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OCEAN CURRENTS.

NOTES ON OBSERVATION AND USE OF PUBLISHED INFORMATION.

By L. A. BROOKE SMITH, MARINE SUPERINTENDENT.

In previous notes we have given evidence of the steady improvement which is taking place in the observation of set and drift of current. The current charts and accompanying remarks published in "The Marine Observer" since its inception have been compiled mainly with a view to assisting the navigator to anticipate the current he will experience.

In his article "Set and Drift, and the new Dead Reckoning Instruments," Mr. F. S. CLIFFORD tells us how with the use of the Gyro Compass, Automatic Course Recorder and Odograph not only may a more accurate course be steered, but a more perfect record of course steered and distance made through the water be kept.

The first object of the navigator is to make a good course and to do this he may from time to time make small alterations in the course steered to allow for changes in variation, compensation for alterations of course to give way to other vessels and for leeway and heave of the sea. It has been often difficult, if not impossible, to

make a complete record of all such conning and, therefore, to log the exact course steered by compass, and so it often occurs that set and drift cannot be measured and, therefore, is not logged when it is most needed for the purpose of current research.

A number of navigators in the trans-Atlantic trade have expressed their confidence in the superiority of the Gyro compass over the Magnetic compass, but on the other hand navigators in Southern trades, where the magnetic compass has proved more satisfactory, have been guarded in their use of the gyro to replace an "old servant," as Captain T. ANGUS fondly terms the magnetic compass in the "Nautical Magazine," Vol. III., No. 4, page 289.

It is not our purpose to discuss the merits of either compass, but we wish to invite attention to the accurate keeping of the Dead Reckoning in order that the estimate of set and drift may be further improved. In this the description of the gyro automatic course recorder and odograph will give those unfamiliar with these new

instruments food for reflection.

Leeway remains a matter for experienced judgment. To what extent the leewardly drift of a vessel through the water is due to wind and to what extent it is due to heave of the sea, is a matter which requires investigation and even when the drift of a vessel away from the vertical plane, though her fore and aft line to the bed of the sea can be instrumentally measured, as we are led to anticipate by Mr. CLIFFORD, it will still be necessary to separate what is due to current and what is due to leeway.

Captain J. F. RUTHVEN in his recent book "Take care of the Ship,"* draws attention to the tank researches of Professor SUYCHIRO of Japan, who demonstrated from model experiments that rolling induces "drift" as well as "yawing." Captain RUTHVEN points out that in his belief it would be practically impossible to represent in a tank all the influences affecting a ship in a gale and heavy sea, but goes on to say that mariners distinguish between "heave of the sea" and the effect of ocean currents. The writer knows of no one better able to express an opinion with regard to the behaviour of ships from practical experience and a knowledge gained by many years study of ship stability.

We would ponder upon this and Marine Observers will do well, if, when logging set and drift, they make due allowance as experience tells them for leeway and heave of the sea, for all we can do in the Marine Division is to make computations from the data you supply.

Quarterly Current Charts, Channel to Cape St. Vincent.

In this number we publish the second of these charts which have been compiled with a view to giving information of the strength and frequency of set and drift of current as well as the mean; also the

* "Take care of the Ship" embracing Speed and Consumption, Stability and Trim, Tactical Diameter and Collision, Practical Rules and Examples for use in the Royal and Merchant Navies, by J. F. RUTHVEN. Published by J. D. POTTER, price 10s. net.

most likely components of set which may be experienced with winds from different directions, which may be used in conjunction with synoptic charts as suggested in "Wireless and Weather, an Aid to Navigation," Chapter IX, "Wind and Set and Drift of Current," Vol. I, No. 9. As already stated, observation and record of current is steadily improving; indeed, the Corps of Voluntary Marine Observers is to be congratulated upon the very marked improvement which they have effected in current observation during the last few years.

But are we making full use in navigation of the knowledge which this improved observation is giving us through the medium of "The Marine Observer"?

As the new charts and improved information are published it must largely lay with navigators to reap the benefit and much will depend upon how the invitation extended in the concluding chapter of "Wireless and Weather," Vol. I, No. 12, is received and used. We therefore invite the renewed attention of Marine Observers to the method advocated in the above-mentioned chapters with the advent of more complete charts now offered in a region where there are always a sufficient number of regular observing ships for the purpose of providing each other with sufficient synchronised data by wireless.

These charts are constructed in a similar manner to that published for the month of September in Vol. I, No. 9. We need not therefore repeat the description except that it should be observed that they are for quarterly periods and that it has been necessary to note any marked peculiarity found in a month within the quarter.

When the four quarterly charts are completed and published we hope to be able to remark further upon these peculiarities. Meanwhile, Marine Observers will be interested to hear that it is hoped in 1926 to complete charts for the routes from the Latitude of Cape St. Vincent to Cape Blanco and to commence the trans-North Atlantic Tracks in which we shall be helped with data collected by our friend Lieutenant Commander VAN RIEL, R.H.M., of Holland, observed in Dutch ships, thus benefiting by international co-operation.

SET AND DRIFT, AND THE NEW D.R. INSTRUMENTS.

By F. S. CLIFFORD, MASTER MARINER.

THE usefulness of a drift bottle for ascertaining set and drift is proportional to the size, for the reason that unless its dimensions are sufficient to enable both surface and under currents to affect the bottle it is incapable of supplying the information required for the better navigation of a deep draught vessel. As it is obviously impracticable for a bottle to be used representing even the depth of the submerged portion of a hull of a small vessel, it seems that the only remaining means of acquiring sufficient ocean current data is by comparing the position by dead reckoning with the position by observation. Since, however, it is well established that inaccuracies in the former are frequently of considerable magnitude, it will be appreciated that any instrument or apparatus which will enhance the precision of a ship's position by dead reckoning must *ipso facto* increase our real knowledge of current phenomena.

There can be little doubt that the continuation of research work and the accompanying skill of the engineer will make available, in course of time, a gyroscopical instrument capable of recording the drift of a vessel away from the vertical plane through her fore and aft line to the bed of the sea. This is by no means a vision, but as it is the intention to deal with apparatus actually available it must for the moment be left out of consideration.

Until the advent of the gyro compass and its auxiliaries, efficient steering was limited to the standing order "see that a good course is made," and the due fulfilment of this, partly by an occasional glance at the compass card by the officer-of-the-watch, but principally by the helmsman on whom rested a responsibility out of all proportion to his rating.

In order to show the assistance a gyro compass can be to accurate dead reckoning apart from the allowance of leeway—and consequently the calculation of set and drift—it is unnecessary to explain the theory underlying its operation, yet it will be well to remind the

reader that the fundamental difference between it and the magnetic compass lies in the knowledge that each depends on forces at variance with the other.

In the case of the magnetic compass, the direction-seeking qualities depend on the varying and feeble magnetic intensity inherent within the earth, and its practical application is limited to magnets of small dimensions by reason of their influence on adjacent masses of metal and the counter evil effect on the compass. With the gyro compass, the directive force is dependent on (a) the angular velocity of the earth about its polar axis; (b) the speed of rotation of the gyro wheel; and (c) the mass of the wheel. Consequently, the first being the premier in importance and fixed in amount, and the remaining two according to the particular requirements of the designer, it is obvious that the gyro compass can have direction giving properties of almost any value. Given, then, a gyro compass with high directive force and slow oscillating period (usually 87 minutes for a complete oscillation), the liveliness or sluggishness, inherent in all magnetic compasses, cannot arise, with a result that improved steering becomes apparent since the necessity for the Q.M. to keep one eye on the compass and the other on the ship's head—a difficult matter in a modern wheel-house and at night—is no longer required. Such may be termed the initial assistance towards improved steering—which is reflected in the more accurate determination of position by dead reckoning—as apart from the advantage of true north indication.

The next stage leads to the automatic course recorder, FIGURE 1, which primarily consists of an ordinary repeater compass motor plus clock-like mechanism to drive the chart paper, according to time, past the course pen which moves laterally across the paper in relation to the change of direction of the ship's head. On reference to FIGURE 2 it will be seen that from the inside marginal line on the left to the right hand side of the chart is 90°, but as a complete turn

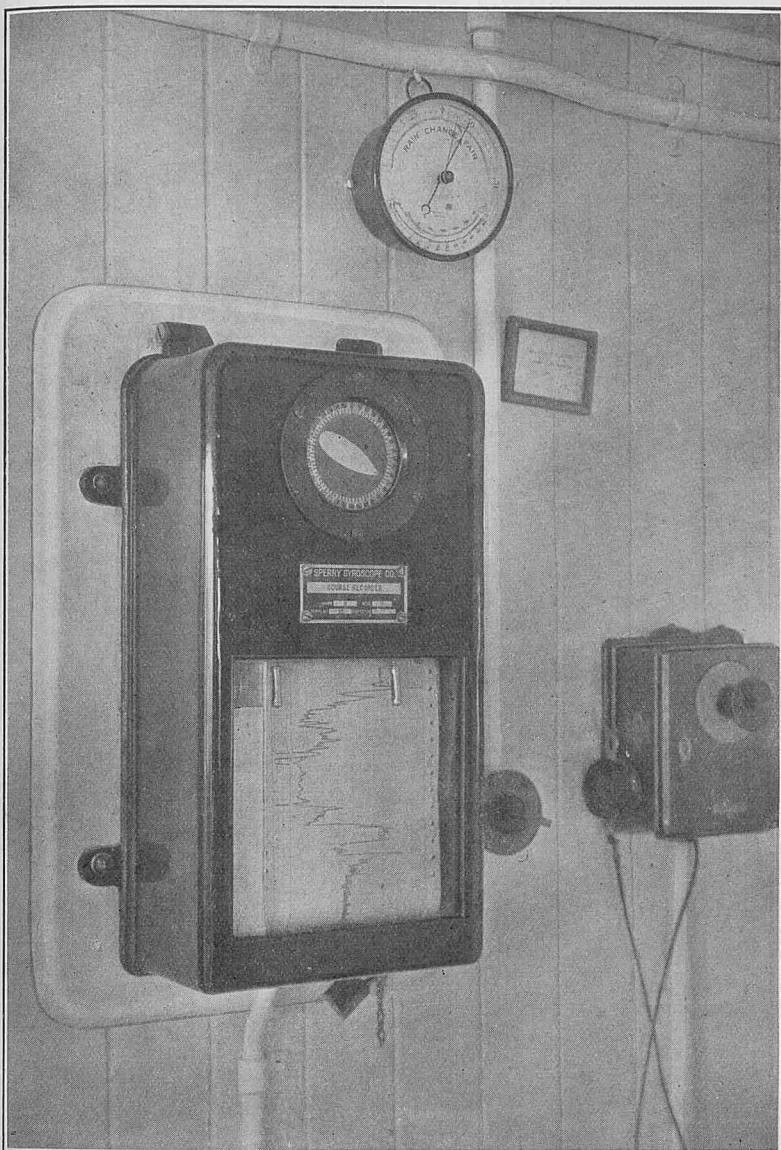


Figure 1. Course Recorder. S.S. Fort St. George
(Furness Withy Line).

is 360°, a second pen—the zone pen—is employed to denote the quadrant the vessel's head happens to be in at the time. This zone pen is situated to the left and if a line is drawn up the 270°–360° zone then the course is read by the position of the course pen in respect to the lateral numerals 270–360. On the right hand side are numerals arranged vertically representing the hours which are sub-divided by lateral lines into intervals of ten minutes. Of the various uses to which auxiliaries of the gyro compass are applicable there is probably none that is of more value to the navigator than the recorder, for on the chart is shown every movement of the ship's head to time and, consequently, forms a permanent log book of unique value, especially in cases where vessels are employed on regular trades. In addition to the statistical value, it affords a ready means of keeping a check on the quarter-masters and produces a psychological effect which results in healthy competition among them, in which the ship and they who sail her certainly benefit.

