expected from the mean values; while the great majority of the drifts do not exceed 1 knot, a small proportion of stronger ones occur. Drifts of over 2 knots are rare; only four were recorded in the period 1910 to 1938, the strongest being that of 60 miles per day, quoted in the article on the currents during November to April, which was

published in the April number. For the purpose of the seasonal table, Latitude 20° N. has been taken as the dividing line between the Canary Current and the North Equatorial Current; all these four drifts exceeding 2 knots were experienced between Latitudes 21° and 28° N., in the more southerly part of the Canary Current.

Easterly Sets in the Neighbourhood of Cape Verde.—A special investigation into the frequency and strength of easterly currents near Cape Verde has been made and the results are shown in FIGURE 3. It is not possible to lay down a hard and fast rule as to what constitutes an onshore set, since this depends on the distance of the ship from the coast and on the angle between her course and the run of the coastline. FIGURE 3 shows the mean strength in miles per day of the easterly component of all currents observed during the period 1910 to 1938 which set between 30° and 150° inclusive. The region included is from Latitude 14° N. to 18° N., Longitude 18° W., to the African coast. The number of currents in each month, on which the mean is based, is shown in the figure; these are the total numbers for the whole period of 29 years. The frequency with which such onshore sets occur is shown in TABLE 2, when the percentage of the total number of currents is given for each month.

Table 2. Region of Cape Verde.

Month.	Percentage Frequency of Onshore Sets.	Month.	Percentage Frequency of Onshore Sets.
November ...	15.5	May ...	10.8
December ...	11.8	June ...	26.2
January ...	13.9	July ...	27.7
February ...	4.8	August ...	27.7
March ...	8.3	September ...	25.3
April ...	6.6	October ...	24.4

Currents in the North Atlantic Ocean and Mediterranean Sea—November to April.

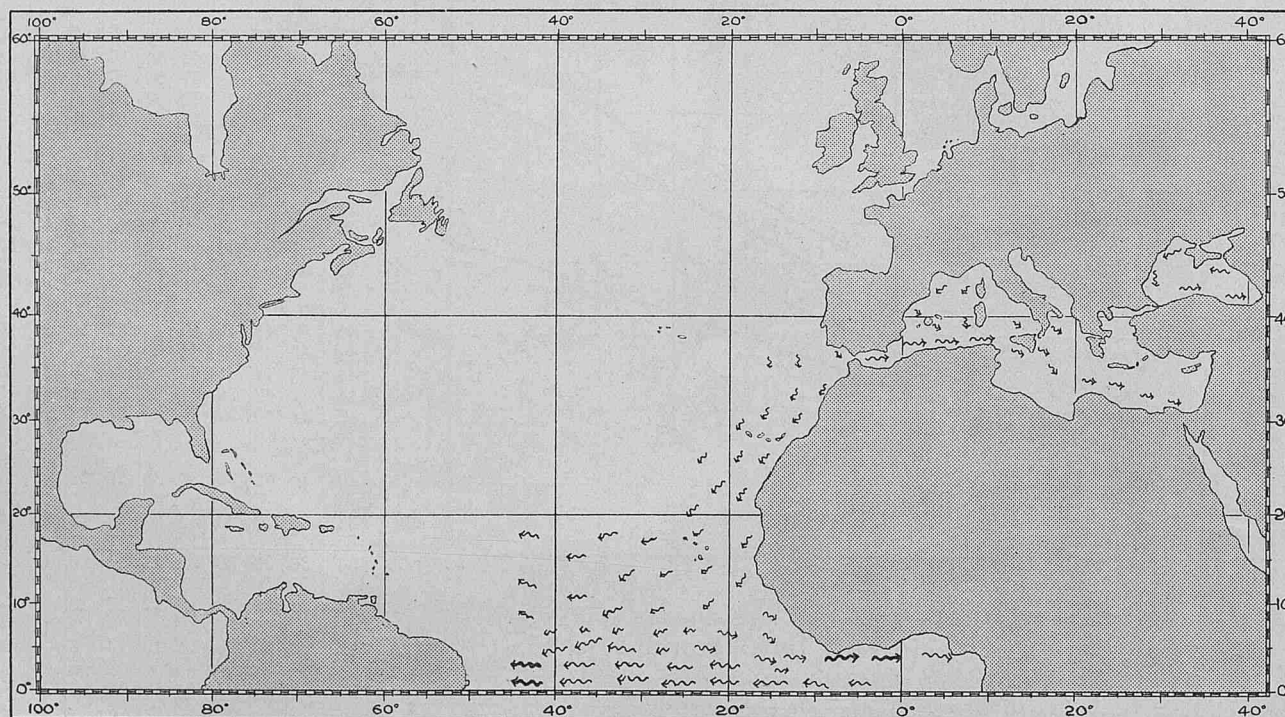


Figure 1.

NOTE.—In the area of the Counter-Equatorial Current (Lat. 4° to 8° N., Long. 18° to 46° W.) the westerly current shown flows only during February to April. In November to January the current flows east as shown in Figure 2.

Annual Variation in Mean Strength of the Easterly Component of all sets between 30° and 150° inclusive, in the neighbourhood of Cape Verde (Latitude 14° to 18° N., Longitude 18° W. to African coast).

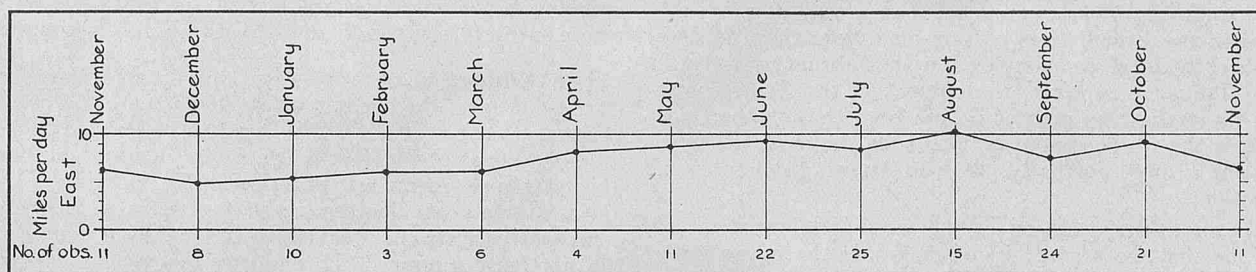


Figure 3.

It is at once seen that onshore sets are most likely to be experienced in June to October inclusive and least likely in February to April. Figure 3 shows that the mean strength of the easterly component of the sets is greatest in April to October, with a maximum of about 10 miles per day in August. Taking both strength and frequency into account, August is therefore the worst month on the average.

North Equatorial Current.—As above stated, the southerly limit of the Canary Current has been taken as Latitude 20° N. and this is therefore, in TABLE 1, the northerly limit of the North Equatorial Current. In current nomenclature it is customary to distinguish (in the northern hemisphere) between the southerly and south-westerly current on the east side of the permanent anticyclone and the westerly equatorial current on the south side of the permanent anticyclone. For the North Atlantic Ocean these are the Canary Current and the North Equatorial Current respectively. In reality the two are one current, primarily caused by the north-east trade wind. The choice of Latitude 20° N. simply means that this is the approximate latitude, taking the year all through, south of which the westerly set across the ocean begins. A wind drift such as the North Equatorial Current has, however, no well-defined northern boundary at any season; in any given longitude of the ocean, say 40° W., passing northwards from the equatorial current to the region of the permanent anticyclone, the frequency of westerly sets gradually decreases until they are no longer predominant.

The North Equatorial Current has been divided into two sections at Longitude 30° W. for computing the seasonal variation. The area west of this meridian has a somewhat stronger mean drift than that east of it, but is never more than 7 miles per day. The North Equatorial Current is therefore relatively weak, but the roses show

that this weakness is partly due to the occurrence of easterly and variable sets. It is not a steady current from any point of view. Except east of Longitude 30° W. in February to July, it is not very steady in mean set and here a change of 40° occurs in August to October, the mean set becoming nearly southerly. The mean drifts shown in the table for August to October are weaker than they should be, since during this quarter the Counter-Equatorial Current is flowing fairly strongly eastwards between Latitudes 8° N. and 10° N., which belt is included in the area of the North Equatorial Current in TABLE 1. This widening of the Counter-Equatorial Current northwards is part of the seasonal shift of the whole of the current belts. It was however considered preferable to show the North Equatorial Current too weak during one quarter in TABLE 1 rather than to show the Counter-Equatorial Current too weak, by the inclusion of westerly current, during three quarters of the year.

Only a small proportion of the actual currents experienced in the region of the North Equatorial Current are between 1 and 2 knots; currents exceeding 2 knots are rare. With the exception of one short-period current at the rate of 49 miles per day, and one at the rate of 68 miles per day, none were recorded in the period 1910 to 1938. Particulars of these currents will be found in the tables of greatest drifts, inset on the charts of frequency roses.

South Equatorial Current.—The seasonal variations of this current north of the equator, between Longitudes 2° W. and 34° W., are given in TABLE 1, the area being divided into two sections at Longitude 18° W. The more easterly area contains the direct Cape route and the more westerly one the route to the Brazils. This northern part of the South Equatorial Current is both steadier in mean set and stronger in mean drift than the North Equatorial Current, the

Currents in the North Atlantic Ocean and Mediterranean Sea—May to October.

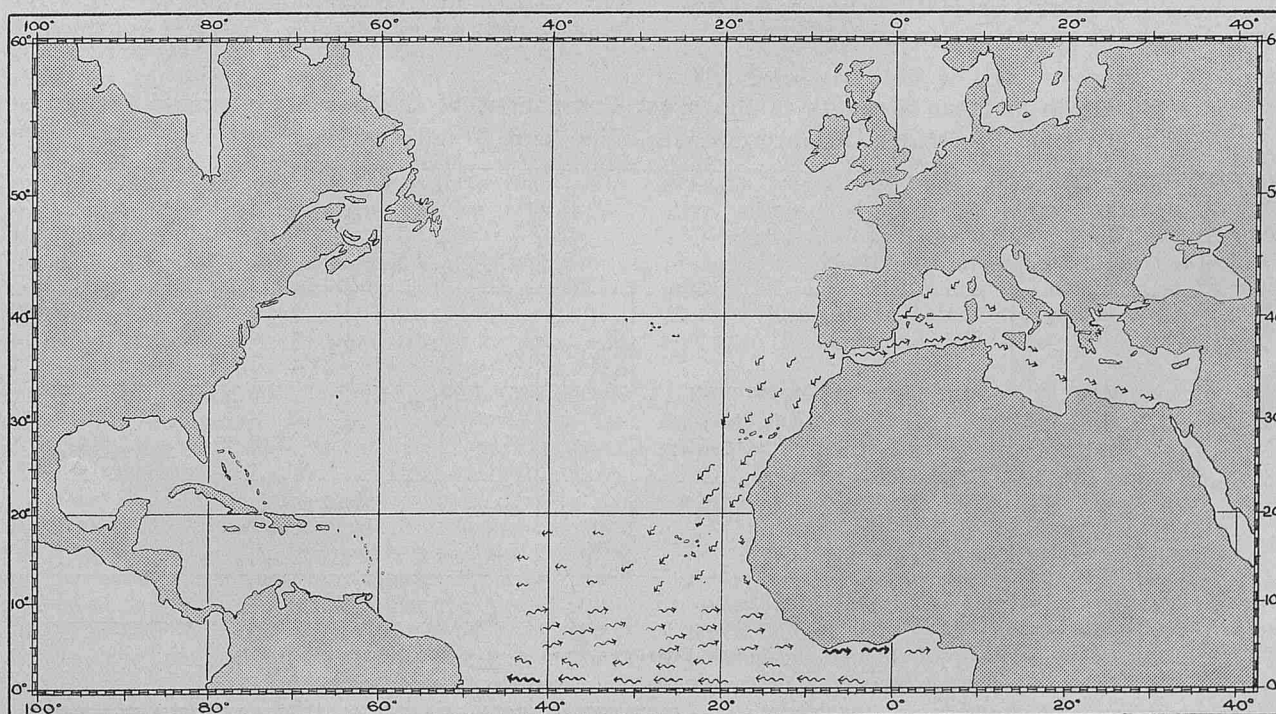


Figure 2.

reason probably being the greater strength and constancy of the south-east trade wind. In the Cape route section there is a great accession of strength in May to July, the mean drift being 22 miles per day: in other quarters it varies only between 8 and 10 miles per day. The current in the Brazil route section also more than doubles its strength in May to July, as compared with February to April. During August to January, however, the current in the Brazil route section maintains its strength in greater degree than that in the Cape route section. Over the whole extent of longitude the mean set is to the north of west; it is most northerly, 305° , in August to October in the Cape route section.

In FIGURE 4 the monthly variation of the westerly component of current is shown for the two areas. In other words the figure gives the mean difference of the westerly and easterly components. In each area the resultant flow of water to the westward is greatest in the northern summer, the maximum flow being in June in the Cape route section and in July in the Brazil route section. Both also show a secondary maximum of strength in December. The curves thus conform to what we now recognize as the normal mode of variation of an equatorial current in any ocean, viz. a main maximum, a secondary maximum and two minima. In both sections one minimum occurs in October but the first minimum of the year is three months earlier in the Cape route section than it is in the Brazil route section. Moreover, the least strength of all occurs at the October minimum in the Cape route section and the April minimum in the Brazil route section. It will be noticed that during the October minimum in the Cape route section there is no resultant westerly current at all, it being replaced by a weak easterly drift. This means that the Guinea Current extends southward to at least as far as the equator, the limit of the present charts, during this month, between Longitudes 2° W. and 18° W.

In spite of the strength of the South Equatorial Current an appreciable proportion of sets in easterly and all other directions occur during each quarter of the year and some of these exceed 1 knot. A considerable or large proportion of the westerly sets exceed 1 knot, as shown by the roses, while occasional sets exceeding 2 knots occur in most longitudes and seasons. Five drifts of 70 miles per day or more will be found in the tables of greatest drifts, mostly in the neighbourhood of Longitude 45° W., the strongest being one of 78 miles per day, setting 301° , recorded by S.S. *Hillpen* on 7th September, 1912, in Latitude $1^\circ 11' N.$, Longitude $45^\circ 29' W.$

The fluctuations of the resultant westerly drift shown in FIGURE 4 might be due to increases of strength of the westerly currents, or decreases in strength of the easterly currents, or both together. Examination of the roses on the charts show that both causes of fluctuation occur in different degrees. Without going in detail into the complexity of these relative fluctuations it may be said that easterly and variable sets are in general most likely to be experienced in the months where the curves in FIGURE 4 show values at or near their minimum, including of course the month of October in the Cape route

section where the easterly currents actually preponderate over the westerly currents. The greatest freedom from easterly and variable sets over any of the longitudes of the South Equatorial Current included in the charts occurs in the Cape route section in May to July, where currents between N. and S.W. through E. are almost non-existent.

The Guinea Current.—We will first consider the Guinea Current proper, the current which flows along the coast of the Gulf of Guinea, from Longitude 10° W. past Cape Palmas to the African coast in about Longitude 9° E. As shown in TABLE 1 this current is remarkably steady in mean set, practically due E. from November to July, and inclining a few degrees to the S. of E. in August to October. It is comparatively strong, weakest in the northern winter and strongest in the northern summer. Throughout the year the current is stronger between Longitude 2° W. and 10° W. than it is eastwards of 2° W. This difference is most marked in the half-year May to October, and in May to July the mean drift between Longitudes 2° W. and 6° W. is 44 miles per day.

The monthly fluctuations of the easterly component of this current are shown by the full line in FIGURE 5. From this it is seen that the current is strongest in July, when the mean drift of the easterly component is over 28 miles per day. There are three lesser maxima, in December, March and October. Of the four minima of strength, those of November and April are the least. The strength of the current in April is only one-quarter of that in July.

A large proportion of the actual currents experienced are between 1 and 2 knots throughout the year. Currents exceeding 2 knots are infrequent during the nine months August to April, but during May to July form a considerable proportion of all currents recorded. Currents of 3 knots are then occasionally met and the greatest drift recorded in the period 1910 to 1938 was a short-period current at the rate of 86 miles per day, setting 100° , observed by M.S. *Accra* on 29th May, 1933, in Latitude $4^\circ 24' N.$, Longitude $5^\circ 3' W.$

The Counter-Equatorial Current.—This current flows in an easterly direction between the North and South Equatorial Currents, during part of the year. For the computation of TABLE 1 the region of the Counter-Equatorial Current has been taken as between Latitudes 4° N. and 8° N., west of Longitude 18° W. In August to October, however, the Counter-Equatorial Current extends further north, to Latitude 10° N., though the strength of the current, as may be seen on the chart of arrows, is less between Latitudes 8° N. and 10° N. than it is further south. In some longitudes it is seen as a weak flow also between Latitudes 10° N. and 12° N. The information which has been derived about this current may be summarized as follows. It sets in an easterly direction from Longitude 46° W. (the limit of the charts) to Longitude 26° W. during nine months of the year, May to January. During the remaining three months, February to April, it is replaced by a westerly set, the North and South Equatorial Currents meeting and forming one great equatorial flow westwards.

Annual Variation in Mean Strength of the West Component of the South Equatorial Current, North Atlantic Ocean, Cape and Brazil tracks.

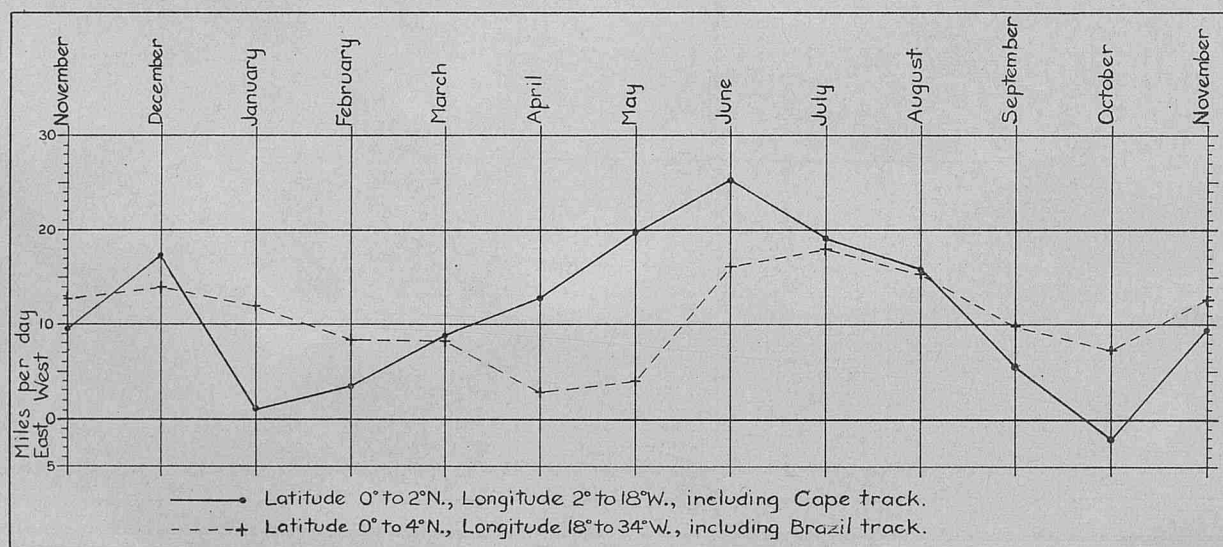


Figure 4.