For the purpose of examining the value of the recorder as an aid to the more accurate ascertainment of set and drift, always remembering that leeway must be taken into consideration, it is convenient to consider, firstly, the case of a vessel which is not so equipped. Let it be assumed that the compass course is N. 88° W. and human nature being what it is, it will be found that in a high percentage of instances the vessel will be kept on a course closer to the cardinal point than away from it, for the simple reason that the eye more readily perceives the conspicuous. The amount is, of course, an unknown quantity, but in a 15-knot vessel it would be no exaggeration to assume that in 24 hours the position by dead reckoning may differ—through this cause alone—from the position by

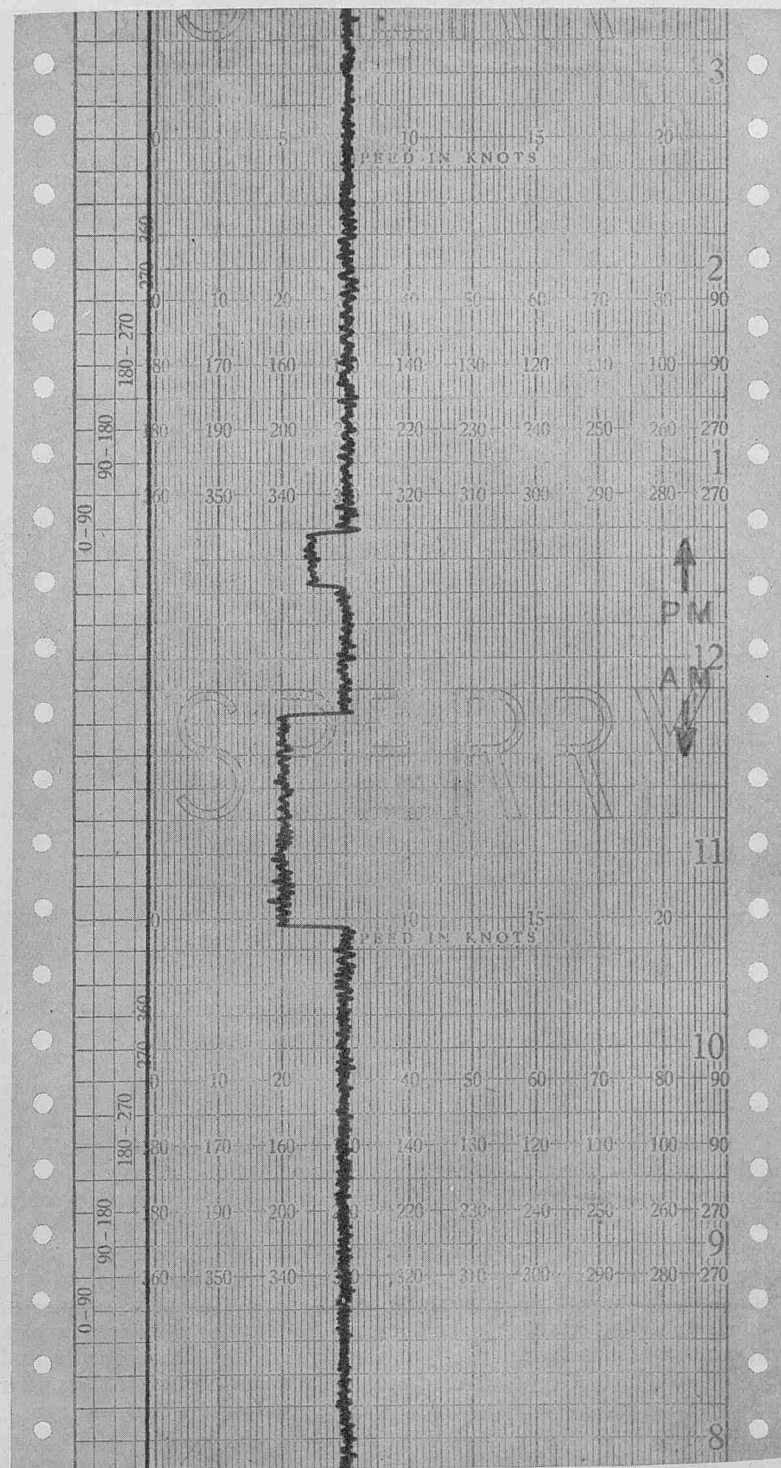


Figure 2. Section of Course Recorder Chart from S.S. City of Cairo,
Captain Dowse, Perim to Suez.

observation to an extent of three to five miles, which would be put down as a set to the southward and thus cause an erroneous current report.

On the other hand, in a vessel which is equipped with a gyro compass and course recorder, this form of error should not arise provided the record is carefully examined and used in conjunction with the log book.

It will be seen on reference to FIGURE 2 that it is a simple matter to take a mean of the average yaw of the vessel which will give the actual course steered as apart from the course set, and will also show each change from that course to avoid other vessels which, if each alteration is to the same side, may conceivably produce an error in dead reckoning of no small amount. It is not suggested that porting five degrees for five minutes will materially affect the position of the ship, but it is the accumulation of these usually unknown factors that result in inaccuracies which, with the aid of the course recorder, can be eliminated.

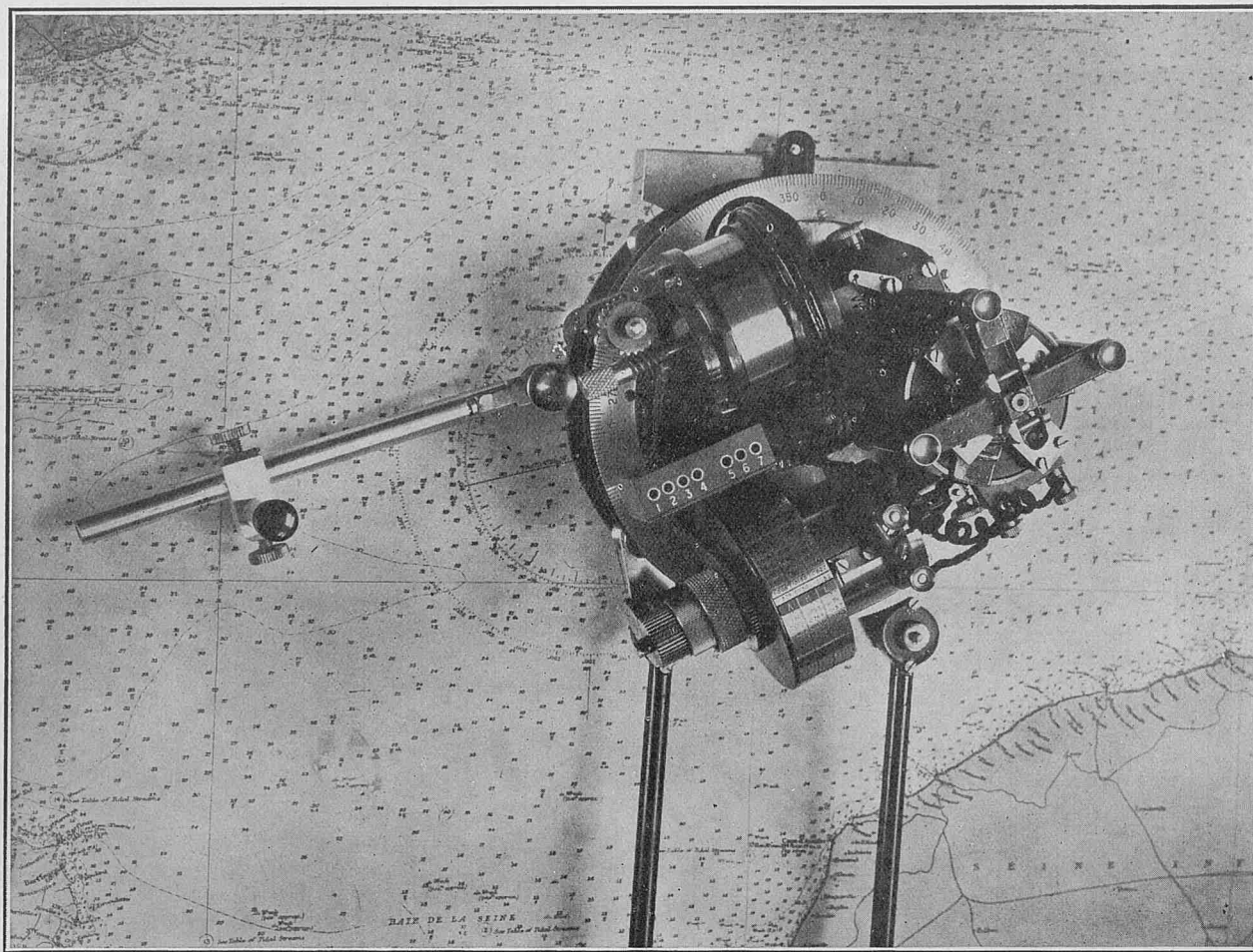


Figure 3. Villier's Odograph.

Another advantage of the gyro compass presents itself in connection with those parts of the earth where the curves of equal magnetic variation are in close proximity to each other and when the vessel is steering a course at right angles, or nearly so, to those lines. Whilst the accurate navigator will change the course a degree or so as the necessity arises, it is nevertheless true that a vessel being steered with the aid of a magnetic compass will make two sides of a small triangle resulting in an increase in distance traversed, which will cause an increase in the "apparent slip" of the propeller and may be accounted for as adverse drift. As a case in point, the writer remembers an occasion of two vessels, of approximately the same speed, making the passage of the Straits of Belle Isle; the leading ship "A" had a gyro compass and the other "B" had a magnetic compass. At one period "B" was slightly on the port quarter of "A" but gradually crossed over to her starboard quarter and then came back on a bearing right astern. Subsequent enquiry revealed the information that "B" had been steered a steady compass course and consequently she had, in fact, made greater distance than "A," which was due either to the rapid change in the variation or to the locality being such that the magnetic dip is considerable with resulting sluggishness of the magnetic compass card. As a further cause, there is the possibility of local magnetic attraction, but in any case "A" was unaffected and steered on one rhumb line and produced her own record of the course steered.

The advance in accurate navigating instruments remains unchecked and it is consequently not unnatural that the facilities of directional transmission provided by the gyro compass have resulted in the development of a recording instrument combining both direction and speed of a ship. This dead reckoning plotter is the invention of Admiral E. C. VILLIERS, and has now reached a degree of precision that places it in the foremost rank as an aid to navigation and to the determination of set and drift.

This instrument is known as Villier's Odograph, FIGURES 3 and 4, and in principle consists of the use of a propelling wheel attached to a carriage which is supported centrally by a frame. The carriage is kept in parallelism with the meridians by the parallel arms and the wheel is magnetised for adhesion to the iron covered surface of a table or board on which the chart is mounted so that rolling and pitching will cause no evil effect on the instrument; yet it is so designed that it may travel in any direction across the chart. The wheel is capable of rotation in its own plane at a speed proportional to the speed of the vessel and is driven by impulses received from a WALKER'S Electric Log or an approved submerged log of the FORBES, SAL or SPERRY type. This main driving wheel and frame is capable of turning about its vertical axis and its directional movement is controlled by an ordinary repeater compass motor operated from the transmitter on the master gyro compass. Another feature of the instrument is that it can be adjusted to any scale chart by moving the circular drum on which are engraved numerals representing inches and a fraction of an inch to the mile. The usual procedure in making this adjustment is to prick off with the dividers say ten miles on the latitude scale and transfer that to an ordinary foot rule which, for explanatory purposes, may be considered to correspond to 1.25 inches. The decimal point is shifted one to the left .125, and the drum is turned until 125 is abreast of the pointer. The effect of this adjustment is to vary the length of the stroke resulting from the impulse received from the log so that the odograph may always travel at a speed in proportion to that of the ship and according to the scale of the chart.

If it be assumed that the point of departure is off C. Barfleur and that the course line is laid down on the chart to a position off the Royal Sovereign *light vessel*, then the odograph will travel, if unaffected by tides, along that line; but as she would

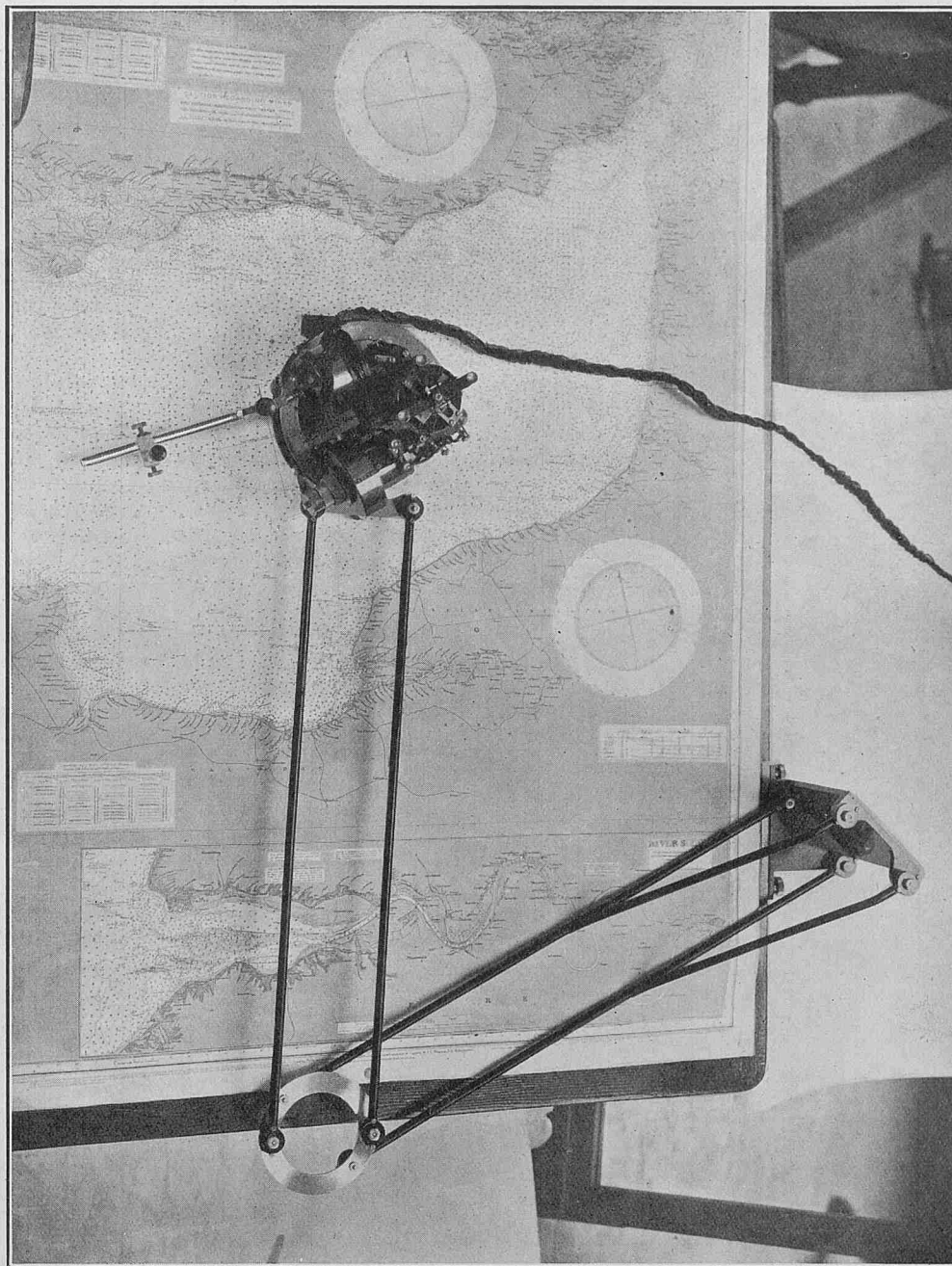


Figure 4. Villier's Odograph.

be steaming in tidal waters it is almost certain that the track of the ship will be either to the northward or southward, according to the set experienced. When a "fix" has been obtained the set and drift encountered is, of course, the bearing and distance of the real position of the ship from the position of the odograph pencil.

With the assistance of the course recorder or odograph, combined with the wireless direction finder operating in conjunction with a repeater compass, if proper allowance is made for leeway, there is little doubt that information concerning ocean currents will be in future of greater accuracy than has hitherto been possible and in this way safety at sea will be further enhanced.

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

COMMODORE SIR BERTRAM HAYES, K.C.M.G.,
D.S.O., R.D., R.N.R.

By ONE OF HIS OFFICERS.

LIEUTENANT A. F. BUTCHER, R.N.R.

IN the annals of the Merchant Service there are records of the careers of many famous shipmasters. The termination of 1924 saw the curtain fall on the seafaring life of probably the most famous and popular Commander in the Merchant Service—that of Sir BERTRAM F. HAYES.

He has been in command of the finest and largest liners under the British flag and is reputed to have had more honours conferred on him than any other shipmaster.

A man of great personal charm and genial disposition, under whom it was a pleasure to serve, he passes into retirement a living example to all who may follow on.

BERTRAM FOX HAYES was born in 1864 at Birkenhead, being the youngest of a large family. When he was 4 years old, his father was appointed manager of the Goole Steamship Company and to Goole the family went. Educated in his earlier years privately, he completed his education at the Goole Grammar School. It was in the days when a boy, upon reaching the age of 14, was considered to have completed his learning—young HAYES was no exception to this rule, and left school soon after his 14th birthday. Although being intimately connected with the sea through his family, he first took up a junior clerkship with the Goole Steamship Company under his father. Pushing the pen very soon palled, however, and following the example of his eldest brother—afterwards Commodore H. W. HAYES of the P.S.N. Company—he signed indentures with HY. FERNIE of Liverpool, and joined their new ship *Laomene* in 1880. It is well to mention that all through Sir BERTRAM's career his brother's success has been his guiding light; being many years his senior, Commodore H. W. HAYES was able to give his younger brother the benefit of his experience.

Sir BERTRAM's 4 years' apprenticeship was mostly uneventful except that he sailed under a captain who took a great interest in his apprentices—rather a rarity in those days. Upon completing his time he passed for 2nd Mate in 1885 and went away as 2nd Mate of the barque *Loch Bredan*.

By 1889, having completed his time for Master, he successfully passed this examination and joined the White Star Line. In doing this he was following out his brother's advice given when he first went to sea, "Get your tickets as quickly as possible and then join a good steamship line." Steam was rapidly displacing sail, and this advice was worth having.

He was first appointed 4th Officer of the S.S. *Coptic* on the London-New Zealand run. In 1891 he was transferred to the S.S. *Teutonic*—then the largest and fastest liner afloat—as 4th Officer. Promotion being fairly rapid about this time he passed through all grades up to Chief Officer in the same ship, and in 1899 was appointed to his first command, S.S. *Britannic*. About 12 months previous to this, whilst Chief Officer of the *Teutonic*, he passed for Extra Master. The South African War was on and the *Britannic* was employed as a troopship. The ship was an old one and hardly modern enough to carry troops, but Sir BERTRAM took full advantage of his early promotion; so much so that the ship was considered to be one of the most popular and successful troopships at that time. It can be well imagined that this success stood him in good stead in after years.

Up to 1914 he had commanded many of the finest ships in the White Star Line, including the *Majestic* (old), *Laurentic*, *Suevic* and *Arabic*.