Annual Variation in Mean Strength of the East Component of the Guinea and Counter-Equatorial Currents, North Atlantic Ocean.

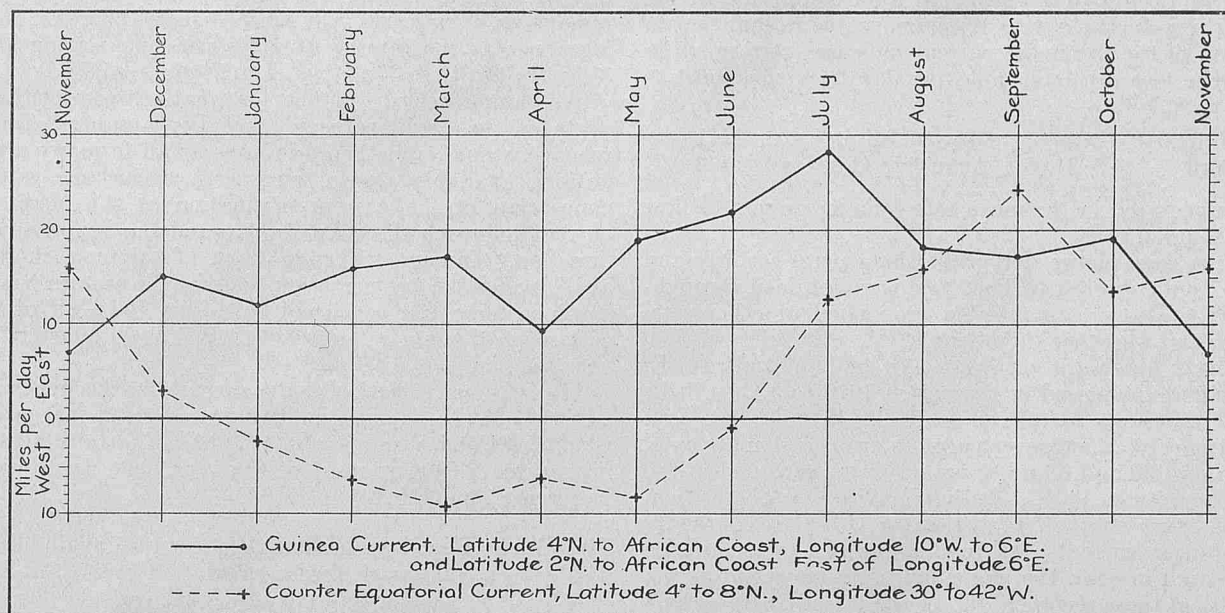


Figure 5.

The chart of arrows for February to April, though incomplete for the region between Longitudes 26° W. and 18° W., indicates that the easterly flow begins there. The region west of Longitude 46° W. will be charted next year and we shall then be able to determine whether the origin of the Counter-Equatorial Current is still further west.

The mean strength of the Counter-Equatorial Current, and also the mean set, vary considerably in different quarters, as shown by TABLE 1. It is strongest in August to October, particularly west of Longitude 30° W., where it has a mean drift of 16 miles per day. The mean set and drift of the section between Longitudes 30° W. and 18° W., for November to January, is given in the table as 345°, 1 mile per day. The chart of arrows shows that the set is nevertheless north-easterly or easterly over the whole area of this section except in Latitude 4° N. to 6° N., Longitude 26° W. to 30° W., where the South Equatorial current spreads northwards.

In the southern part of the region of this current, in some longitudes and seasons, indications will be found on the charts of a recurvature of water from the westerly-flowing South Equatorial Current into the easterly-flowing Counter-Equatorial Current.

Currents exceeding 2 knots were not met with in the region of the Counter-Equatorial Current during the months of February to July in the period 1910 to 1938. They were infrequent during November to January, but comparatively frequent during August to October. The greatest drifts recorded were two of 60 miles per day, as given in the inset tables on the charts.

We have still to account for the region traversed by the Cape route, between Longitude 18° W. and the Guinea current in Longitude 10° W. TABLE 1 shows (Latitude 10° N. to 2° N., Longitude 18° W. to 10° W.) that the mean set here is between S. & E. from August to April and between N. & E. from May to July. When the Counter-Equatorial Current is strongest, in August to October, it flows eastward towards the African coast, off which it turns south-eastward and so passes into the Guinea Current proper. Part of the water of the Canary Current also follows the African Coast in southerly and south-easterly directions during this quarter and joins the general easterly flow. In May to July the Counter-Equatorial Current is similarly continuous with the Guinea Current but the strength of the former is less. Instead of a flow from the Canary Current into the Counter-Equatorial Current there is a weak flow in the reverse direction, northerly along the African coast from Latitude 10° N. to near Cape Verde. In November to January the connection between the Counter-Equatorial and Guinea Currents is not so direct, the former setting north-eastwards between longitudes 26° W. and 20° W. and the latter setting south-eastwards to the east of Longitude 16° W. In February to April there is practically no

Counter-Equatorial Current and the Guinea Current takes its origin in south-easterly sets, as in November to January, between Longitude 18° W. and 10° W., from Latitude 10° N.

Seasonal Relationship between the Counter-Equatorial and Guinea Currents.

In order to determine whether the variations of the Guinea Current are similar to those of the Counter-Equatorial Current, the monthly values of the latter are also given in FIGURE 5, indicated by the pecked line. The part of the Counter-Equatorial Current chosen is in the open ocean, Latitude 4° N. to 8° N., Longitude 30° W. to 42° W. It will be seen that the current sets eastward from July to December inclusive and westward from January to May, the flow being practically zero in June. The month of strongest easterly flow, September, is two months later than the strongest flow of the Guinea Current. There is thus no marked similarity between the fluctuations of the currents and in fact in the months of April, September, October and December the changes in one current are contrary to those of the other.

The Seasonal Shift of the Currents in Latitude.—This shift is known to take place to some extent in all oceans, following the changes in the Sun's declination. This will be fully investigated at a later stage of the re-charting, when the equatorial regions of the North and South Atlantic Oceans have been completed. At present two facts stand out clearly, the movement of the Guinea Current southwards to the Equator in October and the spread of the Counter-Equatorial Current northwards to about Latitude 10° N. in the quarter August to October. The northern limit of the South Equatorial Current west of Longitude 18° W., which is the southern limit of the Counter-Equatorial Current, does not appear to change appreciably throughout the year.

The Mediterranean Sea.—In the first line of TABLE 1, the seasonal variation of the current outside the Strait of Gibraltar is given, the region being from Cape St. Vincent to the African coast, east of Longitude 10° W. The mean set here is between S. and E. throughout the year, the mean drift being weak, but strongest in the half-year May to October.

To determine seasonal variations the region of the main shipping route from Gibraltar to Port Said, which contains the bulk of all the observations received, has been divided into three sections, at Longitudes 10° E. and 22° E. The seasonal variation of mean drift in all three sections is negligible. Between Longitude 10° E. and Port Said the mean drift is less than half the mean drift between Gibraltar and Longitude 10° E. The mean set east of Longitude 10° E. is always between S. and E. but varies appreciably in some seasons. The

mean set west of Longitude 10° E. changes by only a few degrees throughout the year.

Since the mean rate of flow over the region from Gibraltar to Cape Bon is so constant throughout the year it is remarkable to find that in the immediate region of the Strait the current increases very much in May to October. The mean drift in miles per day from the Strait to Longitude 2° W. is as follows:—

November to January	7.3	May to July	... 12.1
February to April	... 8.3	August to October	14.3

This increase is compensated in the mean sets by a lesser rate of flow along parts of the Algerian coast.

Examination of the roses shows that while the general easterly and south-easterly flow from Gibraltar to Port Said is maintained throughout the year, there is also an appreciable proportion of other sets, comprising westerly and all other directions.

Currents exceeding 2 knots are very rare east of Longitude 10° E. and the greatest drifts experienced in the period 1910 to 1938 will be seen from the inset tables on the charts to be 46–48 miles per day. Westward of Longitude 10° E. stronger currents are occasionally met, and drifts at the rate of 50 and 55 miles per day were recorded in the neighbourhood of Longitude 1° W. During May to October when, as above stated, the flow through the Strait of Gibraltar markedly increases, much stronger currents, up to 3 knots or more, may be occasionally experienced in or in the immediate neighbourhood of the Strait. The greatest of these recorded during the period 1910 to 1938

was a short-period current at the rate of 112 miles per day, setting 76°, recorded in Latitude 35° 59' N., Longitude 5° 29' W. by S.S. *British General* on 25th October, 1937. One other remarkable current remains to be noticed. On 22nd August, 1935, S.S. *Tuscania* recorded a current at the rate of 94 miles per day, setting almost due north (354°) in Latitude 37° 24' N., Longitude 0° 47' W.

We cannot get very much information from the charting of other parts of the Mediterranean since the numbers of observations are relatively small and there are none at all in many areas. The observations available are in general in accordance with our previous conception of the current circulation of the Mediterranean, viz. a current following the coast right round the Sea in a counter-clockwise direction. Outside the main track of shipping, more information is available for the western basin than for the eastern basin. The general south-easterly and southerly flow from the Gulf of Lions down the east coast of Spain is fairly well shown in all quarters, though it is not very regular.

The seasonal variation of the currents in the western basin, north of Latitude 38° N., is given in TABLE 1, divided into two sections at the islands of Corsica and Sardinia. On the Spanish side the mean set is nearly due S. during most of the year. On the Italian side it varies between S. and E.S.E.

The Black Sea.—Such observations as are available conform almost wholly to a counter-clockwise circulation round the Sea, which is best shown in the quarter February to April.

Table 1.

Seasonal Mean Set and Drift (in miles per day) in the Eastern North Atlantic Ocean and Mediterranean.

Region.	November to January.		February to April.		May to July.		August to October.	
	Mean Set and Drift.	No. of observations.	Mean Set and Drift.	No. of observations.	Mean Set and Drift.	No. of observations.	Mean Set and Drift.	No. of observations.
Latitude 37° N. to African Coast, Longitude 10° W. to Strait of Gibraltar...	141° 2	166	116° 4	102	147° 5	159	127° 5	120
Canary Current, Latitude 37° N. to 28° N., West of Longitude 10° W. ...	200° 2	1,149	191° 3	938	204° 4	1,279	204° 4	1,163
Canary Current, Latitude 28° N. to 20° N. ...	240° 4	1,128	228° 5	945	234° 7	1,226	234° 6	1,078
North Equatorial Current, Latitude 20° N. to 10° N., Longitude 30° W. to African Coast and Latitude 10° N. to 8° N., Longitude 30° W. to 18° W. ...	254° 4	1,798	233° 5	1,371	234° 2	1,757	193° 1	1,461
North Equatorial Current, Latitude 20° N. to 8° N., Longitude 46° W. to 30° W. ...	275° 7	231	262° 6	184	286° 6	153	258° 2	102
Region of Counter-Equatorial Current, Latitude 8° N. to 4° N., Longitude 42° W. to 30° W. ...	87° 5	65	263° 7	53	40° 5	44	74° 16	39
Region of Counter-Equatorial Current, Latitude 8° N. to 4° N., Longitude 30° W. to 18° W. ...	345° 1	315	258° 4	223	59° 7	282	83° 9	240
Latitude 10° N. to 2° N., Longitude 18° W. to 10° W. ...	124° 3	745	119° 4	616	51° 2	753	107° 7	708
Guinea Current, Longitude 10° W. to 9° E. ...	90° 11	348	89° 12	175	88° 19	135	96° 16	115
South Equatorial Current, Latitude 2° N. to 0°, Longitude 2° W. to 18° W. ...	290° 10	187	296° 9	151	286° 22	247	305° 8	231
South Equatorial Current, Latitude 4° N. to 0°, Longitude 18° W. to 34° W. ...	283° 13	331	283° 6	219	293° 14	390	288° 11	303
Mediterranean, Strait of Gibraltar to Longitude 10° E., Latitude 38° N. to African Coast ...	91° 7	1,184	91° 7	784	84° 6	1,072	82° 7	903
Mediterranean, Latitude 38° N. to African Coast, Longitude 10° E. to 22° E. ...	130° 3	1,235	141° 2	967	157° 2	1,202	137° 3	1,002
Mediterranean, Southward of Crete to African Coast and Port Said, Longitude 22° E. to 34° E. ...	129° 3	1,249	129° 3	938	152° 3	1,122	147° 3	971
Mediterranean, North of Latitude 38° N., coast of Spain to Corsica and Sardinia ...	172° 3	303	184° 2	193	184° 2	188	155° 1	157
Mediterranean, North of Latitude 38° N., East coasts of Corsica and Sardinia to Italian Coast ...	143° 1	197	149° 2	120	174° 1	115	121° 3	87

SOUTHERN ICE REPORTS.

During the Year 1938.

October.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1938	27	From 54° 47' S.	1° 46' E.	} Field Ice	Streams of loose pack, some heavy floes	R.R.S. <i>Discovery II</i> .
	28	To 55° 04' S.	1° 45' E.		{ Large streams of loose pack, some heavy floes and numerous growlers of varying sizes. Several small bergs and growlers grounded on Bouvet I. Glacier on island in process of calving.	
		From 55° 17' S.	1° 37' E.			
		To 54° 32' S.	2° 50' E.			
		In vicinity of Bouvet I.				
			Bergs and growlers	do.		
		Berg	do.			
	30	54° 10' S.	3° 40' E.	1 bergy bit, 3 growlers	do.	
	31	50° 45' S.	10° 27' E.	1 berg	do.	
		53° 29' S.	15° 15' E.		Small irregular	do.

November.

1938	1	From 54° 21' S.	17° 44' E.	} Field ice Brash and growlers 1 small berg Field ice	Streams of loose pack	R.R.S. <i>Discovery II</i> .
	1	To 54° 20' S.	18° 01' E.			
		54° 24' S.	18° 34' E.		Tabular	
		54° 44' S.	19° 17' E.		Close streams of pack ice, some heavy floes	
	1	From 54° 57' S.	20° 04' E.	} Berg bergy bits and growlers berg Small berg and growler	Medium tabular	do.
		To 54° 44' S.	20° 09' E.		Some bottle green sections	
	2	54° 08' S.	20° 21' E.		Estimated size, 500 feet long and 200 high with second peak 100 feet high.	
	3	52° 20' S.	20° 16' E.			
	4	55° 32' S.	127° 48' W.		Estimated size 40 to 50 feet in length and 20 feet high ...	M.V. <i>Port Jackson</i> .
		55° 33' S.	127° 36' W.			do.

December.

1938	5	55° 04' S.	00° 54' E.	Field Ice	A few scattered pieces	R.R.S. <i>Discovery II</i> .
		55° 39' S.	00° 56' 1" E.	Pack ice	Large streams, some open water beyond	
	9	54° 12' S.	16° 40' E.	Berg	Small irregular	
	10	55° 08' S.	18° 35' E.	Berg	Small irregular	
		55° 32' S.	19° 21' E.	2 bergs	Medium irregular	do.
		55° 35' S.	19° 28' E.	Berg and growlers	Medium tabular	do.
	11	56° 41' S.	19° 42' E.	Berg	Large tabular about 1½ miles long	do.
		56° 58' S.	19° 37' E.	Field Ice and 2 bergs	Extensive heavy pack, no visible leads. 2 small irregular bergs in pack.	do.
		56° 56' S.	19° 28' E.	2 bergs	Medium tabular	do.
		56° 25' S.	19° 23' E.	3 bergs and growlers	1 small tabular, 1 medium tabular, 1 small irregular ...	do.
		56° 12' S.	19° 21' E.	Bergy bit and growler	do.	
		55° 54' S.	19° 21' E.	Berg and growler	Berg medium irregular, large growler	do.
		55° 07' S.	19° 21' E.	Growlers		do.
	9	56° 20' S.	124° 01' W.	Berg and 2 growlers	Berg much weathered, height 290 feet, and length 1,150 feet by sextant angles.	M.V. <i>Port Townsville</i> .

Reports of Ice previous to October, November and December, 1938, will be found in "The Marine Observer," Volume XV, No. 132, page 153.

II. WIRELESS WEATHER SIGNALS.

Bulletins.

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

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

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

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

South and North America.

In this number will be found a selection of the most useful Weather Bulletins for shipping, broadcast from stations in the above areas:

This information is compiled from The Admiralty List of Wireless Signals and is corrected by Weekly Notices to Mariners up to the week ending 16th September, 1939.

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 and 25 metres C.W., and 45 metres at 0130 G.M.T. only.

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 given in the list below.

Part III.—Forecast of weather in plain language, based on land station observation only.

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. 38 of the January, 1939, number and in M.O. 329.

Key letters used for station reports—III DDFww PPVTT.

Distinguishing Figure.	Name of Station.	Position.	
		Latitude S.	Longitude W.
031	Temuco	38° 45'	72° 35'
033	Valdivia	39° 48'	73° 14'
035	Pto. Monti	41° 18'	72° 56'
036	Guato I...	43° 34'	74° 45'
037	Pto. Aysen	45° 24'	72° 42'
038	C. Ráper	46° 50'	75° 35'
040	San Pedro	47° 43'	74° 55'
042	Pto. Bories	51° 42'	72° 31'
043	Evangelistas I.	52° 24'	75° 06'
044	Magallanes	53° 10'	70° 54'
046	San Isidro	53° 47'	70° 58'
048	Dungeness	52° 24'	68° 26'
049	Navarino I	55° 10'	67° 30'

Wireless Storm Warnings.

Valparaiso W/T Station, approximate position Latitude 33° 01' S. Longitude 71° 39' W., call sign **CCE**, broadcasts storm warnings when necessary, on a wavelength of 600 metres (I.C.W.).

III.—Wireless Time Signals.

Distinguishing Figure.	Name of Station.	Position.	
		Latitude S.	Longitude W.
000	Arica	18° 28'	70° 20'
002	Iquique	20° 12'	70° 11'
004	Antofagasta	23° 42'	70° 24'
007	Caldera	27° 03'	70° 51'
009	La Serena	29° 54'	71° 15'
010	Coquimbo	29° 55'	71° 22'
011	Combarbala	31° 11'	70° 02'
012	Valparaiso	33° 01'	71° 38'
013	Quillota...	32° 53'	71° 16'
014	Los Andes	32° 50'	70° 37'
015	Santiago	33° 27'	70° 42'
017	San Antonio	33° 34'	71° 37'
019	Juan Fernandez	33° 37'	78° 52'
020	Curico	34° 59'	71° 14'
021	Talca	35° 26'	71° 40'
022	Constitucion	35° 20'	72° 26'
023	Linares	35° 51'	71° 36'
025	Concepcion	36° 50'	73° 02'
026	Talcahuano	36° 43'	73° 07'
027	Los Angeles	37° 28'	72° 21'
028	Traiguén	38° 15'	72° 40'
029	Mocha E. I	38° 22'	73° 54'
030	Pto. Dominguez	38° 54'	73° 14'

W/T Station.	Call Sign.	Wavelength (Metres).	G.M.T. of Time Signal.
Valparaiso Lat. 32° 59' 50" S. Long. 71° 33' 40" W.	CCL	2,150 (C.W.)	^h ^m ^s ^h ^m ^s 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 general statement of weather conditions and a forecast, for the coast of Argentina *en clair* in Spanish.

W/T Station.	Position approximate.		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—Meteo	34° 30' S.	58° 30' W.	LQV	{ 0130 0230 1630 1705	24.79 „ „
Buenos Aires—General Pacheco.	34° 28' S.	58° 38' W.	LPD	{ 0218 1600	{ 35.67 „ I.C.W. 600 „ C.W.

BRAZIL.

II.—Wireless Weather Bulletins.

Rio de Janeiro W/T Station, approximate Latitude 22° 59' S. Longitude 43° 11' W.

Call sign **PPR**.

Wavelength 1,000 metres C.W. and I C.W.

Times of transmission 0100 and 1800 G.M.T.

The messages are based on observations taken at 2100 from Brazilian Stations and 1200 G.M.T. from selected South American Stations respectively, containing weather reports in code and a forecast for the district Rio de Janeiro to Buenos Aires.

The names, numbers and positions of Stations are published in Admiralty List of Wireless Signals Vol. II, Supplement No. 2, 1939, Part B., pages 137A *et seq.*

The forecast in the 0100 G.M.T. message is for the next day. The forecast in the 1800 G.M.T. message is for the night.

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 page 38 of the January, 1939, number and in M.O. 329.

Key letters used for station reports, 111AW, DDFww, PPVTT.

The Brazilian W/T coast stations given in the list below transmit, **every four hours**, except those stations marked *, 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	0350, 0750, etc., etc.
S. Luiz do Maranhão	2° 31' S.	44° 17' W.	PXM	*0500, 0900, 1300, 1700
Fernando de Noronha	3° 51' S.	32° 26' W.	PRI	*0000, 1200, 2000.
Natal Norte...	5° 47' S.	35° 16' W.	PWN	*1130, 1530, 1910, 2330
Olinda (Pernambuco)	8° 01' S.	34° 51' W.	PPO	0200, 0600, etc., etc.
Amaralina (Bahia)...	13° 01' S.	38° 28' W.	PPA	0120, 0520, etc., etc.
Ladario	19° 00' S.	57° 36' W.	PWL	1200, 1500, 1800, 2100, 2400
Abrolhos	17° 58' S.	38° 42' W.	PWH	*1120, 1520, 1920.
Rio de Janeiro ...	22° 59' S.	43° 11' W.	PPR	*0400, 0600, 0900, 1200, 1500, 1900
Santos	23° 59' S.	46° 18' W.	PPS	0005, 0405, etc., etc.
Florianopolis ...	27° 35' S.	48° 34' W.	PPF	*1110, 1210, 1910, 2310.
Juazeiro (Rio Grande do Sul)	32° 03' S.	52° 08' W.	PPJ	0150, 0550, 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 00 ^m 00 ^s 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. 165.

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.

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

Times of Transmission :—

PART I. 0100 to 0130 and 1300 to 1330—Pilot balloon observations.

PART II. 0130 to 0154 } and { 1330 to 1354 } Land station
0200 to 0254 } observations.

PART III. 0300 to 0315 and 1500 to 1515—Ship reports Atlantic, Gulf and Caribbean Sea.

PART IV. 0318 to 0330 and 1518 to 1530—Storm warnings, weather summaries and coastal forecasts.

0330 to 0345 and 1530 to 1545—Land station reports from Caribbean Sea area, additional ship reports, additional land station reports.

PART V. 0348 to end and 1548 to end—Hydrographic data, ice and late weather reports.

The reports are made in the International Wireless Weather Telegraphy Code and may be decoded from the table given in the DECODE, M.O. 329 or from page 38 of the January, 1939, MARINE OBSERVER, with the exception of PPP, which gives the pressure in tens, units and tenths of millibars, and T_sT_s which gives the temperature of the dew point in degrees Fahrenheit. (Note “pp” is given as “bb” in the DECODE, M.O. 329, 6th edition and January, 1939, MARINE OBSERVER.)

Key letters for land station reports :—

III International index number of station.

N Total amount of sky covered with cloud.

V Visibility.

DD Direction from which wind is blowing.

F Wind force in Beaufort Scale.

ww Character of weather at time of observation.

PPP Pressure in tens, units and tenths of millibars, 9 or 10 omitted.

TT Temperature of air (°F.).

T_sT_s Temperature of dew point (°F.).

a Characteristic of barometric tendency in three hours preceding observation.

pp Amount of barometric tendency in three hours preceding observation.

Key letters for ships' reports :—YQLLL 111GG DDFww PPVTT.
The names, numbers and positions of stations are published in Admiralty List of Wireless Stations, Volume II, 1937, Supplement No. 2, 1939, Part B.

The areas used for the forecasts in Part IV are as follows :—

Eastport to Sandy Hook.
Sandy Hook to Hatteras.
Hatteras to Jacksonville.
Jacksonville to Florida Straits.
East Gulf (east of 85° W.).
Middle Gulf (between 85° and 90° W.).
West Gulf (west of 90° W.).
Western Caribbean Sea (west of 75° W.).

Land station reports from Caribbean Sea Area in Part IV are transmitted from 1st July to 31st October only, in the code DDFww PP/TT preceded by the name of the station.

The reports will be selected from the following stations :—

Station.	Position.	
	Latitude	Longitude
	N.	W.
Coco Solo	9° 22'	79° 53'
Bluefields	12° 00'	83° 45'
Belize	17° 30'	88° 12'
Guane	22° 08'	84° 03'
Cienfuegos	22° 11'	80° 33'
Niquero	20° 02'	77° 36'
Grand Cayman	19° 44'	90° 26'
Kingston	17° 58'	76° 48'
Nassau	25° 05'	77° 22'
Inagua	20° 56'	73° 41'
Turks Island	21° 30'	71° 02'
Puerta Plata	19° 49'	70° 43'
Port au Prince	18° 31'	72° 19'
St. Thomas	18° 13'	64° 29'
St. Kitts	17° 18'	62° 43'
Roseau	15° 17'	61° 23'
Bridgetown	13° 04'	59° 37'
Port au Spain	10° 38'	61° 30'
Willemstad	12° 06'	69° 00'

Balboa (Summit) W/T Station, approximate position Latitude 9° 03' N., Longitude 79° 39' W., call sign NBA, rebroadcasts the first 50 stations in Part II and the Caribbean area land stations in Part IV of the Washington message, explained above, on 2653 metres C.W. at 0500 and 1700 G.M.T.

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.).		Time. G.M.T.	Wave-length. Metres.
		Latitude.	Longitude.		
Tuckerton, N.J.	WSC	39° 33' N.	74° 23' W.	1400, 2200	649 (I.C.W. and C.W.)
Chatham, Mass.	WCC WIM	41° 43' N.	70° 46' W.	1400, 2200	2325 738
Thomaston, Me.	WAG	44° 09' N.	69° 13' W.	1400, 2200	718 (I.C.W. and C.W.) 2420

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
	Latitude.	Longitude.				
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 2250 m. 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 2250 m. 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
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.	0230, 1630	2653 (C.W.).	Middle Atlantic Coast.
Baltimore	WMH	39° 17' N. 76° 36' W.	1530	627 (C.W. and I.C.W.).	Do.
† Washington (Arlington)	NAA	38° 52' N. 77° 05' W.	{ 0318* 1518* }	2653, 4690 C.W. simultaneously.	N. Atlantic and Gulf Coasts.
† New York	NAH	40° 28' N. 74° 00' W.			
† Boston, Mass.	NAD	42° 21' N. 70° 57' W.	0530, 1610	2653 (C.W.).	N. Atlantic Coast.

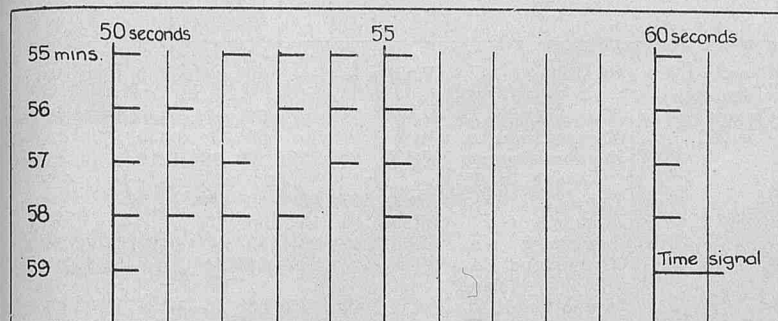
* In Part IV of the Weather Bulletin.

† 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 $38^{\circ} 52' 04''$ N., Longitude $77^{\circ} 04' 47''$ W., call signs **NAA**, and **NSS** on a wavelength of 2653 metres, at 00h. 00m. 00s., G.M.T., and each subsequent hour except 0200, 0400, and 1600 G.M.T., and on wavelengths of 4687 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.

Washington W/T Stations, call sign **NAA**, broadcast at 0348 and 1548 G.M.T. on 2653 and 4690 metres, and at 0900 and 2100 G.M.T. on 2655 metres, messages received from the Patrol Vessel.

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.
	Latitude.	Longitude.				
Limon	$10^{\circ} 00' N.$	$83^{\circ} 03' W.$	TIM	1630	750 m.	Gulf, Caribbean Sea.
Galveston	$29^{\circ} 20' N.$	$94^{\circ} 45' W.$	NKB	0430	2653 m.	S. Atlantic II., Gulf, Caribbean Sea.
New Orleans	$30^{\circ} 00' N.$	$90^{\circ} 06' W.$	WFB	0430, 1630	3331 m. C.W.	Gulf, Caribbean Sea.
Pensacola	$30^{\circ} 21' N.$	$87^{\circ} 16' W.$	NAS	1730	2653 m.	E. Gulf I.
Key West	$24^{\circ} 33' N.$	$81^{\circ} 48' W.$	NAR	0400, 1610	2653 m. C.W.	S. Atlantic II., E. Gulf I., Caribbean Sea.

Barbados W/T Station, approximate position latitude $13^{\circ} 06' N.$, longitude $59^{\circ} 37' W.$, call sign **VPO**, wavelength 600m. I.C.W., broadcasts the following weather information, received from the Meteorological Station, Codrington (latitude $13^{\circ} 07\frac{1}{2}' N.$, longitude $59^{\circ} 36' W.$), 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.

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.
Galveston, Tex.	WGV	$29^{\circ} 18' N.$ $94^{\circ} 48' W.$	720 (C.W.)	When issued.	West Gulf Coast.
" "	NKB	$29^{\circ} 20' N.$ $94^{\circ} 45' W.$	2653 (I.C.W.)	0100, 0430, 1700	Gulf and Caribbean Sea.
Port Arthur...	WPA	$29^{\circ} 52' N.$ $93^{\circ} 56' W.$	720 (C.W.)	When issued.	Gulf Coasts. Caribbean Sea. S. Atlantic Coast of U.S.A. Gulf Coasts.
*New Orleans	WFB	$30^{\circ} 00' N.$ $90^{\circ} 06' W.$	3331 (C.W.)	0300, 1500, 0430, 1630	E. Gulf Coast I.
*Pensacola ...	NAS	$30^{\circ} 21' N.$ $87^{\circ} 16' W.$	2653 (C.W.)	0000, 1730	S. Atlantic Coast II, E. Gulf Coast I, Caribbean Sea.
*Key West ...	NAR	$24^{\circ} 33' N.$ $81^{\circ} 48' W.$	2653 (C.W.)	0400, 1610	—
*Guantanamo (Cuba)	NAW	$19^{\circ} 55' N.$ $75^{\circ} 09' W.$	2653 (C.W.)	When issued.	E. Caribbean Sea. *
San Juan ...	NAU	$18^{\circ} 07' N.$ $66^{\circ} 10' W.$	2653	0200 (1 July to 15 Nov.).	—
Ensenada (Porto Rico)	WPR	$17^{\circ} 58' N.$ $66^{\circ} 56' W.$	600	When issued, repeated hourly at the hour or halfhour.	—
Balboa (Summit)	NBA	$9^{\circ} 03' N.$ $79^{\circ} 39' W.$	2653	1330	—

III.—Wireless Time Signals.

Panama.

Balboa (Summit) W/T Station, position Latitude $9^{\circ} 03' 17'' N.$, Longitude $79^{\circ} 38' 53'' W.$ Call sign **NBA** relays the Washington—Arlington time signals sent out at 0500 and 1700 G.M.T. on a wavelength of 2653 metres C.W.

* Transmits urgent Hurricane warnings at the first silent period, after receipt. These are repeated every two or four hours.

The messages are preceded by the Safety Signal TTT on 600 metres and a direction to change to the station's working wave.

CANADA, NOVA SCOTIA, NEWFOUNDLAND, LABRADOR, ETC.

II.—Wireless Weather Bulletins.

Halifax W/T Station, approximate position, Latitude 44° 40' N., Longitude 63° 35' W.

Call sign **CFH**.

Wavelength 2703 m.

Times of transmission 0500 and 1700 G.M.T.

The messages are based upon observations taken at 0100 and 1300 G.M.T. respectively.

They consist of four parts—

PART I.—General statement of weather conditions.

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

PART III.—A 12 hour forecast of wind and visibility.

PART IV.—Commencing "Outlook" being a brief statement of weather expected after the period of the Forecast.

The Station reports are in the International Weather Telegraphy Code and may be decoded from the tables given in DECODE M.O.329 or from the January, 1939, MARINE OBSERVER, page 38.

Key letters used—IxxAC, DDFww, PPVTT.

Country.	W/T Station.	Call Sign.	Position (approx.).		Time. G.M.T.	Wave-length.
			Lat. N.	Long. W.		
Canada (New Brunswick).	St. John ...	VAR	45° 14'	66° 03'	0400, 1600	650 m.
Canada (Nova Scotia).	Yarmouth ...	VAU	43° 46'	66° 07'	0430, 1630	720 m.
	Camperdown ...	VCS	44° 30'	63° 31'	0440, 1640	750 m.
	Sambro Outer Bank Lt.-V.	VGX	44° 22'	63° 26'	1210, 1740	435 m.
	Canso ...	VAX	45° 19'	60° 58'	—	600 m.
Canada ...	North Sydney	VCO	46° 13'	60° 15'	—	600 m.
	Louisburg ...	VAS	46° 09'	59° 57'	0400, 1600	2804 m.
	*Grindstone Island	VCN	47° 23'	61° 54'	—	600 m.
	*Fame Point, Que.	VCG	49° 07'	64° 36'	0430, 1630	660 m.
Newfoundland and Labrador.	*Father Point, Que.	VCF	48° 31'	68° 28'	0420, 1620	750 m.
	Quebec ...	VCC	46° 48'	71° 12'	0410, 1610	680 m.
	*Montreal ...	VCA	45° 34'	73° 38'	0400, 1600	769 m.
	St. John's ...	VON	47° 34'	52° 41'	0400, 1600	600 m.
Hudson Bay and Strait.	*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.
	†*Port Churchill	VAP	58° 47'	94° 09'	0400, 1600	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'	0420, 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.).		Time. G.M.T.	Wave-length R/T.
			Lat. N.	Long. W.		
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.	Montreal VCA.
Sambro Outer Bank Lt.-V. VGX.	Belle Isle VCM.
Canso VAX.	Camperdown VCS.
North Sydney VCO.	Fame Point VCG.
Louisburg VAS.	Quebec VCC.
Grindstone Island VCN.	St. John VAR.
Father Point VCF.	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).

Index Number.		Station.	Position.	
Used in message.	Inter-national.		Latitude N.	Longitude W.
<i>Eastern District.</i>				
0	(600)	Sable Island ...	43 56	60 02
1	(601)	Halifax ...	44 39	63 36
2	(603)	Yarmouth ...	43 50	66 02
3	(720)	St. John N.B. ...	45 17	66 04
4	(710)	Sydney ...	46 09	60 12
5	(700)	C. Race ...	46 31	53 04
6	(714)	Grindstone ...	47 21	61 59
7	(717)	Chatham ...	47 03	65 29
8	(728)	Father Point ...	48 31	68 28
<i>Western District.</i>				
0	(729)	Dolbeau ...	48 48	72 20
1	(737)	Doucet ...	48 13	76 37
2	(627)	Montreal ...	45 30	73 35
3	(624)	Toronto ...	43 40	79 24
4	(606)	Portland ...	43 39	70 15
5	(504)	Nantucket ...	41 17	70 06
6	(503)	New York ...	40 43	74 00
7	(520)	Pittsburg ...	40 21	79 56
8	(405)	Washington ...	38 54	77 03
<i>Northern District.</i>				
0	(836)	Moosonee ...	51 13	80 31
1	(802)	Harington ...	50 32	59 30
2	(805)	Belle Isle ...	51 53	55 22
3	(903)	Resolution ...	61 18	64 53
4	(904)	Hope's Advance ...	61 05	69 33
5	(915)	Nottingham ...	63 07	77 56

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.

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 on request on 600 metres and at the times and on the wavelengths as below ;—

W/T Station.	Latitude N. (approximate.)	Longitude W. (approximate.)	Call Sign.	Wavelength. (Metres.)	G.M.T. of issue.
St. John N.B. ...	45° 14'	66° 03'	VAR	750 (I.C.W.)	
Yarmouth ...	43° 46'	66° 07'	VAU		
Lurcher Lt.-V....	43° 49'	66° 32'	VGA		
*Camperdown ...	44° 30'	63° 31'	VCS		
Sambro Outer Bank Lt.-V.	44° 22'	63° 26'	VGX		
Canso ...	45° 19'	60° 58'	VAX	{ 2804 (C.W.) 2100	0400, 1600.
*North Sydney ...	46° 13'	60° 15'	VCO		
*Louisburg ...	46° 09'	59° 57'	VAS		
Grindstone Island	47° 24'	61° 51'	VCN		
Fame Point ...	49° 07'	64° 36'	VCG		
Father Point ...	48° 31'	68° 28'	VCF	660 (I.C.W.)	0430, 1630.
Quebec ...	46° 48'	71° 12'	VCC	750	
Montreal ...	45° 34'	73° 38'	VCA	680	
Clarke City ...	50° 11'	66° 37'	VCK	769	
*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	720 (I.C.W.)	0440, 1640.
Belle Isle ...	51° 53'	55° 22'	VCM		
Port Churchill...	58° 47'	94° 11'	VAP		
Cape Hopes	61° 05'	69° 33'	VAY		
Advance					
Nottingham Is. ..	63° 06'	77° 56'	VCB		
Resolution ...	61° 19'	64° 53'	VAW		
Chesterfield Inlet	63° 20'	90° 43'	VBZ		

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

† 2100 metres on request.