On the outbreak of the Great War he was in command of the *Adriatic*; this was the first ship to leave New York after hostilities had commenced. It may be remembered that upon returning to Liverpool the Admiralty mounted guns in the *Adriatic* to protect herself from armed raiders. As she was an ordinary passenger ship, to put guns in her was asking for trouble should she meet with any enemy vessel. Upon reaching New York the American authorities took the matter up and the case became an international one—all this worry being

in addition to commanding a vessel through the war zone full up with passengers. Sir BERTRAM's remarks on the subject are still trenchant and to the point.

In September, 1915, he was appointed in command of the *Olympic*—the largest British built steamer. The war record of this vessel under Sir BERTRAM's command forms one of the finest epics in the annals of the Merchant Service. Few ships were on the "go" more than the *Olympic* and, with exception of a couple of voyages to the Mediterranean, all were across the Western Ocean to Halifax or New York. On May 12th, 1918, he sunk the German submarine U. 103 by ramming, an American destroyer picking up a few survivors; for this he was awarded the D.S.O. For his excellent war services he was knighted by HIS MAJESTY THE KING in 1919, being awarded the Knight Commander of Saint Michael and Saint George—this being the highest honour that had ever been bestowed upon a Merchant Seaman.

A few months after the Armistice it was decided to recondition the *Olympic* and to convert her to oil fuel at Belfast. In June, 1920, she made her first peaceful sailing, with Sir BERTRAM in command, since 1914.

At the end of 1921 he was promoted to Commodore R.N.R. and at the same time Commodore of the White Star Line Fleet—a position that had been dormant for over 40 years.

When the *Majestic* was nearing completion in 1922, Sir BERTRAM joined her in Hamburg for her steaming trials. These were entirely satisfactory, and at 8 a.m. Sunday, April 9th, the British flag was first hoisted on the largest vessel in the world—Commodore HAYES' burgee being broken at the mainmast head simultaneously; an hour later she left for Southampton.

His interest in the field of Marine Meteorology may be summed up when it is stated that he has been a continual observer to the British Meteorological Office for over a quarter of a century. During this period he has contributed 9 meteorological logs and 50 W/T Weather Report registers. On several occasions since the war he has contributed his views on weather reporting as regards its use to seamen. "Let me know," he said to the Marine Superintendent, Captain BROOKE SMITH, at an interview, "the weather and visibility at Scillies and Casquets so I can shape a course for Cherbourg—that's how the M.O. can be of use to seamen, by letting them know the weather that exists around the coast." Shortly after this interview the "Western Seaboard" Bulletin was broadcast, and since, the "Weather Shipping" Bulletin has been introduced, which gives what Sir BERTRAM asked for. He has advocated the more practical and general use of the North Atlantic Weather reporting service, so that seamen might be better enabled to practise Wireless and Weather as an aid to Navigation.

During the last two years he has been interested in the question of W/T direction finding stations, and in letters to the Authorities has pointed out the scarcity of these stations compared to the American Seaboard.

Naturally, Sir BERTRAM has a fund of anecdotes relating to his experiences as a passenger liner commander, also concerning people he has met. Fortunately he has been prevailed upon to write his memoirs, which will be published in book form in the near future. This surely is creating a precedent. Nowadays one expects retiring statesmen, naval or army officers, to write their experiences, but for a merchant shipmaster it is rare indeed.

In expressing an appreciation of this famous man let us review his character. By gaining the confidence of his officers and men he has the happy knack of getting the best out of all who serve under him. He is not only the Master of the ship—he is the friend of the crew—and in both capacities is trusted, respected and looked up to. Like most great men in our profession he is modesty personified. His retirement will be regretted by all that know him, but he felt that he



The Master of the *Majestic*, 1922—1924.

COMMODORE SIR BERTRAM F. HAYES, K.C.M.G., D.S.O., R.D.,
R.N.R.

had to "let the young fellows come" as he so characteristically expressed it. For more than 40 years he has, by his example and conduct, closely guarded the honour of the Merchant Service. Thus

ends his active career, and we can only hope that in his well-earned retirement, he will find great happiness and a long life. No MAN HAS DESERVED IT MORE.

THE MARINE OBSERVER'S LOG.

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

Responsibility for statements rests with the Contributor.

SHIPS' WIRELESS WEATHER REPORTS AS AN AID TO NAVIGATION.

BY LIEUTENANT W. E. ALLEN, R.N.R. AND
MR. F. BOLINGBROKE.

Observing Officers, C.S. *Stephan*, Commander
G. F. CARLTON, O.B.E., R.N.R.

"THE first publication of *The Marine Observer* marked a great step in the use to which wireless telegraphy could be used for forecasting weather, as it brings before the mariner in plain language the essential knowledge necessary for constructing a weather chart for use on board ship.

"If all ships keeping the full meteorological log for the Air Ministry would at stated times for different zones broadcast their position with the **corrected** barometer reading, direction and force of wind, temperature of the air, state of the sea and sky, with their course, speed and barometer tendency, no vessel sailing the seven seas need **guess** the state of the weather for the following twenty-four hours.

"After considerable experience in the construction of weather charts in all parts of the world but especially in the Eastern Basin of the North Atlantic the need of the above broadcast readings have been urgently felt, a perusal of *The Marine Observer* will show that there are any number of Shore Stations over the land areas to the eastward which supply readings, but it is from the westward that the weather systems come and only ships can supply that information. We have found that after a week's practice anyone with an elementary knowledge of meteorology can make an efficient weather chart in half an hour so that the idea that a great deal of time and labour is necessary is erroneous. Since the addition of the two foreign stations to the Air Ministry's shipping weather report it is now possible to make a more comprehensive weather chart when approaching the British Isles from the westward of the conditions over the land and adjacent waters.

"There is still a great need for more ships' reports and we think that if the coded reports of Atlantic Liners to the Meteorological Office were made at specified times, for which purpose zones would be necessary, a great deal of benefit would be derived by seamen.

"At present these reports do not indicate barometer tendency or course and speed, data which is practically indispensable and could surely be included in all coded reports.

"As an example of the use of wireless in navigation, last voyage, October, 1924, as our ship was coming up the Portuguese Coast there was a thick fog for a distance of eight to ten miles from the coast in which we heard a number of vessels blowing their whistles. By the

exchange of wireless messages between ourselves and passing vessels we were able to keep clear of the fog and by that means save at least twelve hours' steaming and catch our tide at London. If the vessels in the fog had only known the conditions a few miles to the westward a slight alteration of course would have kept them clear.

"The weather chart for that day showed conditions favourable for the formation of fog."

Extracts from the Meteorological Log of Cable Ship *Stephan*,
Commander G. F. CARLTON, O.B.E., R.N.R.

Tidal Streams.

"10.30 a.m. (Ship's Time) 20th May, 1924, Latitude 70° 00' N., Longitude 32° 30' E. The waters in this position are Tidal. The Tidal Stream was found to turn from setting E.S.E. to W.N.W.

"22nd May, 1924. Latitude 70° 00' N., Longitude 32° 30' E. Tidal Stream turned from E.S.E. to W.N.W. about Noon (A.T.S.). During the three days vessel was in above position the Tidal Stream was found to ebb and flow for six hours at a rate of about .75 knots."

Cloud Band.

"9.00 p.m. (A.T.S.) 23rd May, 1924, Latitude 70° N., Longitude 18° E., observed band of smoke coloured Ci-St. about 1° broad and forming a semi-circle close above the sun; reaching from a bearing N.W. to the zenith. As sun set this band spread from N.W. to N.E. points of horizon. At 11.15 p.m. (2200 G.M.T.) sun's altitude 1½° and having a distinctly elongated appearance, upper and lower limbs appearing flattened. This band of soft Ci-St. hardened as it set with the sun. Wind E.N.E. 5. Sky, det. Cu. 4 (no upper clouds)."

SUBMARINE VOLCANIC ERUPTIONS NEAR WALVIS BAY.

WE are indebted to Captain J. C. YOUNG, Port Captain of Buffalo Harbour, East London, for the following account taken from the East London "Daily Despatch" of December 29th, 1924.

Marine Observers visiting Walvis Bay are invited to obtain detailed observations from eye witnesses, with a view to publication in this Journal.

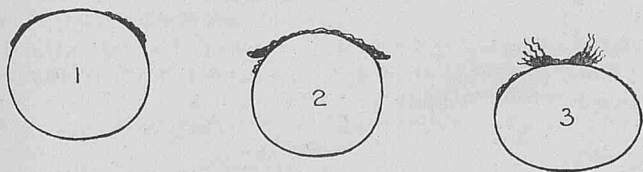
"It is said that about three times every year there is a submarine disturbance in the waters round Walvis Bay. The residents allude

to such as 'sulphur upheavals,' which, if so, suggests there must be a submarine volcano in the vicinity. From accounts received from Walvis, the upheaval which took place during this month was by far the most severe and disastrous within memory. It is stated that millions of fish of all species—snoek, stock, herring, and so on—were killed and washed ashore to rot. A Walvis Bay correspondent of the 'Argus' wrote on December 18:—"The dead fish form a menace to the health of the community. People who have lived there a life time describe this as the most awful visitation they have ever had." There was such an incalculable number of dead fish in the bay that the condensing of sea water for drinking purposes had to be stopped. The proposal was to dig trenches in the sand into which the dead fish might be washed by the tide. It is considered not at all unlikely that the happening may have some effect upon the snoeking season. The snoek visit the Walvis Bay grounds at this season of the year in many millions, and if deprived of their natural food, may depart earlier than usual."

PECULIAR SUNSET EFFECTS.

THE following note has been communicated by Captain Sir DAVID WILSON BARKER, Kt., R.N.R., late Captain Superintendent of H.M.S. *Worcester*, and for many years a regular Marine Observer to the Meteorological Office.

"The phenomenon described below must have been seen by many, but I have not seen it noticed in print. To stimulate interest I will instance one special occasion.



D.W.B.

"As the sun gradually sank to the horizon, it changed gradually in colour from brilliant orange to deep red. A slight haze was on the hitherto clear sky; through a low power telescope irregularities appeared on the sun's outline: (1) on the sides, about one quarter from the top, bulges appeared; (2) and seemed to peel off, at the final separation from the sun's orb; (3) the vapour took a beautiful emerald green colour and then vanished. This process was repeated several times before the sun quite disappeared, the green colouring lessening in effect and there was no 'green ray.'

"There are other phenomena connected with the rising and setting of the sun which are most interesting and worth study. For instance a rare and beautiful phenomenon is the appearance of very faint coloured rays springing up from the spot where the sun is just rising or setting, and before the sky is very light. Often they can only be seen by a 'sideway' observation and only last a very short time.

"Then there are sometimes Sun Pillars, a very striking phenomenon, which I have only seen after the sun has set.

"It may be remembered that remarkable sunrises and sunsets took place in the Pacific Ocean after the Krakatoa eruption. On one occasion, I saw a remarkable sunset at Greenhithe when everything was tinged a bright green colour. I held up white sheets of cardboard and these became quite green in the light of the setting sun. Sometimes curious colour effects are seen inland at sunset.

"I have purposely omitted reference to the remarkable and beautiful sun shadows cast by clouds as these may well demand a separate note, also the wonderful iridescent colours sometimes observed on high Stratus clouds (Cirro-Cumulus) of great weather

significance.

"Perhaps these few remarks may stimulate the observations of other sailors than whom no class of men have better opportunities for observing weather phenomena."

MIRAGE.

THE sketches reproduced were contributed by S.S. *Khyber*, the late Captain L. D. PINCKNEY, Kobe to London, Observer, Mr. J. LIVINGSTON.

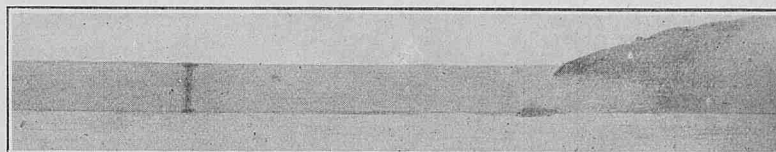
"May 3rd, 1.00 p.m. While passing through the Strait of Bonifacio and with Cape Feno bearing North, 4 miles, the land towards Monachi Rocks Lighthouse had every appearance of being shrouded in fog, but on closer examination it was found to be a sort of mirage effect, as shown in SKETCH I. With Monachi Rocks abeam, on looking astern a similar effect was observed as in SKETCH II. By 3.00 p.m. all signs of this phenomenon had disappeared, but an exceptionally good visibility with great clarity of atmosphere remained.

Wind.	Barometer.	Thermometer.	Clouds.	Sea.
"N.W.'ly 2-1	30.10	71½	Cu. & Ci. 2	D. calm."

Monachi Rks.: Lt. Ho.

brg., N57° W — 16½'

Roccapina Pt.



Sketch I.

Razzoli Is. Lt. Ho.,

S80° E — 22'



Sketch II.

NOTE:—If the temperature of the air falls 1° C. for every 100 feet of ascent, the density, and therefore the refractive index of successive layers of the air, will be the same that is to say there would be no bending of a ray of light in passing from one of these layers to the next. If, on the other hand, there were a rise of 1° C. in 10 feet of ascent the curvature of a nearly horizontal ray would be about 2½ times the curvature of the earth's meridian.

In normal conditions the rate of change of temperature with height (the "lapse-rate") lies between these two limits. Hence it will be recognised why the visible horizon is at a greater distance than would be expected from considering merely the shape and dimensions of the earth.

The two FIGURES on p. 74 will show how refracted images are formed. In each case E is the eye, A B the object, and A' B' the objects as seen.

In FIGURE 1 the refractive index of successive layers of the air depends only on the height above the earth, and the lapse rate is constant. Then the paths of the rays from A and B to E will be segments of equal circles and the image will be seen elevated. If at the same time the object can also be viewed by a direct ray (such as E A), the object will appear superposed on itself. At sea a ship seen at a distance may appear with an exact replica superimposed upon her mastheads as in the sketch contributed some time ago by H.M.S. *Colombo*.

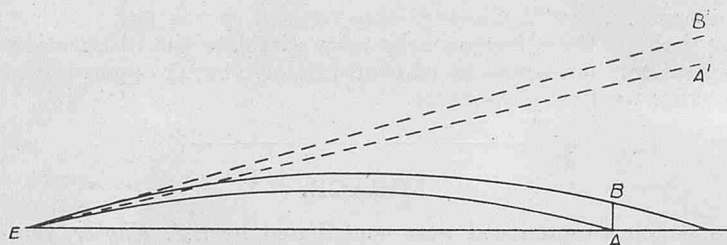


Figure 1.*

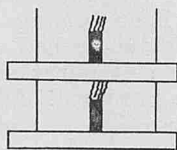


Figure 2.*

In FIGURE 2 the refractive index is supposed to be nearly constant over a layer of (say) 50 or 100 feet thick above the earth but to change rapidly in the layer just above. These conditions are fulfilled if there is a cold layer of air spreading over the sea surface, which gives place above a certain height to warmer air.

In this case it will be seen that the image is inverted; as in the previous case the object may be viewed directly through the lower layers of the air.

Now if in FIGURE 2 the arrangement of the refractive index of the air were such that the angle $A'EB'$ were much greater than the angle AEB , then the object AB would appear drawn out in height.

In the case reported by *Khyber* the weather conditions show that the winds were light and variable, that there was little cloud and high temperature, but that the sea surface temperature was only 58° F. at 8 a.m. and 59° F. at 8 p.m., when the air was 64° and 62° respectively.

Evidently a stratum of hot air was reposing above a thin cool layer just over the sea surface. The land therefore was seen refracted through the warm air and also a looming image was formed at the boundary of the warmer and cooler air.

* These FIGURES are reproduced from "Light," P. G. TAIT, M.A.

EQUATORIAL COUNTER CURRENT. PACIFIC OCEAN.

THE following has been received from Captain W. H. SMITH of S.S. *Orowaiti*, through the Hydrographer of the Navy.

"From careful observations taken and recorded on twelve different voyages, extending over a period of two years, it has been observed that in the vicinity of the 150th W. meridian, the Equatorial Counter Current is met with further north at certain periods of the year.

"My records show that during the months of May, June, July, August and early September, this current is met with between the parallels of 3° and 8° N., whereas from September onwards it would appear to take a more northerly trend, being met with between the parallels of 6° and 11° N., reaching its furthest north during

December and January, then gradually coming south again, until May, this of course applies only, so far as my records show, between the Meridians of 149° and 150° W.

"I beg further to report that on *every occasion* I have experienced a strong Easterly stream *south* of the Equator between the parallels of 5° and 1°, and the meridians of 151° and 150° West, varying in strength from one to two knots.

"It will be observed that the above vessel having passed twenty-four times through the area in question, the observations may be relied upon."

CURRENT RIPS.

THE following was contributed with the Meteorological Report of S.S. *Teucer*, Captain T. W. HANNEY, Penang to Suez, Observer, Mr. J. C. MORTON, ex-3rd Officer.

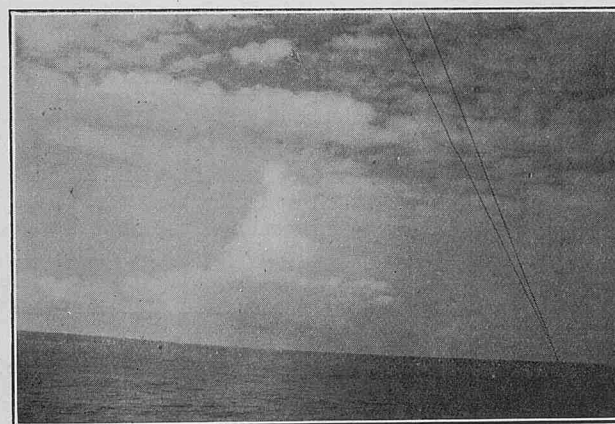
"On Thursday, May 22nd, 1924, at 5.27 p.m. A.T.S. in Latitude 5° 49' N., Longitude 89° 27' E., vessel passed through a belt of water 1,600 yards in breadth, and extending as far as visible in a N. 12° E., S. 12° W. direction, upon which was distinctly visible current disturbing the surface.

"The wind at the time was W.S.W. moderate breeze, inclined to freshen, and the sea slight with W.S.W. swell. The disturbed surface was visible at least three miles before vessel entered it, and a considerable choppiness prevailed over its area. Upon reaching it, no increase in the force of the wind was observed, but the sea disturbance was such as to cause the vessel to spray over the fore deck and after passing through it the sea disturbance again became normal.

"Previous to meeting this we had experienced a current setting N. 5° W. $\frac{1}{2}$ knot and from then until noon next day experienced a current setting S. 21° W. 1 knot."

CLOUD PHOTOGRAPHS.

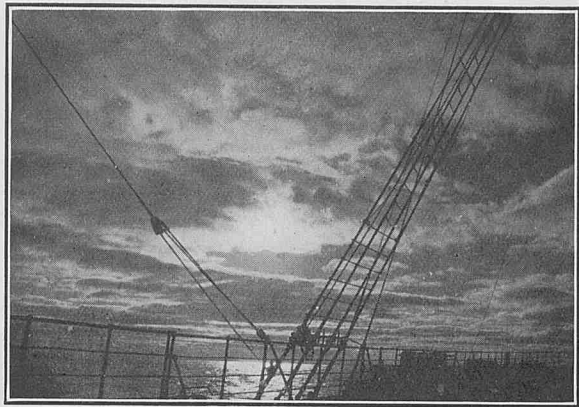
THE photographs below were taken from S.S. *Port Hacking*, Captain A. E. STICKLAND, London to Melbourne, by Mr. H. G. B. PINKNEY, 2nd Officer.



"2 p.m., May 1st, 1924.

"Cu-Nb with St-Cu and Ci-Cu above. Bearing N.E./E., Latitude 0° 30' N., Longitude 9° 30' W. Wind S.E./S. 2. Bar. 29.79. Ther. 83°."

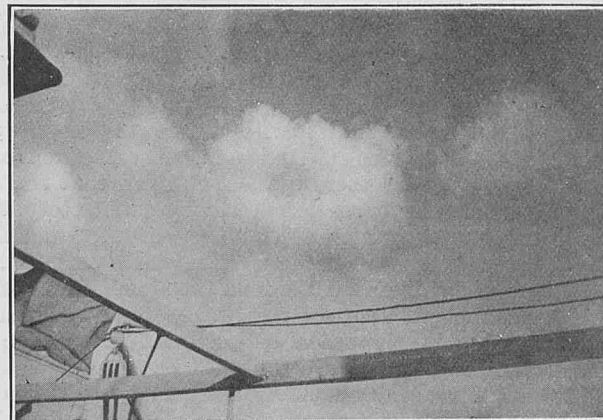
NOTE.—The form of the towering Cu-Nb shows that convection is taking place to great heights. The absence of spreading out of the cloud in the upper air (as is seen in the typical anvil shape Cu-Nb of higher latitudes) indicates an absence of stratification of the atmosphere.



"A Trade Wind Sky.

"4.30 p.m., May 8th, 1924.