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—7000 and 2653 metres (C.W.) simultaneously.

The messages are based upon observations taken at 0030 and 1230 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. 38 of the January, 1939, number and in M.O. 329.

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

Distin-
guishing
letter.

Name of station.

Latitude Longitude
north. west.

Distin- guishing letter.	Name of station.	Latitude north.	Longitude west.
D	San Diego ...	32 43	117 10
I	San Nicholas Island ...	33 15	119 28
P	San Pedro ...	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
A	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
C	Atka, Alaska ...	52 10	174 12
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.

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.	Wave- length. (Metres).	Area.
Puget Sound	NPC	47° 42' N. 122° 37' W.	0030, 0330, 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, 0348, 1530, 1730, 2130.	2653	do.

W/T Station	Call Sign.	Position (Approx.) Latitude. Longitude.	Time G.M.T.	Wave-length. (Metres).	Area.
Hillsboro ...	KEK	45° 29' N. 122° 57' W.	0418, 1618.	717	Tatoosh Is., North Head, and Marshfield.
Eureka ...	NPW	40° 41' N. 124° 16' W.	0500, 0818, 1230, 1700, 2030, 2330.	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.
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 ... Lat. 47° 42' N. Long. 122° 37' W.	NPC	2653 (2458)	0030, 0330 1248, 1800 2100	Puget Sound and Strait of Juan de Fuca.
†Tatoosh Island ... Lat. 48° 23' N. Long. 124° 44' W.	NPD	833 (833)	0130, 0330 1300, 1700 2100	
†Astoria ... Lat. 46° 09' N. Long. 123° 50' W.	NPE	2653 (646)	0048, 0348 1530, 1730 2130	do.
*Hillsboro ...	KEK	717	0418, 1618	Oregon and Washington Coasts.
†Eureka, Calif. ... Lat. 40° 42' N. Long. 124° 16' W.	NPW	2653 (646)	0500, 0018 1230, 1700 2030	N. Coast of California, Washington and Oregon Coasts.
†San Francisco, Calif. Lat. 38° 06' N. Long. 122° 17' W.	NPG	2653 (C.W.)	0000, 0600 0800, 1200 1630, 2000	N. California Coast.

* 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 in brackets above.

III.—Wireless Time Signals.

For method of transmission of the undermentioned Time Signals, see diagram, p. 165.

W/T Station.	Call Sign.	Wavelength. Metres.	Time of Signal being made, G.M.T.															
San Francisco, Calif. Lat. 38° 05' 55" N. Long. 122° 16' 37" W.	NPG	2,653 and 7,005 (C.W.)	<table><tr><td>h. m. s.</td><td>h. m. s.</td></tr><tr><td>*23 55 00—</td><td>0 00 00</td></tr><tr><td>2 55 00—</td><td>3 00 00</td></tr><tr><td>* 7 55 00—</td><td>8 00 00</td></tr><tr><td>14 55 00—</td><td>15 00 00</td></tr><tr><td>*16 55 00—</td><td>17 00 00</td></tr><tr><td>19 55 00—</td><td>20 00 00</td></tr></table>	h. m. s.	h. m. s.	*23 55 00—	0 00 00	2 55 00—	3 00 00	* 7 55 00—	8 00 00	14 55 00—	15 00 00	*16 55 00—	17 00 00	19 55 00—	20 00 00	Sent daily.
h. m. s.	h. m. s.																	
*23 55 00—	0 00 00																	
2 55 00—	3 00 00																	
* 7 55 00—	8 00 00																	
14 55 00—	15 00 00																	
*16 55 00—	17 00 00																	
19 55 00—	20 00 00																	

* On 7005 m. only.

PERSONNEL.

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

AWARD.

Captain C. H. Sapsworth.—HIS MAJESTY THE KING has been pleased to confer on Captain CHARLES HOWARD SAPSWORTH the Insignia of Commander of the Royal Victorian Order on the occasion of THEIR MAJESTIES return to England from Canada in the *Empress of Britain* under Captain SAPSWORTH'S command.

J. H.

APPOINTMENTS.

Captain J. K. Chaplin, R.D., R.N.R.—HIS MAJESTY THE KING has been pleased to appoint Captain JOSEPH KENNETH CHAPLIN, Commander of the R.M.S. *Corfu*, Royal Naval Reserve Aide-de-Camp to His Majesty in succession to Captain S. N. WHITE, R.D., R.N.R.

J. H.

Captain R. G. Clayton, D.S.C., R.D., R.N.R.—HIS MAJESTY THE KING has been pleased to appoint Captain RICHARD GEORGE CLAYTON, Commander of the R.M.S. *Highland Brigade*, Royal Naval Reserve Aide-de-Camp to HIS MAJESTY in succession to Captain G. G. THORNE, R.D., R.N.R.

J. H.

RETIREMENTS.

Captain J. R. Bulmer, M.B.E.—Captain J. R. BULMER, Commander of the Irish cross-channel steamer *Hibernia* and Commodore of the L.M. & S. Fleet, has retired after 48 years seafaring.

Before joining the Irish cross-channel service in 1900, Captain BULMER served for nearly 10 years in large ocean going square rigged ships.

J. H.

Captain Edwin Thowless, late Commander of the S.S. *Marwarri*, has retired after 48 years service at sea, 33 years of which being spent in the Brocklebank Line. He commenced his sea career as an apprentice in sailing ships under the House Flag of Shaw Savill and Albion Co., and also served for some time in their steamships before joining the Union-Castle Line. He later transferred to the Brocklebank Line and has commanded several ships in their fleet.

J. H.

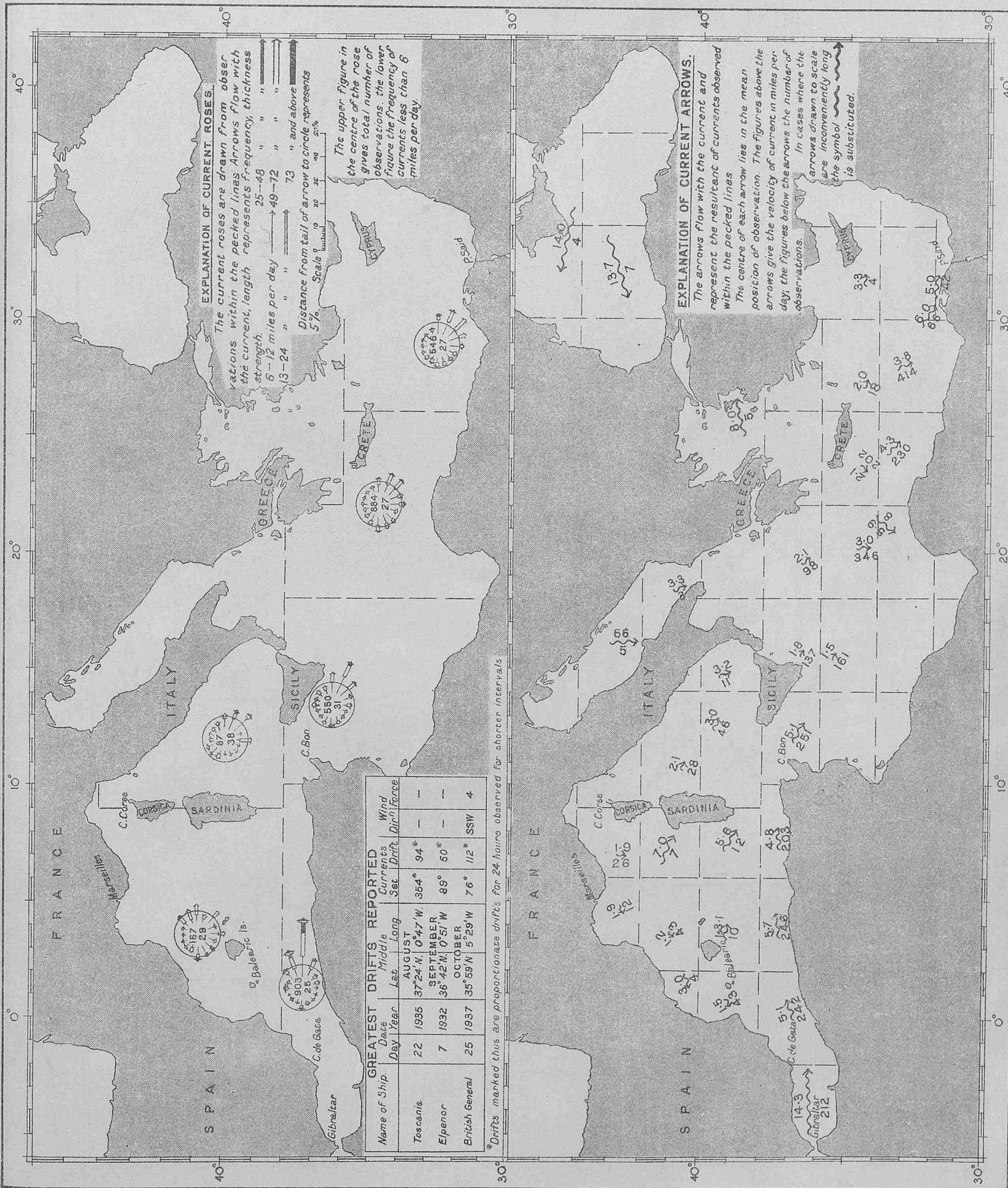
OBITUARY.

Captain J. B. Davies.—The death of Captain JOHN BURTON DAVIES which took place at the Dreadnought Seamen's Hospital Greenwich on June 25th last, after a long illness, is recorded with deep regret.

Born in 1889 at Abbots Langley, Herts, Captain BURTON DAVIES served his apprenticeship in the ships *Celtic Queen* and *Celtic Race* owned by Messrs. Hughes Jones & Co. On obtaining his second mate's certificate he continued as an officer in sail for some time before joining the New Zealand Shipping Company as 4th Officer in 1911. Promoted through the various ranks he was given his first command, the *Whakatane*, in 1921 and before retiring from the sea on account of ill-health in 1937 had commanded the *Hurunui*, *Tongariro* and *Hertford*.

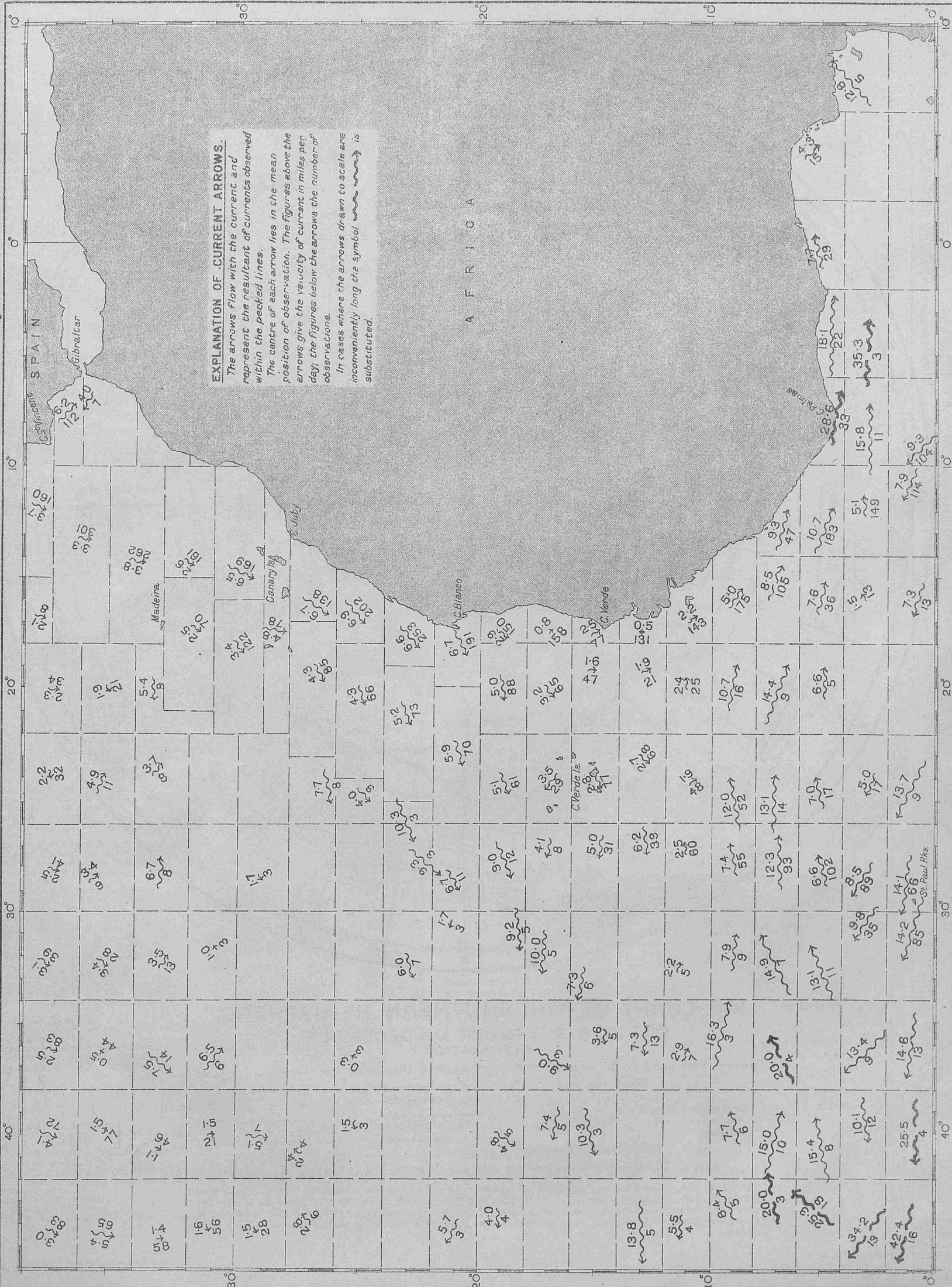
Prior to his retirement Captain BURTON DAVIES had for many years been a keen member of our Corps of Voluntary Marine Observers, and did much in assisting the Marine Division by his work at sea in the treatment of Marine Meteorology as a branch of Seamanship.

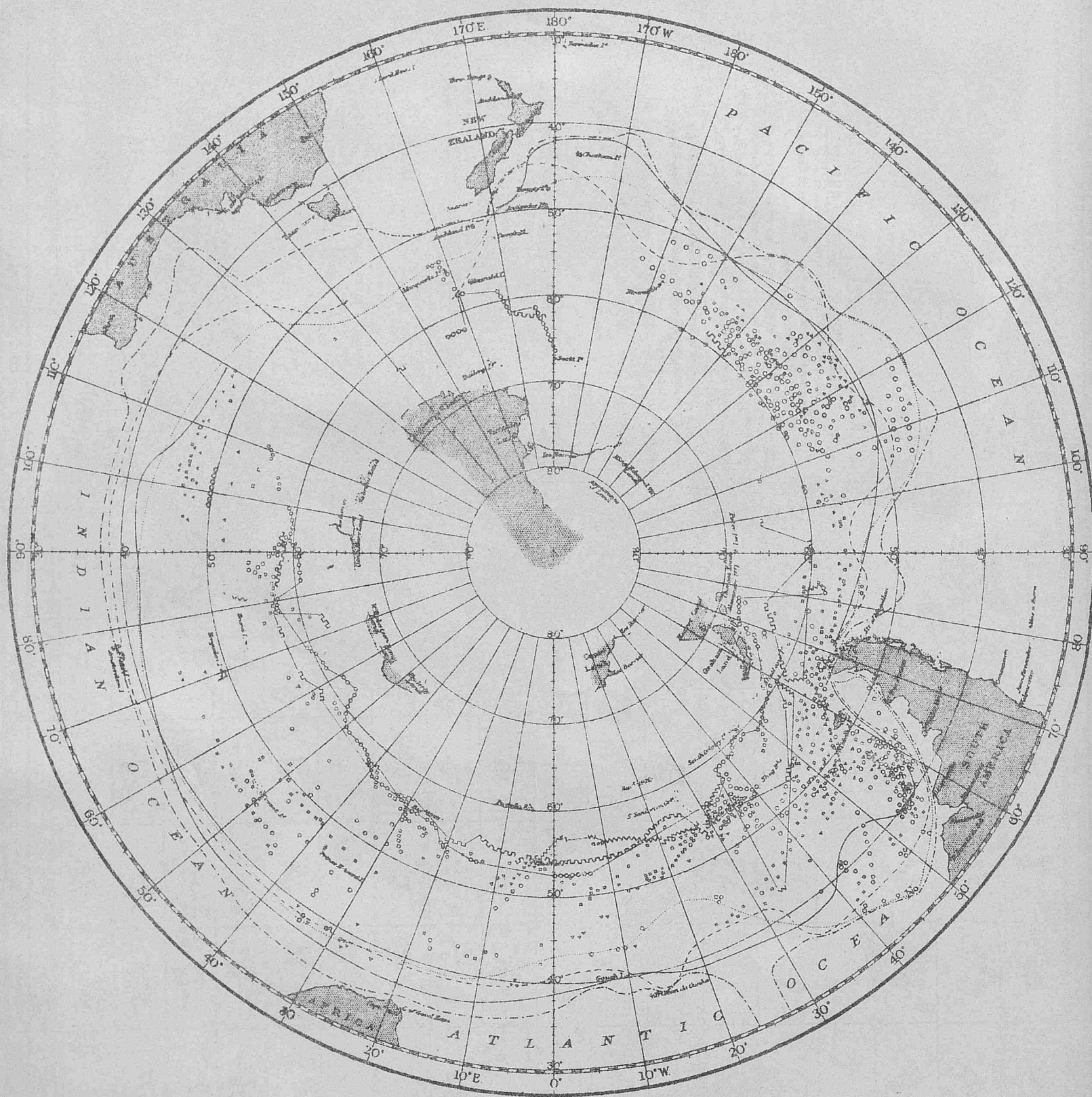
J. H.



CURRENTS IN THE NORTH ATLANTIC, SOUTHEASTERN PORTION
Observations of ships regularly observing for the British Meteorological Office, 1910-1938.
AUGUST SEPTEMBER and OCTOBER







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, 1902-1938.	Position of northernmost pack ice actually observed 1885-1938.	Extreme limit of all ice, 1772-1938.
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.

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FLEET LIST.

VOLUNTARY OBSERVING SHIPS.

The following is a complete list of British observing ships regularly co-operating with the Marine Division of the Meteorological Office.

The names of the Captains, Observing Officers, and, in the case of Selected ships, Wireless Operators, are given as ascertained from the last written return received. Meteorological Logs, Records, and W/T Weather Registers received up to the date specified at the head of the seventh column are referred to by Form number, with commencing and ending dates of period covered by the returns; the date of receipt of the last return received is given in the eighth column.

All returns received from observing ships will be acknowledged, direct to the ship by the Marine Superintendent. The Port Meteorological Officers and Merchant Navy Agents at the ports will make personal calls on the Captains and Observing Officers as opportunity offers, or on notification from the ship at any time when their services are desired.

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 273.

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.

M.-S. = Ship having her own mercurial barometer, but partly equipped with other tested Meteorological Office instruments.

A. = Ships' own aneroid.

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteoro-logical Instrument Equip-ment.	Owners.	Logs, Registers, or Records Contributed up to 6.9.39	Date Last Return Received.
115 †† <i>Abosso</i> , M.S. ...	A. Smith	A. C. Large, D. D. Jones, J. H. Crane.	G. Arrowsmith	M.-S.	Elder Dempster Lines, Ltd.	Fms. 911 & 138 17.5.39 to 17.8.39	22.8.39
122 †† <i>Accra</i> , M.S. ...	P. Sola, D.S.O., Lieut. Commr., R.N.R.	F. Lomax, E. E. Raddan, H. W. Cowman.	R. J. Dowling ...	"	" "	" " 2.6.39 to 7.7.39	13.7.39
123 †† <i>Adda</i> , M.S. ...	R. W. Tate	C. H. Rhodes, L. D. Truman	A. J. H. Edwards	"	" "	16.6.39 to 22.7.39	27.7.39
*† <i>Admiral Sir John Laurford</i> , S.T.	J. Tomlinson	S. Nettleton	S. Nettleton ...	S.	Iago Steam Trawling Co., Ltd.	Fms. 911 & 138 4.8.39 to 25.8.39	29.8.39
090 *† <i>Aeneas</i>	T. B. Marsham ...	J. H. Kirk, J. W. Patterson, I. H. Laing.	A. J. Dart ...	M.-S.	A. Holt & Co. ...	" " 18.4.39 to 8.7.39	11.7.39
166 *† <i>Agamemnon</i> , M.S.	J. O'Connor	J. H. Finch, F. Jones, J. R. Brown.	A. C. Nevin ...	S.	" " ...	" " 3.4.39 to 20.7.39	24.7.39
065 †† <i>Akaroo</i>	W. G. Summers ...	H. H. Falkiner, A. G. Mac- kenzie, J. G. Fairgrieve.	W. T. Lewis ...	M.-S.	Shaw, Savill & Albion Co., Ltd.	" " 13.3.39 to 27.6.39	30.6.39
245 †† <i>Alaunia</i>	R. Spencer, R.D., Capt., R.N.R.	F. J. Storey, H. F. Denison, J. Nolan.	M. Boome ...	S.	Cunard White Star Ltd.	{ Fm. 912 5.6.39 to 18.8.39	21.8.39
*† <i>Albion Star</i> ...	H. Palmer	" " " " " " " "	" " " " " " " "	M.	Blue Star Line, Ltd.	" " " " " " " "	21.8.39
129 †† <i>Alicantara</i> ...	T. J. C. Buret, D.S.C.	T. B. Bolland, G. W. Medlycott, H. H. P. Coombes, W. E. Avison.	W. Smith ...	M.-S.	Royal Mail Lines, Ltd.	Fms. 911 & 138 25.6.39 to 31.7.39	3.8.39
175 †† <i>Almanzora</i> ...	H. P. Womersley ...	G. S. Grant, R. Shinn, R. S. Holland.	J. Caldwell ...	S.	" " " "	" " 28.5.39 to 10.7.39	12.7.39
086 †† <i>Almeda Star</i> ...	H. C. Howard ...	J. L. Anson, G. N. Elliott, A. Norquay.	P. Norwood ...	M.-S.	Blue Star Line, Ltd.	" " 30.4.39 to 22.8.39	25.8.39
022 *† <i>Alynbank</i> , M.S.	B. H. Bulman	J. Murray, D. H. Morris ...	J. W. Hunter ...	S.	A. Weir & Co. ...	" " 24.12.38 to 22.2.39	3.4.39
160 *† <i>Amarapooru</i> ...	S. Sinclair-Duncan ...	P. F. Carnochan, P. Treas- urer, P. McCoke.	A. M. Douglas... ..	"	P. Henderson & Co.	" " 12.6.39 to 22.8.39	28.8.39
*† <i>Amsterdam</i> ...	A. P. Sutton	R. R. Defty, E. J. Gould ...	D. T. Wright ...	"	L. & N. E. Rly... ..	" " 2.6.39 to 30.7.39	1.8.39
006 †† <i>Andalucia Star</i>	R. Vernon	R. Leech, B. Toynbee, D. P. Shippobotham.	R. Gregory ...	M.-S.	Blue Star Line, Ltd.	" " 18.6.39 to 7.8.39	11.8.39
113 *† <i>Andania</i>	H. R. Oulsnam, R.D., Commr., R.N.R.	K. M. Nicholson, J. Mackay, A. Thompson.	J. Doyle ...	S.	Cunard White Star, Ltd.	{ Fm. 912 21.5.39 to 4.8.39	8.8.39
040 *† <i>Anselm</i>	B. B. Furneaux ...	J. W. Wayman, R. Richard- son, R. Heyburn, A. A. Gerrard.	J. Strong ...	"	Booth S.S. Co., Ltd.	Fms. 911 & 138 21.5.39 to 4.8.39 7.6.39 to 18.7.39	8.8.39 27.7.39
259 *† <i>Antonia</i>	C. N. Ford	J. E. Wolfender, L. K. Goodier, G. T. Kavanagh.	A. F. L. Crosby... ..	"	Cunard White Star, Ltd.	{ Fm. 912 4.6.39 to 19.8.39 4.6.39 to 19.8.39	22.8.39 22.8.39

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed up to 6.9.39.	Date Last Return Received.
120 †† <i>Apapa</i> , M.S. ...	E. Vaughan Davies ...	W. J. Holt, C. Morrison ...	J. Rea ...	M.-S.	Elder Dempster Lines, Ltd.	Fms. 911 & 138 5.5.39 to 4.8.39	9.8.39
017 †† <i>Aquilania</i> ...	J. C. Townley, R.D., Capt., R.N.R.	A. E. Divers, A. Lettey, J. Mackay.	S. W. Brown ...	S.	Cunard White Star, Ltd.	{ Fm. 912 8.6.39 to 21.8.39	26.8.39
201 †† <i>Arandora Star</i> ...	E. W. Moulton ...	F. S. Hambridge, L. Donoghue, A. W. Jewiss.	S. T. Williams ...	M.-S.	Blue Star Line, Ltd.	{ Fms. 911 & 138 10.8.39 to 21.8.39	26.8.39
248 *† <i>Arawa</i> ...	T. V. Roberts, R.D., Capt., R.N.R.	W. G. Burt, E. Snaith, B. H. Forgham.	H. Tanner ...	"	Shaw, Savill & Albion Co., Ltd.	{ Fms. 911 & 138 3.6.39 to 10.8.39	12.8.39
114 *† <i>Ariguani</i> ...	R. A. Thorburn, R.D., Commr., R.N.R.	T. C. Crane, J. Hughes ...	B. M. Evans ...	S.	Elders & Fyffes, Ltd.	{ Fm. 912 9.7.39 to 27.7.39	31.7.39
092 †† <i>Arundel Castle</i> ...	F. A. Smyth, R.D., Lt. Commr., R.N.R.	R. M. Wright ...	P. P. Williams ...	"	Union-Castle Mail S.S. Co., Ltd.	{ Fms. 911 & 138 29.1.39 to 8.5.39	20.5.39
233 †† <i>Ascania</i> ...	G. Russell-Hope ...	S. W. Howell, E. J. Binfield, H. L. Pryse.	J. W. Haynes ...	"	Cunard White Star, Ltd.	{ Fm. 912 13.6.39 to 12.8.39	14.8.39
013 †† <i>Asturias</i> ...	F. R. Miles, R.D., Capt., R.N.R.	R. J. Finch, C. J. Webster, F. O. Plunkett-Cole.	T. Bradfield ...	"	Royal Mail Lines, Ltd.	{ Fms. 911 & 138 21.5.39 to 4.8.39	8.8.39
028 †† <i>Athlone Castle</i> ...	E. S. Vincent, R.D., Commr., R.N.R.	J. Tait ...	J. Hodgson ...	"	Union-Castle Mail S.S. Co., Ltd.	{ Fms. 911 & 138 21.5.39 to 4.8.39	8.8.39
197 †† <i>Atlantis</i> ...	R. B. Hill ...	C. Marshall, G. T. Barff ...	W. H. Chick ...	M.-S.	Royal Mail Lines, Ltd.	{ Fms. 911 & 138 11.6.39 to 14.7.39	18.7.39
208 *† <i>Aurania</i> ...	A. R. Macdonald ...	G. E. Newey, H. Morgan, B. L. Butcher.	C. L. Wood ...	S.	Cunard White Star, Ltd.	{ Fm. 912 9.6.39 to 19.7.39	11.8.39
103 *† <i>Ausonia</i> ...	C. H. Bate, R.D., Capt. R.N.R.	H. A. Stonehouse, A. H. Young, W. J. Law.	S. A. Arnold ...	"	"	{ Fms. 911 & 138 12.6.39 to 25.8.39	28.8.39
046 *† <i>Australia Star</i> , M.S.	J. Fisher ...	J. Buyrne, F. Quinn, C. R. Kinning.	W. Rollason ...	M.-S.	Blue Star Line, Ltd.	{ Fms. 911 & 138 29.5.39 to 16.7.39	17.7.39
133 *† <i>Avelona Star</i> ...	G. E. Hopper ...	L. V. Seymour, J. J. Redden	J. H. —	"	"	{ Fm. 912 28.2.39 to 12.6.39	5.7.39
045 †† <i>Avila Star</i> ...	R. J. Thomas ...	L. McClure, S. Dickens, J. Elliott.	H. Varley ...	"	"	{ Fms. 911 & 138 14.5.39 to 24.6.39	1.7.39
110 *† <i>Balmoralwood</i> ...	F. Chilton ...	G. Norton, A. A. Alexander, R. B. Hargreaves.	W. B. Charlton ...	S.	Constantine Steamships, Ltd.	{ Fm. 912 17.5.39 to 1.7.39	17.7.39
*† <i>Baronesa</i> ...	G. Brien ...	C. Lyndon, P. Boothy, S. Howell.	R. G. Farrell ...	M.	Furness Lines ...	{ Fms. 911 & 138 23.6.39 to 18.7.39	1.8.39
209 *† <i>Bassano</i> ...	A. H. Best ...	J. E. Stott, S. G. Poskitt, T. Hornsly.	C. G. O'Keeffe ...	S.	Ellerman's Wilson Line, Ltd.	{ Fm. 912 23.6.39 to 18.7.39	1.8.39
*† <i>Beacon Grange</i> , M.S.	A. B. Friend ...	D. Murray ...	"	M.	Houlder Bros. & Co.	{ Fms. 911 & 138 31.5.39 to 25.8.39	29.8.39
180 *† <i>Beaverbrae</i> ...	B. L. Leslie ...	G. M. Ball, F. Granger, R. Walgate.	J. N. Coutts ...	M.-S.	Canadian Pacific Steamships, Ltd.	{ Fms. 912 31.5.39 to 25.8.39	29.8.39
130 *† <i>Beaverburn</i> ...	W. Stanfield, Cmmr., R.N.R.	S. P. Berna, D. H. Coughlin, F. H. Stell.	S. J. Taylor ...	"	"	{ Fms. 911 & 138 3.6.39 to 29.7.39	11.8.39
138 *† <i>Beaverdale</i> ...	H. Pettigrew ...	E. H. Smith, B. R. Russell, J. Shearer.	J. Ormiston ...	"	"	{ Fms. 912 3.6.39 to 28.7.39	10.8.39
232 *† <i>Beaverford</i> ...	E. J. Jones ...	B. Charles, G. D. Barr, P. Locke.	J. J. Frazer ...	"	"	{ Fms. 911 & 138 27.5.39 to 26.8.39	2.9.39
*† <i>Benarty</i> ...	J. Watt ...	G. Sinclair, T. Gilmour, N. Crowe.	E. J. Hathway ...	M.	W. Thomson & Co.	{ Fm. 912 27.5.39 to 26.8.39	5.9.39
*† <i>Benledi</i> ...	J. H. Patterson ...	G. Kaysmith ...	"	"	"	{ Fms. 911 & 138 10.6.39 to 5.8.39	11.8.39
*† <i>Benroch</i> ...	D. Macgregor ...	"	"	S.	W. Thomson & Co.	{ Fms. 912 10.6.39 to 5.8.39	10.8.39
111 *† <i>Benueyvis</i> ...	H. J. Small ...	W. P. Gollan, G. D. McMillan, I. W. Williamson.	A. A. Smith ...	M.	"	{ Fms. 911 & 138 21.5.39 to 18.8.39	24.8.39
145 *† <i>Berwickshire</i> ...	A. R. Cossar ...	G. Stronach, T. O. Marr, H. Bradshaw.	W. G. Peddie ...	S.	Turnbull, Martin & Co., Ltd.	{ Fm. 912 24.6.39 to 18.8.39	24.8.39
007 *† <i>Bradfyne</i> ...	R. G. Banner ...	D. Marks ...	J. N. Collins ...	"	Sir Wm. Reardon Smith & Partners, Ltd.	{ Fms. 911 & 138 2.4.39 to 1.6.39	3.7.39
*† <i>Brighton</i> ...	B. Shaw ...	H. L. Smith ...	A. Jones ...	"	Southern Ry. ...	{ Fms. 911 & 138 19.5.39 to 18.7.39	24.7.39
*† <i>Brisbane Star</i> , M.S.	F. N. Riley ...	M. B. N. Tallack, C. Horton, G. Goodman.	M. F. Guiry ...	M.-S.	Blue Star Line ...	{ Fms. 911 & 138 7.4.39 to 8.7.39	12.7.39
189 †† <i>Britannic</i> , M.S.	A. C. Greig, O.B.E., R.D., R.N.R.	W. G. Fitzgerald, W. G. Robinson, J. T. Jones.	A. G. Hill ...	S.	Cunard White Star, Ltd.	{ Fms. 911 & 138 20.5.39 to 26.8.39	30.8.39
106 *† <i>British Colonel</i> (tank)	E. Millers ...	W. Dick, W. Forsyth, A. G. Max.	C. N. Brierly ...	M.	British Tanker Co., Ltd.	{ Fm. 912 15.3.39 to 6.7.39	17.7.39
038 *† <i>British Corporal</i> (tank)	J. Cunningham ...	S. Wilkinson ...	"	"	"	{ Fm. 912 30.4.39 to 7.8.39	16.8.39
153 *† <i>British Endurance</i> (M.S. (tank))	R. O. Putt ...	M. Hutchinson, J. J. Walters	H. D. Johnston ...	"	"	{ Fms. 911 & 138 28.5.39 to 10.8.39	28.8.39
054 *† <i>British General</i> (tank)	D. C. Bartun ...	R. S. Hughes, W. D. Cayton, G. S. Allen.	G. H. W. Sewell ...	"	"	{ Fm. 912 2.6.39 to 7.8.39	21.8.39
249 *† <i>British Grenadier</i> (tank)	J. A. Ferrier ...	E. J. Simpson, D. L. O. Smith, C. H. Humphries.	T. Gledhill ...	"	"	{ Fms. 911 & 138 2.3.38 to 28.5.38	2.6.38
*† <i>British Gunner</i> (tank)	C. W. G. Stook ...	R. A. Harrison, C. Stibbs, R. Salmund.	T. H. Knill ...	"	"	{ Fm. 911 18.5.39 to 29.7.39	21.8.39
257 *† <i>British Hussar</i> (tank)	W. F. Beddison ...	G. R. Mackillican, B. W. Hope, P. Hawkins.	A. J. Berryman ...	"	"	{ Fms. 911 & 138 28.6.39 to 3.8.39	15.8.39
076 *† <i>British Officer</i> (tank)	R. H. Guswell ...	R. M. Anderson, M. H. Rowland, L. J. Hambling.	R. P. Allen ...	"	"	{ Fms. 911 & 138 3.5.39 to 24.8.39	1.9.39
*† <i>British Power</i> (tank)	E. G. Dobson ...	N. Walton ...	"	"	"	{ Fms. 911 & 138 11.5.39 to 24.6.39	21.8.39
124 *† <i>British Premier</i> (tank)	G. Johnson ...	P. Taylor, C. Forster, D. Turney.	A. J. Locke ...	"	"	{ Fms. 911 & 138 12.5.39 to 16.8.39	4.9.39
*† <i>British Resolution</i> (M.S. (tank))	J. C. Leybourne ...	A. G. Davidson, J. S. Weddle, H. J. Wire.	L. G. Sparks ...	"	"	{ Fms. 911 & 138 21.5.39 to 23.7.39	25.7.39
225 *† <i>British Statesman</i> (tank)	T. Gaffney ...	H. Evans, H. S. Munn, A. W. Evans.	W. R. Dunderdale ...	"	"	{ Fms. 911 & 138 23.6.39 to 9.8.39	18.8.39
273 *† <i>British Strength</i> (M.S. (tank))	R. G. Mott ...	T. W. Cuffley, S. A. Cave, E. G. Basley.	K. B. Reade ...	"	"	{ Fms. 911 & 138 15.6.39 to 24.6.39	4.7.39
178 *† <i>British Workman</i> (tank)	S. D. Bumstead ...	J. P. M. Samson, S. L. Mier, R. B. Lewis.	J. M. Mullin ...	"	"	{ Fms. 911 & 138 17.5.39 to 16.8.39	21.8.39
200 *† <i>Cairnesk</i> ...	E. A. Organ ...	S. W. Parks, J. Henderson, R. Armstrong.	R. A. Penny ...	S.	Cairns, Noble & Co., Ltd.	{ Fm. 912 27.5.39 to 6.8.39	9.8.39
241 *† <i>Cairnglen</i> ...	A. W. Melling ...	F. W. Fairley, T. Sutherland, E. A. Organ.	F. A. Munday ...	"	"	{ Fms. 911 & 138 27.5.39 to 6.8.39	9.8.39
072 *† <i>Cairnmona</i> ...	A. C. Dickson ...	A. L. Swapp, J. C. Anderson, J. R. S. Preston.	J. Jackson ...	"	"	{ Fm. 912 13.5.39 to 22.7.39	24.7.39
112 *† <i>Cairnross</i> ...	L. Halcrow ...	D. Eason, A. J. Dunn, P. Usher.	H. Jardine ...	"	"	{ Fms. 911 & 138 4.6.39 to 1.7.39	6.7.39
075 *† <i>Cairnvalona</i> ...	W. J. Thompson ...	E. Cairns, L. Purey ...	J. Roderick ...	"	"	{ Fm. 912 4.6.39 to 1.7.39	6.7.39
081 †† <i>Caledonia</i> ...	A. Collicie ...	G. Ramage, H. L. P. King, R. Harrison.	J. F. Reid ...	"	Anchor Line, Ltd.	{ Fms. 911 & 138 11.6.39 to 18.8.39	21.8.39
077 †† <i>California</i> ...	R. W. Smart ...	J. D. Mackenzie, R. F. Caldwell, B. S. Leiper.	D. Thompson ...	"	"	{ Fms. 912 18.6.39 to 18.8.39	21.8.39
						{ Fms. 911 & 138 14.5.39 to 15.7.39	21.7.39
						{ Fms. 912 14.5.39 to 19.7.39	22.7.39
						{ Fms. 911 & 138 28.5.39 to 5.7.39	8.7.39
						{ Fms. 912 21.5.39 to 23.8.39	25.8.39
						{ Fm. 912 21.5.39 to 23.8.39	25.8.39