"St-Cu bearing N.W. Latitude 22° S., Longitude 7½° E. Wind S.S.E. 4.



"May 17th, 1924.

"Small Cu clouds in the rear of a gale. Latitude 42° S.

"Longitude 46° E. Moderate S.W. wind. Bar. 29.83. Ther. 43°"

CLOUD ARCH.

THE following was contributed with the Meteorological Report of S.S. *Port Hacking*, Captain A. E. Stickland, London to Melbourne. Observer, Mr. J. ROWLAND HILL, 4th Officer.

"On the night of May 27th shortly before 8.0 p.m., whilst the vessel was in Latitude 43° 44' S., Longitude 109° 17' E., the following rather unusual phenomenon was observed.

"The wind had been blowing steadily from the Westward force 6 since noon with the usual heavy squalls and overcast sky, when a bright clearing was seen to be approaching from the Southward. This gradually extended until the whole sky to the Southward of

the vessel was clear, and as could be expected the wind had shifted to the S.S.W. We naturally thought that it would stay in this direction and that the rest of the sky would subsequently clear. This, however, was not the case: the arch which had broken up overhead, reformed and slowly receded to the Southward again, the wind veering to W.N.W. and continuing to blow with the same force as before.

"For twenty-four hours before and after this occurrence there was no appreciable rise in the barometer readings, or any other signs of a Southerly wind."

UPPER AIR OBSERVATIONS OVER THE SEA.

BY COMMANDER L. G. GARBETT, R.N. (RETIRED).

SUPERINTENDENT NAVAL METEOROLOGICAL SERVICES.

In my note "The Investigation of the Upper Air" which appeared in the February Number of "The Marine Observer" last year, I explained two methods of obtaining observations in the upper air which have been proved to be practical at sea. The first of these is the observation of the track of a Pilot Balloon, followed from a ship, by means of a sextant and compass. From such observations as this we can compute the direction and force of the wind at different heights from the repeated determination of the position of a rubber balloon which is inflated with hydrogen. The balloon is released from the ship and rises, at the same time as it is being carried along in the horizontal stream of air in which it finds itself.

The assumption is made that the balloon rises uniformly at a rate which depends upon its weight and free lift which must be determined before the ascent begins. The height at any instant after the commencement of the ascent can then be calculated and the actual position of the balloon fixed by obtaining observations of altitude with an ordinary ship's sextant and the azimuth by the compass.

The sextant has mostly to be kept inverted and no telescope is used. Thus the balloon is seen with the naked eye and the horizon reflected up to it, so the distance at which the balloon is visible is dependent on the sight of the observer.

The bearing by compass has also to be obtained with the naked eye, and is therefore always liable to inaccuracies especially when the altitude is high.

It is obvious that such observations from a ship at sea present considerably greater difficulties than those ashore, owing to the

movements of the ship in a seaway and further, unless one is able to manœuvre the ship at will, the relative wind, although in some cases—as, for instance, with a following wind—it may improve conditions, in others it accelerates the drifting away of the balloon which is then very soon lost to sight.

In spite of these difficulties some very valuable results from pilot balloon observations were obtained by M. TEISSERENC DE BORT (France) and Mr. ROTCH (America), two enthusiastic meteorologists who chartered the yacht *Otavia* and carried out a series of observations during three successive cruises in the years 1905–06–07 when they explored the regions of the Trade Winds. In the course of these expeditions the important fact was demonstrated that above the N.E. Trades there was a counter current from the S.W. and above the S.E. Trades there was a counter current from the N.W.

The height at which this reversal of current takes place varies greatly with place and time, being in some instances as low as 6,000 feet and in others as high as 30,000 feet.

Above the equatorial belt of calms a current from the east always exists, having a velocity which increases with height.

Pilot balloon observations of this kind have also been undertaken by the Germans. During the years 1906–08, a certain number of captains in the German Mercantile Marine carried out observations on voyages to and from South America. In 1911 similar observations were made during two voyages in sailing ships, but in this case a special sextant was used for obtaining the altitude, which was graduated in degrees and tenths and had an endless screw instead of the usual

tangent screw.

In more recent years Captain H. P. DOUGLAS, C.M.G., R.N., the present Hydrographer of the Navy, when in command of H.M.S. *Mutine*, and, later, H.M.S. *Ormonde*, carried out pilot balloon observations in the West Indies with interesting results; these observations have already been referred to in "The Marine Observer." But experience gained in all these cases has shown that this method of following pilot balloons at sea is not wholly satisfactory, for with the exception of a few very high ascents carried out, probably under exceptional circumstances, quite inadequate heights have been reached.

When we consider that on land special theodolites with telescopes of large magnification are used for this work, it may reasonably be supposed that at sea also the use of a telescope, with a wide field of vision, would considerably improve the method.

Herr WEGENER has devised such an instrument, which is known as the Mirror Theodolite. The instrument is an ordinary pilot balloon theodolite with a small sextant in a reversed position attached in front of the object glass. The horizon is reflected so that the angle of elevation can be measured independently of the motion of the ship.

The instrument is mounted on a tripod stand and is set up on gimbals with a pendulum weight attached to keep the theodolite vertical. The azimuth angle is obtained from the horizontal arc of the theodolite, the zero point on this arc being set on the fore and aft line of the ship and the true azimuth deduced from the ship's course.

This instrument, we are told, was tested with satisfactory results in 1922 on a voyage to Mexico and back on board the cargo steamer *Sachsenwald*, of the Hamburg Line, by German meteorologists who were berthed on board at the expense of the company. In the introductory remarks to the report on the trials of this instrument, it is said that: "The primary object of the voyage was to prepare for further aerological research in the Atlantic by testing a new instrument for observations of pilot balloons from a moving ship and at the same time it forms the first part of a great project which consists mainly of carrying out a series of such voyages for the purpose of investigating the wind at high altitudes above the Atlantic Ocean in view of a future trans-Atlantic air service."

If a knowledge of the direction and force of the wind only were necessary, observations of pilot balloons would suffice, but information concerning other important meteorological elements in the upper air is also required, and for this it is necessary to employ the second method of observation, which is by Sounding Balloons sent up in tandem. These balloons carry a self-recording instrument, and records of pressure, temperature and humidity for the various layers can be obtained.

In this method the chief difficulty lies in the fact that the instrument must be recovered on its descent, so the ship has to be manœuvred in any direction in which the balloon may go, which means sacrifice of time, unless the ship has been specially detailed to carry out such observations.

In the early days of upper air observations kites were used for obtaining observations of temperature and Mr. W. H. DINES carried out a series of such observations on board H.M.S. *Seahorse*, Captain F. CROOKE, R.N., off the West Coast of Scotland.

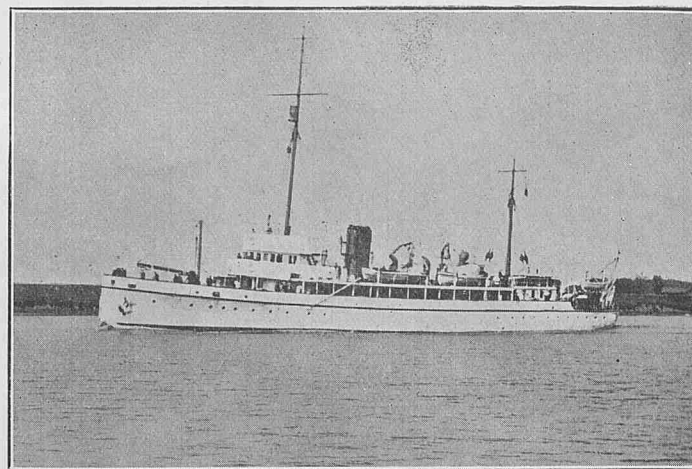
Kites were also used by DE BORT and ROTCH, but balloons were found to be handier for use at sea as they can be sent up in calm weather when it is not possible to fly a kite. Moreover, the height to which a kite can rise is very limited, which is not the case with sounding balloons.

By means of sounding balloons DE BORT was able to find a layer in the atmosphere in which there was no fall of temperature with height. This was one of the most important discoveries in Meteorology. This layer was reached at about 41,000 feet above the surface in temperate regions, and it was not until some years later that its existence was also found over the equatorial regions from observations made at Batavia, but at a height of 64,000 feet.

It is worthy of note that the lowest temperatures in the upper air are to be found over the Equator.

Great heights have been reached by sounding balloons; the maximum obtained by DE BORT was 58,000 feet, but on land heights up to 80,000 feet have been reached.

With the exception of the kite observations carried out in *Seahorse* no observations of the upper air over the sea have been obtained in this country, so I welcomed the opportunity afforded me by the Commanding Officer of H.M.S. *Kellett*, Commander F. E. B. HASELFOOT, D.S.O., R.N., with the approval of the Hydrographer, to spend a week on board in the English Channel.



H.M.S. Kellett.

H.M.S. *Kellett* is a surveying ship of 800 tons, and was working in the vicinity of the Royal Sovereign *Light Vessel*.

I embarked at Dover on the 15th of June, 1924, with a large equipment of pilot balloons, sounding balloons and hydrogen, etc., and a Mirror Theodolite similar to the one designed by WEGENER, described above.

The weather conditions as far as we could see from the Synoptic Chart were settled, and consequently it was a great disappointment to find a dense fog the following morning when we left for the surveying ground. Fog was the very last thing we wanted for the experiments and if it persisted, as it might well do under the anti-cyclonic conditions prevailing, the cruise was doomed to failure. However, as we proceeded westward the fog cleared and by 4 p.m. it was fine with moderate visibility.

The surface conditions were ideal for the release of sounding balloons—a calm sea and a light S.E'ly breeze blowing at about 5 m.p.h. But surface conditions are no criterion of what the conditions are above, except that with increase of height one would expect a veer of the wind and increase in strength. This was actually the case, as in accordance with arrangements a report was received from the Meteorological Office regarding the conditions in the upper air at Calshot and Lympne (air stations on the south coast), which gave the wind direction as being S.E. to S. less than 10 m.p.h. up to 8,000 feet increasing to 30 m.p.h. at 23,000 feet from S. to S.W.

From this knowledge we were able to estimate that a balloon allowed to rise to a height of 23,000 feet would probably fall 16 miles to the N.N.E. of the position in which it was released. The idea was to limit the rise of the balloon to this height, as the sea room was limited, and it was necessary in order to give full trial to the apparatus for it to fall into the sea and not on the land. For this purpose an ingenious device was designed by Mr. L. DINES of the Meteorological Office, by which the upper balloon of the tandem would be released at a pre-arranged height. The device consists of an aneroid box which expands as the pressure on it decreases, and by so doing releases a catch which holds the upper balloon.