FLEET LIST

iii

Name of Vessel.	Captain	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed up to 6.9.39	Date Last Return Received.
223 *† <i>Cambria</i> ...	A. Marsh ...	S. P. Pritchard ...	J. Pritchard ...	S.	L.M. & S. Rly. ...	Fms. 911 & 138 6.2.39 to 19.5.39	1.6.39
*† <i>Cambridge</i> ...	A. Angell ...	G. E. Mason, J. B. Rose, A. M. Ducat.	P. McConnachie ...	"	Federal S.N. Co., Ltd.	" " 15.1.39 to 7.5.39	12.5.39
042 †† <i>Cameronia</i> ...	J. Dunlop ...	J. A. Leitch, A. Colquhoun, J. Baxter.	W. S. Lennard...	"	Anchor Line, Ltd.	{ " " 4.6.39 to 9.8.39 14.8.39 Fm. 912 4.6.39 to 19.7.39 24.7.39	
252 *† <i>Camito</i> ...	R. J. Bostock ...	A. MacCallum ...	R. E. Blizzard ...	"	Elders & Fyffes, Ltd.	Fms. 911 & 138 27.5.39 to 30.7.39 4.8.39	
037 †† <i>Canton</i> ...	H. M. Jack ...	M. Greaghy, D. West, G. Melville.	G. W. Bailey ...	M.-S.	P. & O. S.N. Co.	" " 29.1.39 to 2.6.39 9.6.39	
117 *† <i>Cape of Good Hope</i> M.S.	P. A. Wallace ...	J. S. Binnie, W. J. Justen, G. Campbell.	S. E. Cowling ...	S.	Lyle Shipping Co., Ltd.	" " 15.1.39 to 27.8.39 28.8.39	
188 †† <i>Capetown Castle</i> , M.S.	E. J. Thornton, R.D., Capt., R.N.R.	A. A. Freer ...	R. Cullen ...	"	Union Castle Mail S.S. Co. Ltd.	" " 28.4.39 to 2.8.39 10.8.39	
266 †† <i>Carinthia</i> ...	W. C. Battle, D.S.C., R.N.R.	T. T. Sheehan, J. C. Bryce, S. J. Right.	A. F. Porter ...	"	Cunard White Star, Ltd.	" " 22.5.39 to 23.7.39 11.8.39	
264 †† <i>Carnarvon Castle</i> , M.S.	A. H. Blackman ...	J. A. McConnell ...	A. G. Blow ...	"	Union Castle Mail S.S. Co., Ltd.	" " 5.5.39 to 10.8.39 14.8.39	
155 †† <i>Carthage</i> ...	H. Williams ...	E. Kay, F. G. Kell, A. A. Terry.	F. Rose ...	M.-S.	P. & O. S.N. Co.	" " 12.3.39 to 14.6.39 27.6.39	
184 †† <i>Cathay</i> ...	H. Starling ...	W. W. Bow, H. N. Simms, H. M. Askin.	E. L. Boyce ...	"	" " "	" " 2.4.39 to 5.7.39 12.7.39	
127 *† <i>Cavina</i> ...	W. T. Forrester, O.B.E.	J. A. Duff, B. R. Coe...	A. N. Taylor ...	S.	Elders & Fyffes, Ltd.	" " 12.5.39 to 20.8.39 22.8.39	
*† <i>Celtic Monarch</i> ...	G. C. Winchester ...	J. T. Craigie, H. Downie, E. Lamb.	" " "	M.L.	Monarch S.S. Co. Ltd.	Fm. 915 19.12.38 to 22.6.39 18.7.39	
011 †† <i>Ceramic</i> ...	H. C. Elford ...	V. H. Vizer, W. Dickson, W. J. Strange.	W. M. Ross ...	S.	Shaw, Savill & Albion Co., Ltd.	Fms. 911 & 138 20.2.39 to 17.5.39 22.5.39	
029 *† <i>Cheshire</i> , M.S. ...	C. Fountain ...	A. N. Williamson, T. Cooper, O. Bennett.	F. W. Greaves ...	"	Bibby Bros. & Co.	" " 19.5.39 to 11.8.39 21.8.39	
067 *† <i>Chinese Prince</i> , M.S.	W. Finch ...	A. H. Kent, J. T. Hennessey, G. P. Freeman, D. G. P. Tait, H. Frisby.	D. T. de Witt ...	M.L.	Furness Lines Ltd.	Fm. 915 13.2.39 to 23.5.39 10.7.39	
192 †† <i>Chitral</i> ...	W. E. L. S. Pocock ...	F. E. French, P. G. Lawrence, D. Brett.	W. B. Goodsell	M.-S.	P. & O. S.N. Co.	Fms. 911 & 138 21.5.39 to 23.8.39 26.8.39	
051 *† <i>City of Auckland</i>	H. G. Jenkins, O.B.E.	J. C. Storey, R. G. Jones, T. V. Birkett.	P. J. Cummings	S.	Ellerman Lines, Ltd.	" " 19.5.39 to 26.6.39 29.6.39	
135 *† <i>City of Barcelona</i>	E. J. Myles ...	H. G. Williams, A. N. Field, J. Walker.	J. J. Bunbury ...	M.	" " "	" " 2.7.39 to 25.7.39 1.8.39	
265 *† <i>City of Baroda</i>	W. J. Merchant ...	N. S. P. Bradbury, R. S. Steel, R. Reettig.	F. S. Doubler ...	S.	" " "	" " 3.7.39 to 28.7.39 8.8.39	
057 †† <i>City of Benares</i> ...	L. Nicoll ...	H. H. Asher, P. C. Rendle ...	A. B. Fairweather	M.-S.	" " "	" " 5.6.39 to 10.8.39 21.8.39	
*† <i>City of Bombay</i> ...	O. Cheverton-Brown ...	G. R. Jackson, J. A. Beynon, J. G. Shepherd.	D. Gaines ...	"	" " "	" " 17.7.39 to 7.8.39 21.8.39	
158 *† <i>City of Cairo</i> ...	A. J. Phillip ...	H. N. Jones, C. T. Heywood, W. L. Nelson.	G. S. Creighton	M.	" " "	" " 5.6.39 to 16.8.39 21.8.39	
215 *† <i>City of Canberra</i>	H. R. Jackson ...	D. W. Penberthy, H. Ward, J. Sapp.	C. Kerridge ...	"	" " "	" " 20.4.39 to 6.7.39 19.7.39	
033 *† <i>City of Canton</i> ...	E. Scrymgeour...	H. Nish, R. H. Bellhouse, E. Routledge.	W. Titmusse ...	"	" " "	" " 8.5.39 to 28.7.39 3.8.39	
157 *† <i>City of Delhi</i> ...	E. Wilson ...	H. A. Rose, P. C. Arthur, D. Thorsen.	D. A. Hayes ...	S.	" " "	" " 19.5.39 to 15.8.39 6.9.39	
030 *† <i>City of Dieppe</i>	W. J. Merchant ...	E. A. Chapman, J. F. Mitchell, E. N. Colville.	A. Emslie ...	"	" " "	" " 21.1.39 to 10.5.39 17.5.39	
049 *† <i>City of Evansville</i>	G. Vickers ...	R. Winship, B. M. Postlethwaite, R. H. Broadbent.	C. W. Manley ...	M.	" " "	" " 24.6.39 to 2.8.39 18.8.39	
220 †† <i>City of Exeter</i> ...	A. V. Radcliffe, Cmr., R.N.R.	P. C. Wilson, N. Hall, R. C. Rendle.	G. D. White ...	S.	" " "	" " 3.4.39 to 9.6.39 15.8.39	
089 *† <i>City of Hereford</i>	R. A. Grove ...	T. F. Symons, I. M. McBeath, A. J. Tyrell.	J. R. Birch ...	M.	" " "	" " 5.5.39 to 19.7.39 21.8.39	
237 †† <i>City of London</i> ...	R. P. Longstaff ...	W. G. McCulloch, G. Stewart, R. Steadman.	O. A. Read ...	S.	" " "	" " 21.5.39 to 9.7.39 20.7.39	
256 *† <i>City of Lyons</i> ...	T. Cooper ...	A. Spence, G. H. Watkins, R. J. Bushell.	H. E. Kendall ...	M.	" " "	" " 22.7.39 to 5.8.39 26.8.39	
066 †† <i>City of Nagpur</i> ...	D. L. Lloyd ...	N. Groundwater ...	J. Powell ...	S.	" " "	" " 11.6.39 to 24.8.39 28.8.39	
074 †† <i>City of Paris</i> ...	A. N. Hogg ...	J. Andrew, I. Stewart	G. Fulton ...	"	" " "	" " 26.7.38 to 13.5.39 26.6.39	
271 *† <i>City of Roubaix</i>	H. G. T. Booth ...	T. M. Williams, C. G. E. Griffith, F. C. O'Neill.	V. H. Davis ...	M	" " "	" " 20.2.39 to 13.4.39 5.6.39	
272 *† <i>City of Singapore</i>	T. R. Watkins ...	L. E. Brook, S. G. Hider, J. M. Hatherley.	H. Cant... ..	"	" " "	" " 22.6.39 to 23.7.39 12.8.39	
035 *† <i>City of Sydney</i> ...	W. Hill ...	N. F. R. Gill, R. Hall, E. Robertson.	E. R. Gledhill ...	"	" " "	" " 10.5.39 to 2.8.39 5.8.39	
167 *† <i>City of Tokio</i> ...	G. Burton ...	J. H. Aldridge, R. K. Walker, M. L. Herman.	J. C. Creighton	S.	" " "	" " 2.4.39 to 14.8.39 19.8.39	
136 *† <i>City of Winchester</i>	W. S. Coughlan ...	H. Laird, W. Scott-Craig, H. Lewis.	M. J. Farrelly ...	"	" " "	" " 4.5.39 to 4.6.39 20.6.39	
125 *† <i>City of Windsor</i>	E. E. Bulkeley ...	J. Vizer, N. Bradley, H. G. White.	P. T. McKinlay	"	" " "	" " 2.6.39 to 2.8.39 11.8.39	
027 *† <i>Clan Farquhar</i> ...	C. E. O'Byrne ...	F. Sherratt, C. J. Harris, J. Browne.	A. MacIennan ...	M.	Clan Line Steamers, Ltd.	" " 19.2.39 to 28.3.39 3.4.39	
050 *† <i>Clan Macalister</i>	R. W. Mackie...	P. Philip, E. G. G. Mobbs, K. Banks, A. J. Brina.	C. J. Andrews ...	S.	" " "	" " 1.5.39 to 13.7.39 17.7.39	
222 *† <i>Clan Macdougall</i> , M.S.	C. C. Parfitt ...	G. Matheson, K. W. Davies, S. Brett.	H. A. Croft ...	"	" " "	" " 15.5.39 to 24.6.39 18.7.39	
101 *† <i>Clan Macfarlane</i>	H. Andrews ...	A. Macdonald, R. G. Gardener, C. Rodger.	A. Taylor ...	"	" " "	" " 29.6.39 to 22.7.39 27.7.39	
118 *† <i>Clan Macindoe</i> ...	A. G. Macpherson ...	N. M. Birtley, K. Simson, W. R. Williamson.	E. T. Shillabeer	"	" " "	" " 29.5.39 to 23.7.39 5.8.39	
082 *† <i>Clan Macnair</i> ...	E. Coulthart ...	G. Roberts, E. M. Crawley ...	G. O. Hawke ...	"	" " "	" " 15.5.39 to 6.8.39 12.8.39	
255 *† <i>Clan Maeneil</i> ...	H. E. G. Scott Smith, O.B.E., R.D., Lieut.-Commr., R.N.R.	H. Whitehead, R. S. Stewart, M. G. Deschamps, A. Hogg.	W. Hayes ...	"	" " "	" " 26.6.39 to 17.7.39 14.8.39	
001 *† <i>Clan Macphee</i> ...	C. F. Paul ...	R. C. Steel, T. Gillies ...	W. Scott ...	"	" " "	" " 21.5.39 to 31.7.39 10.8.39	
168 *† <i>Clan Mactaggart</i>	F. W. Last ...	F. Chisholm ...	P. Cormack ...	"	" " "	" " 15.4.39 to 16.7.39 25.7.39	
261 *† <i>Clan Mactavish</i>	R. J. W. Bennett ...	A. Clark, S. R. Woods, J. E. Clayton.	A. M. Forbes ...	"	" " "	" " 8.6.39 to 13.8.39 21.8.39	
002 *† <i>Clan Macwhirter</i>	E. E. Arthur ...	A. Woodall, G. Bowen, C. D. Mavitty.	D. M. Dixon ...	"	" " "	" " 23.6.39 to 13.8.39 23.8.39	
109 *† <i>Clan Morrison</i> ...	B. A. Hardinge ...	J. Thomas, J. H. Holman, D. Carmichael, F. C. Doyle.	D. Glen ...	"	" " "	" " 25.6.39 to 1.8.39 8.8.39	
214 *† <i>Clement</i> ...	F. C. P. Harris...	C. Smethurst, H. J. Gill ...	G. W. Jennings	"	Booth S.S. Co., Ltd.	" " 23.6.39 to 13.8.39 22.8.39	

Name of Vessel	Captain.	Observing Officers	Senior Wireless Operator.	Meteoro-logical Instrument Equip-ment.	Owners.	Logs, Registers, or Records Contributed up to 6.9.39	Date Last Return Received.
041 *† Clydebank, M.S.	W. Broome ...	E. F. Brownlee, J. Body, E. W. Dibble.	N. W. Goodman	S.	A. Weir & Co. ...	Fms. 911 & 138 8.6.39 to 30.6.39	14.8.39
084 *† Clydefield, M.S. (tank)	D. A. Law ...	M. H. Hooker, H. L. Humphries, W. C. Moore.	M. J. Little ...	"	Hunting & Son, Ltd.	" " 5.5.39 to 13.7.39	18.7.39
016 *† Comtiebank, M.S.	R. C. Jones ...	M. Maughan, W. Thompson, B. Brumby.	A. S. G. Broad-bent.	"	A. Weir & Co. ...	" " 2.3.39 to 15.5.39	30.5.39
Como ...	E. S. Green ...	C. Newton ...	"	M.L.	Ellerman's Wilson Line	Fm. 915 17.12.38 to 12.5.39	25.5.39
185 †† Comorin ...	A. W. Drew, R.D., R.N.R.	P. C. Reid, D. A. W. Bell, R. H. Turner.	E. Howard ...	M.-S	P. & O. S.N. Co.	Fms. 911 & 138 19.3.39 to 21.6.39	28.6.39
069 *† Consuelo ...	D. H. Carrom ...	C. E. Holland, J. B. Dunkley, F. Ellison.	J. Greer ...	S.	Ellerman's Wilson Line, Ltd.	" " 20.7.39 to 11.8.39	17.8.39
198 *† Contractor ...	J. Bellet ...	T. E. Steel, G. Davies, H. Proctor.	J. A. Watt ...	M.-S.	T. & J. Harrison	" " 23.6.39 to 19.8.39	23.8.39
258 †† Corfu ...	J. K. Chaplin, R.D., Capt., R.N.R.	N. W. Eade, C. W. Pierce, J. T. Sheffield.	R. V. McCreath	"	P. & O. S.N. Co.	" " 12.2.39 to 18.5.39	23.5.39
*† Corrientes ...	J. McBrown ...	H. Parrish ...	J. Limpitlaw ...	S.	Donaldson Line ...	" " 18.6.39 to 13.7.39	17.7.39
191 *† Crispin ...	W. W. Torkington ...	G. G. Roberts, T. E. Williams	D. Edwards ...	"	Booth S.S. Co., Ltd.	" " 5.6.39 to 2.8.39	14.8.39
036 *† Cumberland ...	E. A. Burton ...	N. L. Warren, L. G. Hollis, H. C. Douglas.	A. A. Lees ...	"	Federal S.N. Co., Ltd.	" " 10.4.39 to 31.7.39	10.8.39
274 *† Custodian ...	D. A. McCallum ...	W. Brown ...	C. K. Thornton	"	T. & J. Harrison	" " 17.6.39 to 18.8.39	23.8.39
240 *† Dalrym ...	D. J. Jones ...	J. Thompson ...	"	"	Campbell Bros. & Co.	" " 13.2.39 to 21.6.39	24.7.39
219 *† Dearne ...	R. H. Sherwood ...	R. Wise, V. R. Richardson, C. Hoff.	R. D. Akers ...	"	L.M. & S. Rly. ...	" " 20.5.39 to 5.8.39	12.8.39
194 *† Deebank ...	G. S. Reed ...	S. Forsyth, B. Beavis ...	M. McGowan ...	"	A. Weir & Co. ...	" " 7.3.39 to 23.6.39	26.6.39
204 †† Derbyshire, M.S.	G. L. English ...	A. Young, H. Davis, G. Allen.	D. McLellan ...	"	Bibby Bros. & Co.	" " 7.5.39 to 15.7.39	18.7.39
*† Deucalion, M.S.	W. Beswick, D.S.C., Commr., R.N.R.	H. J. Summers, A. R. Davidson, A. J. Froukes.	C. Gardman ...	"	A. Holt & Co. ...	" " 30.4.39 to 17.8.39	23.8.39
061 *† Devon ...	H. Goater ...	H. C. Turner, D. Bunn, T. Salmon.	H. Ridgeway ...	M.-S.	British India S.N. Co., Ltd.	" " 4.4.39 to 21.8.39	24.8.39
*† Diplomat ...	J. J. Egerton ...	W. Rowland-Jones, W. P. Baker.	J. Hammond ...	M.	T. & J. Harrison	" " 13.2.39 to 13.4.39	18.4.39
216 †† Dominion Monarch, M.S.	W. Hartman ...	W. Williams, J. McNichol, J. L. Forster	J. P. Cary ...	S.	Shaw Savill & Albion Ltd.	" " 19.2.39 to 1.6.39	8.6.39
096 *† Don ...	J. Blackburn ...	A. P. Milner ...	"	"	Associated Hum-ber Lines.	" " 27.5.39 to 30.8.39	15.8.39
058 *† Dorset, M.S.	C. Matthews ...	J. R. Vincent, H. J. Brownings, C. B. Poole.	M. G. Horlett ...	M.	Federal S.N. Co., Ltd.	" " 15.11.38 to 13.12.38	21.1.39
142 †† Duchess of Atholl	W. B. Coyle, R.D., Commr., R.N.R.	C. H. Belton, N. W. Whitfield, R. Kenton.	E. Murphy ...	M.-S.	Canadian Pacific Steamships, Ltd.	{ " " 11.6.39 to 11.7.39 22.7.39 Fm. 912 8.7.39 to 12.7.39 22.7.39 Fms. 911 & 138 28.3.39 to 3.8.39 9.8.39 Fm. 912 28.3.39 to 3.8.39 9.8.39 Fms. 911 & 138 21.5.39 to 21.6.39 1.7.39 Fm. 912 21.5.39 to 21.6.39 1.7.39 Fms. 911 & 138 4.6.39 to 14.8.39 17.8.39 Fm. 912 4.6.39 to 14.8.39 16.8.39	
152 †† Duchess of Bedford.	W. G. Busk-Wood, R.D., Commr., R.N.R.	F. Falconer, R. Burns, R. W. Barker.	A. O'Sullivan ...	"	"	Fms. 911 & 138 9.5.39 to 21.8.39 2.9.39 " " 12.6.39 to 10.8.39 17.8.39 " " 15.5.39 to 23.7.39 27.7.39 " " 1.6.39 to 2.7.39 15.7.39 Fm. 912 8.4.39 to 23.5.39 25.5.39	
151 †† Duchess of Richmond.	H. A. Moore, R.D., Capt., R.N.R.	E. D. Morrison, J. Norfolk, E. Ford.	I. F. Yorston ...	"	"	Fms. 911 & 138 19.6.39 to 12.8.39 21.8.39	
143 †† Duchess of York	C. Richardson ...	W. A. Stanley, J. A. Dale, F. W. Roberts.	J. W. Potts ...	"	"		
*† Duke of Argyll ...	J. W. Richmond ...	W. Bleakley, S. Green ...	G. Poulton ...	S.	L.M. & S. Rly. ...		
*† Duke of Lancaster	E. B. Sergeant ...	J. Irwin ...	A. N. Davies ...	"	"		
*† Duke of Rothesay	F. C. Raven ...	A. E. Willmott, J. Abram ...	G. Pilling ...	"	"		
*† Dunaff Head ...	A. Niblock ...	J. McClelland, A. Mont-gomery, J. Quail.	T. Frazer ...	"	G. Heyn & Son ...		
098 †† Dunbar Castle, M.S.	H. A. Causton ...	J. J. Smith, R. H. Pope ...	H. G. Liggins ...	"	Union-Castle Mail S.S. Co., Ltd.	Fms. 911 & 138 19.6.39 to 12.8.39 21.8.39	
193 †† Dunnottar Castle, M.S.	R. Harris ...	D. Robertson, A. Lawson ...	R. Brew ...	"	"	" " 4.6.39 to 31.7.39 3.8.39	
043 †† Dunvegan Castle, M.S.	S. F. Newdigate ...	R. G. Anderson, A. H. Parry, G. R. Williams, C. W. Armstrong, W. Anderson.	E. H. Pearce ...	"	"	" " 16.2.39 to 18.7.39 10.8.39	
093 †† Durban Castle, M.S.	C. Lovegrove ...	R. Pargatez, P. Clissold, A. J. Tront.	A. Hunter ...	"	"	" " 1.7.39 to 26.8.39 29.8.39	
064 *† Durham, M.S.	C. R. Pilcher ...	E. Porter, H. H. Mackillican, M. D. Hutby.	F. Shaw ...	M.-S.	Federal S.N. Co., Ltd.	" " 22.11.38 to 1.4.39 11.4.39	
*† Eastern Coast ...	W. Quirk and H. Cameron	E. Greenall, J. Blaney ...	"	M.L.	Coast Lines, Ltd.	Fm. 915 21.10.38 to 30.5.39 16.8.39	
107 *† El Argentino, M.S.	C. R. Fost ...	H. N. Sherwell, A. M. Lackie, A. McEwan.	L. Gledhill ...	M.-S.	Furness Lines ...	Fms. 911 & 138 17.6.39 to 16.8.39 18.8.39	
091 †† Empress of Australia.	A. R. Meikle, C.V.O., R.D., Capt. R.N.R.	H. Roberts, W. Howell, I. R. Findlayson.	J. Butler ...	S.	Canadian Pacific Steamships, Ltd.	{ " " 7.6.39 to 25.8.39 28.8.39 Fm. 912 21.5.39 to 24.5.39 30.5.39 Fms. 911 & 138 4.6.39 to 16.8.39 22.8.39 Fm. 912 4.6.39 to 16.8.39 22.8.39 Fms. 911 & 138 11.6.39 to 18.8.39 22.8.39	
034 †† Empress of Britain.	C. H. Sapsworth ...	R. J. Barlow, J. Roche, E. W. Newell.	W. N. Holmes ...	"	"		
119 †† Erin ...	R. C. Vigurs ...	R. De Gruchy, M. N. Faichney, V. Hill.	T. Bruce ...	"	Erin S.S. Co., Ltd.	" " 11.6.39 to 18.8.39 22.8.39	
010 *† Eros (t-e) ...	R. N. Shore ...	J. T. C. Vigurs, H. T. Green, H. E. Lascelles.	W. J. Burnett ...	"	"	" " 26.5.39 to 5.8.39 11.8.39	
169 *† Essex, M.S.	F. N. Wyatt ...	H. P. Williamson, I. R. Griffiths, A. H. Robertson.	S. K. Jones ...	M.	Federal S.N. Co., Ltd.	" " 8.3.39 to 19.6.39 22.7.39 Fm. 912 21.3.39 to 2.4.39 22.7.39	
199 *† Ettrickbank	T. Watkins ...	E. G. Stevenson, J. Charlesworth, O. Brown.	F. V. Harford ...	S.	A. Weir & Co., Ltd.	Fms. 911 & 138 16.4.39 to 6.7.39 4.9.39	
Explorer ...	D. C. Sandison ...	A. E. Bruce, J. Craig ...	"	M.L.	Scottish Fishery Board	Fm. 915 8.3.39 to 5.8.39 9.8.39	
*† Explorer ...	A. J. Meek ...	C. V. Watts, R. E. Harvey ...	R. C. Stone ...	M.	T. & J. Harrison	Fms. 911 & 138 20.6.39 to 27.8.39 5.9.39	
*† Fordsdale ...	D. Christie ...	E. Warren, C. Harvey, W. Stott.	R. Jones ...	"	Shaw, Savill & Albion	" " 29.9.38 to 11.1.39 19.1.39	
239 *† Foylebank, M.S.	S. J. Smith ...	J. W. Hart, J. W. Greig, W. M. Reade.	R. O'Shea ...	S.	A. Weir & Co. ...	Fms. 911 & 138 17.3.39 to 7.8.39 11.8.39	
173 †† Franconia ...	J. G. Bissett, R.D., R.N.R.	J. Evans, J. G. Bradley, O. O. Stewart.	J. Harvey ...	"	Cunard White Star, Ltd.	" " 19.6.39 to 25.6.39 19.8.39	
*† Geddington Court	G. Blacklock ...	A. Peacock ...	G. A. Clarke ...	"	United British S.S. Co., Ltd.	" " 5.5.39 to 7.7.39 11.7.39	
186 †† Georgic, M.S.	E. E. Edkin, O.B.E., R.D., R.N.R.	M. Kingscott, P. W. Silson, E. Davies.	A. Schofield ...	"	Cunard White Star Co., Ltd.	{ " " 29.5.39 to 12.8.39 16.8.39 Fm. 912 28.5.39 to 12.8.39 16.8.39 Fms. 911 & 138 11.1.39 to 30.4.39 15.5.39	
234 *† Glaucus ...	E. W. Berry ...	A. Letty, J. C. Thomas, I. R. Phillips.	J. F. Denson ...	"	A. Holt & Co. ...	" " 11.1.39 to 30.4.39 15.5.39	
026 *† Glenbank, M.S.	J. Macdonald ...	W. J. H. Pearce, D. S. Morrison, A. T. Dickinson.	A. C. Chamberlain	"	A. Weir & Co. ...	" " 24.5.39 to 18.7.39 28.8.39	
203 †† Gretafield (tank)	E. Derriks ...	J. M. Waters, D. Dallas, J. Mallaburn.	J. Taylor ...	"	Hunting & Son ...	" " 26.5.39 to 4.7.39 24.7.39	
218 *† Harmonides ...	H. Evans ...	J. K. Gorrie, J. L. Jones ...	C. S. Sinclair ...	"	Houston Line, Ltd.	" " 16.5.39 to 6.8.39 23.8.39	

V

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteoro-logical Instrument Equip-ment.	Owners.	Logs, Registers, or Records Contributed up to 6.9.39.	Date Last Return Received.
171 *† Hertford ...	T. J. C. Tuckett ...	R. T. Birkin, J. T. Alderman, E. S. Kelso.	W. Iveson ...	S.	Federal S.N. Co., Ld.	Fms. 911 & 138 13.3.39 to 9.7.39	27.7.39
*† Hibernia ...	J. R. Bulmer, M.B.E....	W. Crawford ...	D. T. Rockey ...	"	L.M. & S. Railway	" " 20.2.39 to 12.5.39	23.5.39
182 †† Highland Brigade, M.S.	R. G. Clayton, R.D., Capt., R.N.R.	E. Card, T. Frazer ...	E. A. Reynolds...	M.-S.	Royal Mail Lines, Ld.	" " 8.5.39 to 27.6.39	30.6.39
116 †† Highland Chieftain, M.S.	J. Hodges, R.D., Commr. R.N.R.	J. Green, Q. H. Ballarde, E. M. Quarrie.	T. Desboro ...	"	" " "	" " 19.6.39 to 8.8.39	10.8.39
099 †† Highland Monarch, M.S.	S. Weller ...	H. Cormick, H. D. Bowler, W. C. Hamlyn, J. Rouse.	E. F. Weather-head.	"	" " "	" " 5.6.39 to 25.7.39	31.7.39
230 †† Highland Patriot, M.S.	R. H. Robinson ...	G. E. Leech, A. Dodd, E. George.	M. Carpenter ...	"	" " "	" " 22.5.39 to 11.7.39	14.7.39
250 †† Highland Princess, M.S.	A. R. Murley ...	W. E. Gelling, J. M. Phillips, W. A. Weeks.	L. P. Thayne ...	"	" " "	" " 26.4.39 to 12.6.39	26.6.39
*† Hopecrown, M.S.	R. W. D. Gilbertson ...	W. A. Hall, T. Finnigan, R. Young.	C. Walsh ...	S.	A. Stott & Co., Ld.	" " 10.7.39 to 3.8.39	28.8.39
*† Hopepeak, M.S.	J. Hardy ...	J. Marshall, R. Atkinson, E. G. Painter.	W. L. Cowan ...	"	" " "	" " 16.5.39 to 27.7.39	11.8.39
*† Hopestar ...	J. Steward ...	E. Denham, R. G. Wynd ...	W. Kellier ...	"	" " "	" " 7.5.39 to 20.7.39	28.8.39
260 *† Inanda ...	W. A. Short ...	E. P. Simmons, D. N. Matthews, J. W. Laverack.	E. J. Cook ...	"	T. & J. Harrison	" " 22.5.39 to 23.8.39	31.8.39
*† Inkosi ...	W. H. Gibbings ...	W. L. Ashton, J. Steward, G. J. Crispin.	R. Francis ...	M.-S.	" " "	" " 19.6.39 to 24.7.39	27.7.39
144 *† Inverbank, M.S.	A. C. Loads ...	F. H. Lamming ...	G. Cavage ...	S.	A. Weir & Co. ...	" " 30.5.39 to 12.7.39	21.8.39
*† Isle of Guernsey	F. W. Hodges ...	G. Pearce, D. Danny, R. Large.	T. Barron ...	"	Southern Ry. ...	" " 3.4.39 to 18.8.39	19.8.39
*† Isle of Jersey ...	H. N. Golding, F. W. Hodges.	H. Willow, H. F. Bremilly ...	T. Stubbs ...	"	" " "	" " 12.5.39 to 10.7.39	11.7.39
*† Isle of Sark ...	R. J. Large ...	C. C. Durley ...	T. Stubbs ...	"	" " "	" " 12.4.39 to 15.5.39	5.6.39
269 *† Icion ...	R. G. Sturrock ...	J. J. Williams, J. G. Sibley, L. Richards.	S. Smalley ...	M.L.	A. Holt & Co. ...	Fm. 915 3.1.39 to 5.7.39	30.8.39
226 *† Japanese Prince, M.S.	C. S. Smith ...	N. Gale, C. J. P. Martin, C. N. Clare.	T. V. Goodman	"	Furness Lines ...	" " 17.3.39 to 5.5.39	14.6.39
262 *† Kemmendine ...	R. B. Reid ...	W. D. Tulloch, R. R. Simpson, J. S. Whitehead.	W. Clark ...	M.-S.	P. Henderson & Co., Ld.	Fms. 911 & 138 15.5.39 to 26.7.39	31.7.39
190 *† Kenbane Head ...	J. R. Moore ...	R. J. Kidd, J. Greene ...	J. Murray ...	S.	G. Heyn & Sons	{ Fm. 912 18.6.39 to 24.7.39 Fms. 911 & 138 18.6.39 to 24.7.39 Fm. 912 15.6.39 to 18.7.39 10.4.39 to 21.5.39	2.8.39 2.8.39 24.7.39 30.5.39
*† Kingswood ...	F. Fenn... ..	W. B. Thompson, W. J. Wilson.	J. Duncan ...	"	Joseph Constantine Line, Ld.	{ Fm. 912 18.6.39 to 24.7.39 Fms. 911 & 138 15.6.39 to 18.7.39 Fm. 912 10.4.39 to 21.5.39	2.8.39 24.7.39 30.5.39
*† Kyno ...	J. W. Grimston ...	F. Eglin, C. Tutty, B. Waldie	T. G. Jones ...	"	Ellerman's Wilson Line.	Fms. 911 & 138 11.6.39 to 19.7.39	28.7.39
147 †† Laconia ...	G. G. Illingworth, R.D., Capt., R.N.R.	J. A. S. Halcrow, W. J. Forster, H. L. de Legh.	W. M. McArdley	"	Cunard White Star, Ld.	{ Fms. 911 & 138 29.5.39 to 8.8.39 Fm. 912 29.5.39 to 8.8.39	11.8.39 10.8.39
150 †† Lancastria ...	C. G. Illingworth, R.D., Capt., R.N.R.	... ..	... ..	"	" " "	... ..	...
267 *† Lassell, M.S. ...	G. Scott ...	T. J. Sweeney, C. E. Legg, J. F. Parr.	T. S. Allen ...	"	Lamport & Holt Line, Ld.	Fms. 911 & 138 25.4.39 to 22.7.39	28.7.39
083 *† Lautaro, M.S. ...	C. Stowe ...	S. Armitage ...	C. R. Pill ...	M.	Pacific S.N. Co. ...	" " 25.10.38 to 28.2.39	6.3.39
251 *† Leverbank, M.S.	H. A. Jones ...	D. Robertson, D. Harrison ...	P. L. O'Byrne ...	S.	A. Weir & Co. ...	" " 14.2.39 to 19.7.39	21.8.39
†† Llandaff Castle...	H. Maxwell-Hart ...	J. Elder ...	E. Stevens ...	"	Union Castle Mail S.S. Co., Ltd.	" " 10.6.39 to 15.8.39	18.8.39
140 †† Llandovery Castle	R. T. Smailes ...	E. Everitt ...	S. Kilmister ...	"	" " "	" " 13.5.39 to 19.7.39	27.7.39
097 †† Llangibby Castle, M.S.	F. A. Smyth, R.D., Lt.-Commr., R.N.R.	A. P. Ramsay ...	R. Batchelor ...	"	" " "	" " 23.4.39 to 21.6.39	26.6.39
†† Llanstephan Castle	... ..	... ..	... ..	"	Union Castle Line,	... ..	...
*† Lochavon, M.S....	F. Cook ...	... ..	... ..	M.-S.	Royal Mail Lines, Ld.	... ..	...
137 *† Logician ...	W. Jones ...	G. T. Rendon, G. H. Howard, D. V. Jones.	W. C. Davies ...	M.	T. & J. Harrison	Fms. 911 & 138 27.3.39 to 16.6.39	28.6.39
008 *† Losada, M.S. ...	J. V. Langford...	J. H. Allenby, J. Williams, R. T. Goodwin.	J. Coyle ...	"	Pacific S.N. Co. Ld.	" " 14.6.39 to 28.6.39	6.7.39
062 *† Mahia ...	W. T. Thompson ...	D. Ashley, E. Vaughan, P. Rylands.	J. Lorimer ...	S.	Shaw, Savill & Albion Co., Ld.	" " 29.1.39 to 7.6.39	13.6.39
014 *† Mahronda ...	A. Anderson ...	I. A. McLaren, J. B. Newman, H. Fosbrooke.	W. H. Ritch ...	"	T. & J. Brocklebank, Ld.	" " 17.5.39 to 22.6.39	26.6.39
015 *† Mahsud ...	D. Ison ...	P. D. McKenzie, H. Simpson, M. R. Melville.	R. Burton ...	"	" " "	" " 21.5.38 to 13.8.38	20.8.38
018 *† Makalla ...	J. Greenall ...	S. Slade, A. Nelson, K. Sabin	H. C. Norman ...	"	" " "	" " 19.6.39 to 12.7.39	24.7.39
236 *† Malayan Prince, M.S.	J. Smith ...	J. A. Reeves, W. R. Harries, B. M. Collard	K. B. Harris ...	M.L.	Furness Lines ...	Fm. 915 13.1.39 to 21.4.39	18.5.39
195 †† Maloja ...	R. C. Dene ...	L. J. Brown, A. G. Stansfield, S. Kingsley Edwards.	A. F. Babbage ...	M.-S.	P. & O. S.N. Co.	Fms. 911 & 138 29.4.39 to 2.8.39	8.8.39
*† Manchester Brigade	F. R. Osborne ...	F. Downing, G. S. Jones, N. B. Lane.	H. Cowan ...	S.	Manchester Liners Ld.	" " 14.7.39 to 21.8.39	30.8.39
060 *† Manchester Citizen	G. M. Mitchell ...	N. C. Donovan, A. A. Meyer, W. Hine.	C. B. Morton ...	"	" " "	" " 11.6.39 to 18.8.39	22.8.39
179 *† Manchester Commerce	J. E. Riley ...	A. Hutton, W. H. Downing, M. Barnes.	J. J. Hand ...	"	" " "	{ Fm. 912 14.5.39 to 10.6.39 Fms. 911 & 138 14.5.39 to 22.7.39 Fms. 911 & 138 27.5.39 to 6.7.39	16.6.39 31.7.39 1.8.39
187 *† Manchester Division	E. E. Bonnard ...	A. Starmer, W. W. King ...	C. B. Moreton ...	"	" " "	" " 17.6.39 to 25.8.39	4.9.39
009 *† Manchester Progress	P. Linton ...	G. S. Swales, H. Dobson, A. H. Rigby.	J. J. Hand ...	"	" " "	" " 28.5.39 to 3.8.39	9.8.39
253 *† Manchester Regiment	E. W. Raper ...	H. Boyce, G. B. Harrington, M. G. Stevens.	W. H. Critchley	"	" " "	" " 25.5.39 to 30.7.39	11.8.39
146 *† Mandasor ...	A. S. Bain ...	D. M. Edwards, J. B. Lee, W. Robertson.	R. A. S. Gibbons	M.-S.	T. & J. Brocklebank, Ld.	" " 23.6.39 to 19.7.39	28.7.39
213 *† Mashobra ...	P. Taylor ...	A. R. Gimblett, J. A. Bell, B. S. Springer.	P. Rowley ...	"	British India S.N. Co., Ld.	" " 11.6.39 to 13.7.39	4.8.39
235 †† Mataroa ...	— Jackson ...	R. Grant, — Snaith, — Forgham.	— Bloxham ...	S.	Shaw, Savill & Albion Co., Ld.	" " 25.5.39 to 30.7.39	11.8.39