Having decided to make an ascent with a sounding balloon the ship proceeded to a position 6 miles S.W. of the Royal Sovereign *Light Vessel* in order that—assuming the calculation of the point of descent to be correct—the instrument, with balloon and sea anchor, would be picked up in the vicinity of the anchorage off Hastings where it was proposed *Kellett* should anchor for the night.

The balloons and attachments took about one hour to prepare and were arranged as shown in FIGURE I.

The upper balloon (a) is inflated with hydrogen to give a free lift of 8 lbs., its diameter would then be about 7 feet, the lower balloon (b) is inflated to give a free lift of 2 lbs. The balloons are attached to a wire spreader (c) with a releasing device (d) already described, set to release the upper balloon at 23,000 feet. The sea anchor float (f) consists of a cylinder-shaped wicker frame covered with canvas two feet high by one foot in diameter, which is secured to a base of canvas three feet in circumference. The latter is perforated with holes and is attached to the balloon by three lines passing through beackets on the upper part of the cylinder, thus making it collapsible during ascent. When in the water the base fills with water and acts as a sea anchor, the cylinder preventing it from sinking; its weight is $3\frac{1}{4}$ lbs.

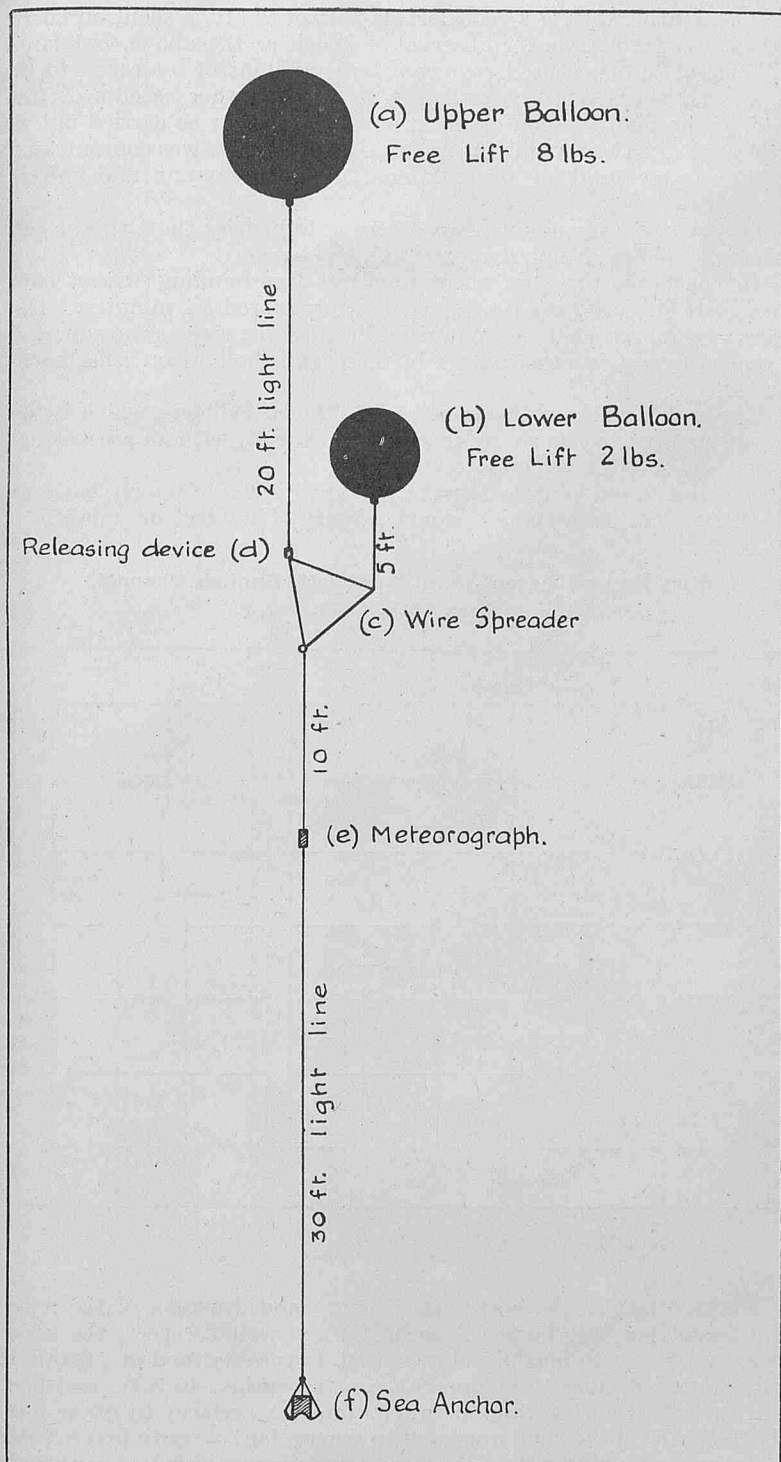
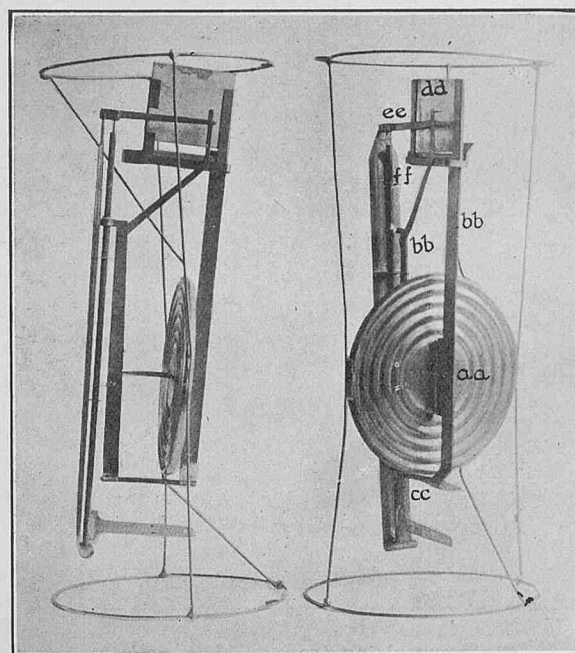


Figure 1.

The self-recording instrument (e) is a Dines Meteorograph and is attached to the line securing the sea anchor to the spreader. The meteorograph, *see* photograph, consists of an ordinary aneroid box (aa) which, being only partially exhausted of air, expands under reduced pressure as the apparatus ascends, and the two parts of the frame (bb) which are held together by the spring (cc) move apart. One side carries the plate (dd) on which is already engraved a small pressure and temperature diagram, and the other the scratching point (ee) so that when they move a scratch is made on the diagram. Changes in temperature cause a movement perpendicular to this scratch and are recorded by the expansion and contraction of the slip of german silver (ff).

The instrument is protected by an aluminium cylinder and its total weight is only 2 oz.

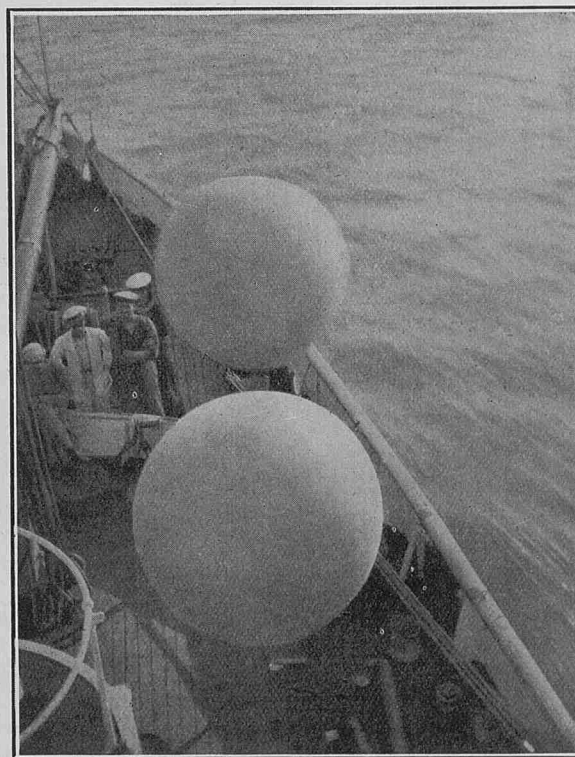
When the whole apparatus reaches a height to which the releasing device is set—in this case 23,000 feet—the upper balloon will be released. If no device of this kind is used the balloons will continue



The Dines Meteorograph.

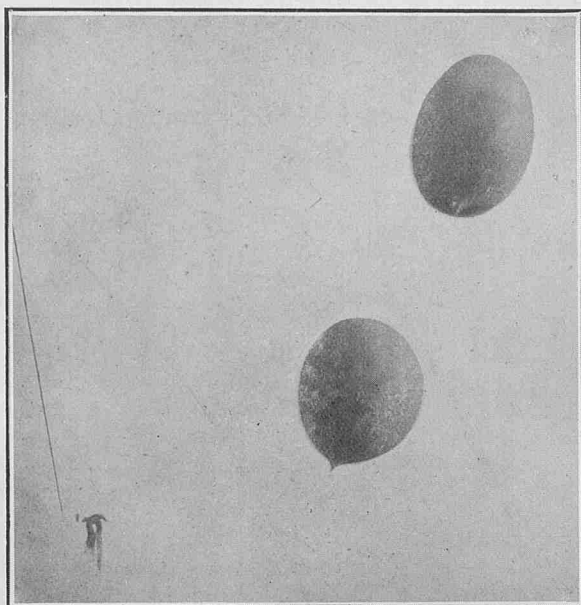
to rise until the upper one bursts, probably at about 30,000 to 40,000 feet. The remaining balloon not having sufficient buoyancy, will be dragged down by the weight of the sea anchor until the latter touches the water. The balloon will then be able to support the instrument and be prevented from drifting by the sea anchor.

The balloons were inflated on the fore deck, as shown in photographs by Lieutenant BAKER, R.N., and all being ready, the ship was stopped and placed beam to the wind.



Balloons inflated on fore deck of H.M.S. Kellelt.

The balloons were now allowed to rise, the line being paid out slowly until the apparatus was clear; it was then released and ascended clear: this was at 6.45 p.m.



Balloons rising from H.M.S. Kellett.

The sketch by Commander HASelfoot shows the apparatus immediately after release. The wind at the time was N.N.E., force 2.