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed up to 6.9.39.	Date Last Return Received.
023 *† <i>Matheran</i> ...	W. T. King ...	L. E. Jeans, J. P. Brand, W. Couling.	J. Edmond ...	M.-S.	T. & J. Brocklebank, Ltd.	Fms. 911 & 138 12.6.39 to 30.8.39	6.9.39
024 *† <i>Matra</i> ...	J. F. Butterworth ...	F. Moore, N. B. Exley, J. P. Hewitt.	G. J. Steers ...	"	"	" 11.7.39 to 3.8.39	11.8.39
244 †† <i>Mauretania</i> ...	A. T. Brown, R.D., R.N.R.	R. Conway, W. E. Warwick, F. Parker.	F. Clark ...	S.	Cunard White Star, Ltd.	" 17.6.39 to 17.8.39	4.9.39
126 *† <i>Melmore Head</i> ...	E. W. Black ...	W. J. Lenster, G. A. Moore, R. B. Ansell.	P. C. Cahill ...	"	G. Heyn & Son ...	Fm. 912 2.7.39 to 4.8.39	8.8.39
*† <i>Modavia</i> ...	J. S. MacMillan ...	K. Conway ...	"	"	Donaldson Line ...	Fms. 911 & 138 15.6.39 to 12.7.39	18.7.39
131 †† <i>Montcalm</i> ...	D. Pert ...	C. S. Morris, G. Richardson...	J. Biggins ...	M. S.	Canadian Pacific Steamships, Ltd.	" 30.5.39 to 5.8.39	22.8.39
149 †† <i>Montclare</i> ...	W. S. Brown ...	R. McKillop, E. M. Moir, A. Smith.	W. Davies ...	S.	"	" 19.6.39 to 21.8.39	23.8.39
268 †† <i>Montrose</i> ...	H. J. Ferguson, D.S.C.	F. E. Williams, R. Antrabus, E. F. Aikman, W. Ascroft, J. B. Sharkes.	J. Warren ...	"	"	{ Fm. 911 25.6.39 to 11.8.39 Fm. 912 25.6.39 to 10.8.39 Fm. 912 6.7.39 to 21.8.39 Fm. 912 13.7.39 to 21.8.39	15.8.39 15.8.39 23.8.39 23.8.39
164 †† <i>Mooltan</i> ...	H. S. Allen, R.D., R.N.R.	W. H. C. Wood-Roe, F. F. Irons, F. Wilkinson.	H. Williamson	M.-S.	P. & O. S.N. Co.	Fms. 911 & 138 28.5.39 to 29.8.39	5.9.39
196 *† <i>Mulbera</i> ...	W. A. Grant-Pyves ...	L. O. Harborow, T. M. Muir, G. Usher.	I. R. M. Thomas	"	British India S.N. Co., Ltd.	" 15.5.39 to 18.8.39	6.9.39
078 *† <i>Myrtlebank</i> , M.S.	E. T. Evans ...	A. Brown, E. Craig, F. H. Main.	J. A. Browne ...	S.	A. Weir & Co. ...	" 30.12.38 to 6.3.39	24.4.39
*† <i>Nairnbank</i> , M.S.	J. Edward ...	C. Eveningham ...	"	"	"	" 7.5.39 to 28.6.39	9.8.39
227 *† <i>Nardana</i> ...	C. E. Dorkin-White ...	W. Brown, T. Alford, L. Osborne.	S. V. Knight ...	M.	British India S.N. Co., Ltd.	" 27.4.39 to 13.8.39	4.9.39
202 †† <i>Narkunda</i> ...	W. D. C. Smith ...	P. L. Marian, I. M. Sinclair, A. R. Crowse.	C. W. Herbert ...	M.-S.	P. & O. S.N. Co.	" 5.3.39 to 7.6.39	10.6.39
†† <i>Nascopie</i> ...	T. F. Smellie ...	J. C. M. Cotton ...	"	S.	Hudson's Bay Co.	{ Fm. 911 18.6.39 to 28.6.39 Fm. 912 18.6.39 to 28.6.39 Fms. 911 & 138 18.4.39 to 15.7.39	11.7.39 11.7.39 19.7.39
162 *† <i>Nestor</i> ...	J. J. Power ...	H. Haines, W. Angus, R. T. Spinks.	J. Nightingale ...	"	A. Holt & Co. ...	" 26.5.39 to 27.8.39	30.8.39
154 *† <i>Newfoundland</i> ...	J. W. Murphy ...	W. Lutyens, C. H. Kenyon, C. Trenman.	F. Alton ...	"	Furness Lines ...	{ Fm. 912 26.5.39 to 27.8.39	30.8.39
*† <i>Northern Coast</i> ...	H. Cameron, W. Quirk.	A. H. Johnston, L. Williams...	"	M.L.	Coast Lines, Ltd.	Fm. 915 2.9.38 to 17.1.39	20.1.39
181 *† <i>Nova Scotia</i> ...	T. H. Webber ...	J. E. Wilson, J. Warren, R. Crangle.	W. C. Brock ...	S.	Furness Lines ...	{ Fms. 911 & 138 10.5.39 to 13.8.39 Fm. 912 10.5.39 to 13.8.39	15.8.39 15.8.39
243 *† <i>Opawa</i> , M.S. ...	F. S. Hamilton ...	G. H. Goldsbrough, F. E. Mitchell, N. A. Thomas.	H. W. Jackson	"	New Zealand Shipping Co., Ltd.	Fms. 911 & 138 5.7.38 to 21.11.38	29.11.38
172 †† <i>Orama</i> ...	L. V. James, D.S.C. ...	P. G. A. King, R. S. Mortimer, L. C. Sly, G. S. Harris.	"	S.	Orient S.N. Co., Ltd.	" 13.2.39 to 16.5.39	14.6.39
080 *† <i>Orari</i> , M.S. ...	J. G. Almond ...	F. W. Newman, O. Chadwick, A. C. Gale.	A. J. King ...	M.-S.	New Zealand Shipping Co., Ltd.	" 12.2.39 to 15.3.39	28.3.39
246 *† <i>Orbita</i> ...	E. H. Large, R.D., Commr., R.N.R.	F. J. Leicester, J. E. Evans, G. Holt-Hobson.	C. Coleman ...	"	Pacific S.N. Co.	" 23.4.39 to 29.6.39	4.7.39
081 †† <i>Orcades</i> ...	F. R. O'Sullivan ...	S. C. Blair, E. P. Wathen, S. B. Hickman.	T. Edwards ...	"	Orient S.N. Co. ...	" 2.1.39 to 11.5.39	13.5.39
087 *† <i>Orduna</i> ...	H. B. Reece, R.D., Capt., R.N.R.	E. C. Hicks, A. Lang, J. P. Edwards.	W. G. Sutherland	"	Pacific S.N. Co.	" 14.5.39 to 20.7.39	26.7.39
148 †† <i>Orford</i> ...	N. Savage ...	J. E. Purvess, J. R. Grandage	G. Macdonald ...	S.	Orient S.N. Co. ...	" 27.2.39 to 1.6.39	5.6.39
019 †† <i>Orion</i> ...	A. L. Owens, R.D., Capt. R.N.R.	F. R. F. Wilson, H. Barker, T. Williams.	N. A. Boon ...	M.-S.	"	" 30.1.39 to 2.5.39	4.5.39
174 †† <i>Ormonde</i> ...	C. Fox ...	D. G. Charlton, T. S. Hardy, C. Edgecombe.	C. F. Seaton ...	S.	"	" 27.3.39 to 27.6.39	3.7.39
055 †† <i>Oronsay</i> ...	A. E. Nicholls ...	J. Dixon, R. J. Brittain, E. W. Tucker.	P. Darby ...	"	"	" 23.4.39 to 25.7.39	4.8.39
085 †† <i>Orontes</i> ...	G. G. Thorne, R.D., Capt., R.N.R.	K. M. Marson, R. W. Roberts, E. Wilson, E. G. Riddelsdell, H. C. Malir.	M. J. Murphy ...	"	"	" 21.5.39 to 22.8.39	1.9.39
095 *† <i>Oropesa</i> ...	R. E. Dunn, O.B.E. ...	G. Gerrity, A. Lyall, B. King	G. Penketh ...	"	Pacific S.N. Co.	" 31.5.39 to 3.7.39	9.8.39
104 *† <i>Otaio</i> , M.S. ...	H. J. Wilde ...	R. G. Hollingdale, J. A. C. Shalcross, P. A. Underwood.	R. Sangster ...	M.	New Zealand Shipping Co., Ltd.	" 12.5.39 to 11.6.39	19.6.39
156 †† <i>Otranto</i> ...	E. J. Baxter, R.D., R.N.R.	J. O. H. Kirkwood, A. Kidnew, J. Hular.	J. L. Curry ...	S.	Orient S.N. Co. ...	" 20.3.39 to 13.6.39	17.6.39
070 *† <i>Oxfordshire</i> ...	C. Askieson ...	R. H. Jameson, N. Fitch, W. Herbert.	W. Fletcher ...	"	Bibby Bros. & Co.	" 1.7.39 to 26.8.39	1.9.39
044 *† <i>Pacific Exporter</i> , M.S.	J. S. Williamson ...	A. Bailey, J. Anthony, C. Denhorst.	A. W. Hearnden	"	Furness Lines ...	" 6.6.39 to 26.8.39	6.9.39
*† <i>Paris</i> ...	E. A. Biles ...	V. G. English ...	C. Kelley ...	"	Southern Rly. ...	" 21.3.39 to 26.8.39	1.9.39
*† <i>Pilar de Larrinaga</i>	J. V. de A. Chevarria...	"	"	"	Larrinaga S.S. Co., Ltd.	"	"
128 *† <i>Port Auckland</i>	C. A. Robinson ...	R. A. Finch, E. C. Read, J. T. Armitage.	A. B. Cole ...	"	Port Line, Ltd. ...	Fms. 911 & 138 30.3.39 to 9.8.39	15.8.39
*† <i>Port Chalmers</i> , M.S.	W. G. Higgs ...	J. Porter, J. G. A. Dunn, A. J. Richardson.	H. Olding ...	"	"	" 18.4.39 to 27.7.39	2.8.39
*† <i>Port Dunedin</i> ...	A. H. Brown ...	E. N. Howard, O. N. Harries, F. R. Gorman.	P. T. McKinlay	"	"	{ Fms. 911 & 138 9.12.38 to 29.3.39 Fm. 912 9.12.38 to 29.3.39	4.4.39 4.4.39
163 *† <i>Port Gisborne</i> , M.S.	T. Keppins ...	J. G. Thom, R. C. H. Webb...	J. Downie ...	"	"	Fms. 911 & 138 20.2.39 to 10.6.39	20.6.39
*† <i>Port Hunter</i> ...	R. Williams ...	"	"	M.L.	"	Fm. 915 17.12.38 to 21.4.39	26.4.39
*† <i>Port Jackson</i> , M.S.	W. Gilling ...	"	"	S.	"	Fms. 911 & 138 6.1.39 to 22.4.39	3.5.39
*† <i>Port Townsville</i> ...	S. C. Cottell ...	A. G. Russel, R. G. Sharp, H. Clinon.	H. Reeves ...	"	"	{ Fm. 911 6.2.39 to 29.5.39 Fm. 912 29.4.39 to 10.5.39	5.6.39 5.6.39

FLEET LIST

vii

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed up to 6.9.39.	Date Last Return Received.
177 *† Port Wellington	E. O. Thomas ...	L. E. Ring, S. R. Cottell, W. F. Douglas.	T. S. Johnstone	S.	Port Line Ld. ...	Fms. 911 & 138 21.3.39 to 5.7.39	11.7.39
003 *† Port Wyndham, M.S.	W. J. Enright, R.D., Capt., R.N.R.	L. J. Brice, R. W. Nicholl, J. R. Peek.	J. V. Kininmouth	"	" " "	Fms. 911 & 138 21.3.39 to 5.7.39	11.7.39
*† Prague ...	C. Baxter ...	R. H. Wright ...	"	"	L. & N.E. Rly. ...	" " 5.6.39 to 21.8.39	4.9.39
206 †† Pretoria Castle, M.S.	A. E. Castle ...	L. H. Farrow, W. Allan, W. Anson, J. June.	E. A. Shaw ...	"	Union-Castle Mail S.S. Co., Ld.	" " 8.5.39 to 3.7.39	8.7.39
063 *† Queen City	R. V. Arkwright ...	D. Williams, K. Germany, W. D. Boucher.	F. Taylor ...	"	Sir Wm. Reardon Smith & Partners, Ld.	" " 17.4.39 to 26.8.39	1.9.39
263 †† Queen Mary ...	R. B. Irving, O.B.E., R.D., Capt., R.N.R.	A. C. Hanson, N. E. Rees-Potter, G. T. Marr.	A. H. Farman ...	"	Cunard White Star, Ld.	Fm. 912 1.6.39 to 27.8.39	30.8.39
205 †† Rajputana ...	W. A. Catly ...	J. L. Dunkley, E. Cowen, J. Price.	J. A. Skinner ...	M.-S.	P. & O. S.N. Co.	Fms. 911 & 138 5.3.39 to 15.3.39	18.3.39
228 †† Ranchi ...	J. Sparkes ...	J. Johnston, D. S. Charles, L. H. Howard, F. Collinson.	W. Stevenson ...	"	" " "	" " 29.3.39 to 28.6.39	4.7.39
224 †† Rangitane, M.S.	H. L. Upton, D.S.C., R.D., R.N.R.	G. C. Mather, J. R. Vincent, C. D. Pool.	N. J. Hallet ...	"	New Zealand Shipping Co., Ld.	" " 14.1.39 to 12.7.39	24.7.39
217 †† Rangitata, M.S.	E. Holland ...	F. J. Jones, H. Hill, D. Tanner	H. Leedman ...	"	" " "	" " 6.3.39 to 3.6.39	28.6.39
105 †† Rangitiki, M.S.	H. Barnett ...	G. Goldsborough, L. W. Fulcher, A. Gale.	L. Horn ...	"	" " "	" " 16.2.39 to 2.6.39	5.6.39
207 †† Ranpura ...	L. Parfitt ...	R. B. Webster, K. Richardson, F. E. Cox, R. H. Danser.	J. R. C. Johnson	"	P. & O. S.N. Co.	" " 28.5.39 to 28.6.39	31.8.39
071 †† Rawalpindi ...	M. G. Draper, R.D., Commr., R.N.R.	A. P. Godfrey, H. J. Cholerton, M. F. Shute, C. F. Beddoe.	S. W. Sharp ...	"	" " "	" " 23.4.39 to 26.7.39	1.8.39
247 *† Recorder ...	W. Baird ...	F. G. La Hive, G. H. Jolly	R. Starling ...	M.	T. & J. Harrison	" " 7.5.39 to 9.8.39	11.8.39
*† Red Gairnlet, S.T.	W. H. Hicks ...	W. H. Hicks ...	G. G. Gibson ...	S.	Iago Steam Trawling Co. Ld.	" " 2.12.38 to 20.2.39	4.4.39
132 *† Reina del Pacifico, M.S.	A. Ridyard, O.B.E. ...	F. B. Jones, M. Chapman, G. H. Rice, H. Mathews.	J. B. Stone ...	M.-S.	Pacific S.N. Co. ...	" " 28.7.39 to 25.8.39	31.8.39
211 †† Remuera ...	F. W. Robinson ...	J. J. Paterson, R. Cohen, T. Codrington.	J. B. Stockman	S.	New Zealand Shipping Co., Ld.	" " 20.6.39 to 10.8.39	15.8.39
094 †† Rimutaka ...	C. B. Lamb ...	J. Trotter, J. G. Taylor, T. Crossley.	E. Stride ...	M.-S.	" " "	" " 11.3.39 to 26.6.39	13.7.39
139 *† Robert F. Hand (tank).	C. Cruikshank ...	F. J. Hewlett, T. Lloyd Jones, R. MacLraith.	S. C. Baldwin ...	S.	Anglo-American Oil Co., Ld.	" " 28.4.39 to 30.7.39	2.8.39
032 *† Rotorua ...	G. Kinnell ...	R. H. Chapman, I. Norrie, W. Fitzmaurice.	T. S. Owen ...	M.	New Zealand Shipping Co., Ld.	" " 25.6.39 to 20.7.39	24.7.39
*† Royal Sceptre ...	G. Jours ...	P. M. Williams, M. Dodds ...	W. Cameron ...	S.	Hall Bros. ...	" " 1.4.39 to 24.7.39	29.7.39
231 *† Ruahine ...	G. Kinnell ...	K. A. Vasey, C. W. Roberts, D. B. Brittain.	W. Fordham ...	"	New Zealand Shipping Co., Ld.	Fm. 911 6.3.39 to 25.4.39	3.5.39
*† St. Helier ...	R. Pitman ...	T. D. Thomas ...	R. E. Littell ...	"	G.W. Railway ...	Fms. 911 & 138 4.7.38 to 1.11.38	12.11.38
*† St. Julien ...	L. Richardson ...	G. Cartwright ...	E. Trappell ...	"	" " "	" " 27.6.39 to 15.7.39	1.8.39
*† St. Patrick ...	H. C. Bond ...	B. E. Williams ...	H. B. Dyer ...	"	" " "	" " 18.7.39 to 20.7.39	3.8.39
100 †† Samaria ...	R. Sharp, R.D., R.N.R.	R. W. Pickersgill, A. J. Daniels, T. C. Dawson.	T. F. Wyatt ...	"	Cunard White Star, Ld.	" " 30.6.39 to 24.6.39	17.7.39
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