The balloons ascended rapidly and moved off in a S.S.W'y direction until attaining a height of about 3,000 feet; they then gradually appeared to veer round through West to the N.E. The ship now proceeded on a course for the position where it was anticipated the balloon would fall.

The balloons were easily discernible through glasses for 18 minutes and at that time must have been at a height of nearly 15,000 feet and travelling very fast. The last seen of the balloons together was at 7.12 p.m., when they disappeared into haze.

At 7.16 a single balloon—the released one—was observed on the port bow bearing N.N.E. and crossing the ship's course; it appeared to be at a great height and was clearly visible. At 7.35 p.m., forty-one minutes after release, it was lost sight of and presumably burst at that moment. Its height was then estimated at 30,000 feet.

The second balloon with apparatus was not seen again from the ship, but was eventually picked up off Eastbourne that evening, having been seen to fall by the local inhabitants at about 7.30 p.m. about 4 miles S.S.W. of the pier.

The boatman who picked it up informed me later that when first observed the balloon was thought to be manned, and probably one of those which had taken part in the Gordon-Bennett race, thereby causing some excitement, and several motor boats were despatched to the rescue.

Had the apparatus not been picked up it would probably have been seen by *Kellett* as she approached the anchorage off Hastings. It had actually fallen some 10 miles to the Westward of the estimated position.

The balloon had a label attached, which is used for all ascents ashore, on which there are instructions to the finder to return the instrument to the Meteorological Office, for which he will receive a reward of five shillings; in this case the reward was somewhat increased.

The ascent proved quite successful and the upper balloon was apparently released at the pre-arranged height.

The temperature and pressure obtained from the record are as follows:—

Height above M.S.L. Feet.	Pressure. Millibars.	Temperature. Fahrenheit.
0	1,014	68°·0
3,770	902	60°·8
7,554	801	50°·0
11,330	709	42°·8
15,100	626	28°·4
18,880	550	15°·8
20,390	520	12°·2

The weather during a considerable part of the time spent on board *Kellett* was favourable for observations such as the above, but large balloons of the type used require a large amount of hydrogen to fill them, and there was not sufficient to make further ascents of this kind, if the pilot balloon observations were also to be carried out as arranged. In view of this the remainder of the time was concentrated on the latter kind of observations, using a sextant and mirror theodolite.

Observations of pilot balloons were obtained by the Captain and Officers of *Kellett* during five ascents.

In each case the instrument used was the sounding sextant supplied to H.M. Surveying Ships, which is graduated in minutes. The balloons were reflected to the horizon in the same way as the sun, and in one case only was the sextant reversed and the horizon reflected to the balloon.

The maximum height obtained with 90-inch balloons, which is the type generally used on shore, was only 2,000 feet, with an ascensional velocity of 500 feet per minute.

The maximum obtained with the larger sized 150-inch balloons was 12,000 feet, with an ascensional velocity of 700 feet per minute.

Pilot Balloon Ascent, H.M.S. Kellett, English Channel,
June 18th, 1924.

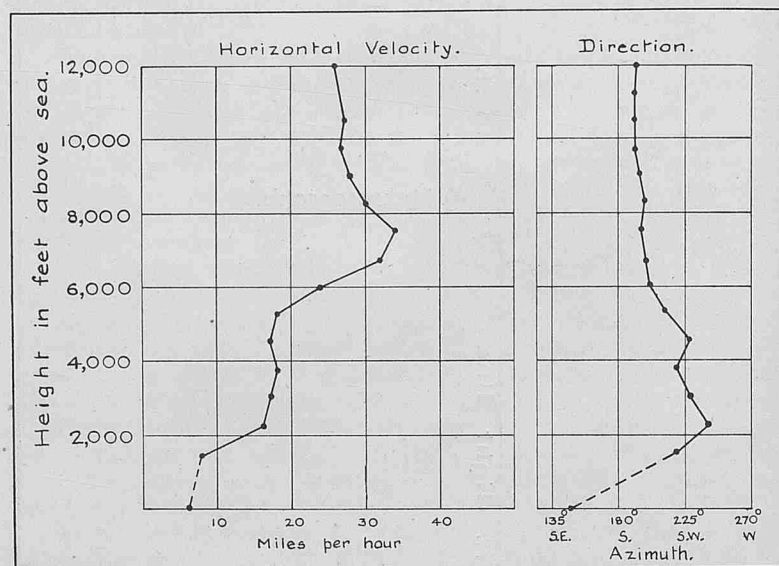


Figure 2.

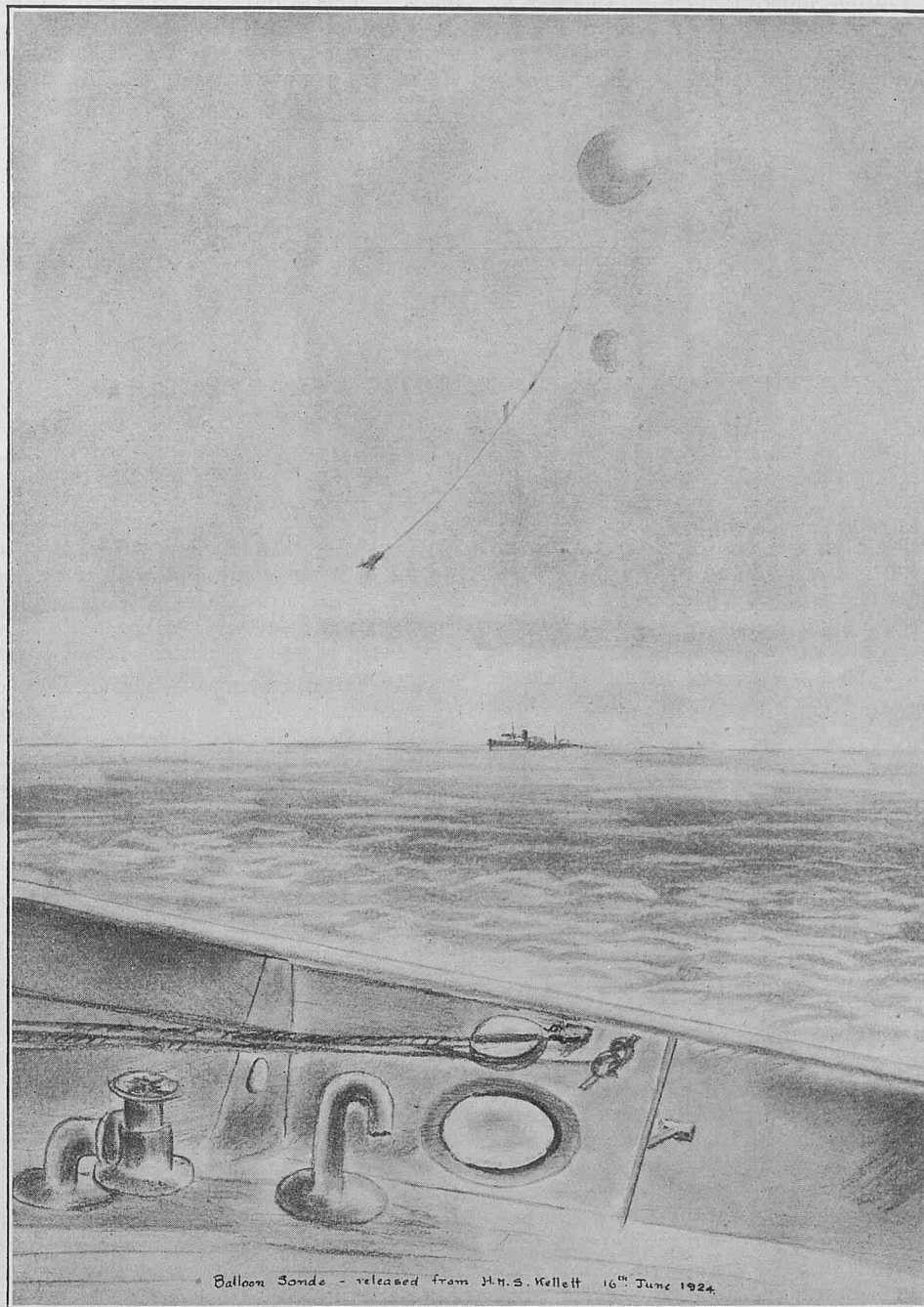
FIGURE 2 gives the horizontal velocity and direction of the wind at different heights. In this ascent, as one would expect, the wind veered rapidly with height and increased its velocity, and at 2,000 feet had changed its direction from S.E. on the surface to S.W. and had increased its velocity from 6 m.p.h. (on the surface) to 15 m.p.h. Above this level the wind appeared to remain fairly steady in a S.S.W. direction up to the limit of the ascent but increased in velocity to a height of 7,500 feet, where it attained its maximum of 34 m.p.h.

This ascent shows that considerable heights can be obtained with moderate-sized balloons with a sextant, when in the hands of experienced observers.

The use of balloons having the greatest possible rate of ascent is clearly of importance at sea in order to attain the vertical height as rapidly as possible before the horizontal distance has become too great, and therefore balloons smaller than 150 inches are of no use for observations with a sextant. The azimuth in this case was obtained from the horizontal arc of the theodolite; it is doubtful whether at such distances it would have been possible to have obtained the bearing satisfactorily by compass.

Ten ascents were also made with the mirror theodolite and observations to heights varying from 1,500–14,000 feet were obtained. The instrument was set up on the boat deck abaft the bridge, this position being clear of obstructions such as boats, davits, etc., and the balloons were inflated near this position. All these ascents were made whilst the ship was steaming 5 knots.

In view of the fact that these observations were only trials of the mirror theodolite, it is considered to be an instrument of practical



Sketch by Commander F. E. B. Haselfoot, D.S.O., R.N.

value. A few alterations in the instrument have been suggested and it is hoped then to give it further trials at sea.

It is needless to say that great assistance was afforded me throughout the experiments by the Captain and Officers of the *Kellett*, without which the expedition would not have been a success.

Observations of the kind which I have described in the foregoing paragraphs are more urgently required at this moment as a contribution to general Meteorology than any other form of observation.

As I have already remarked in my Note in the February issue of this Magazine last year, little or nothing is known of the circulation of the atmosphere over vast tracts of the oceans, and such knowledge is now more than ever necessary in view of the opening up of air routes in all parts of the world. We know that a great advance has been made in the last 20 years in the systematic observations of the upper winds over the land by nearly all the Meteorological Services of the world, and as a result we can form a fairly accurate idea of the circulation of the atmosphere up to high levels over the continents, but our knowledge is incomplete without observations of winds over the sea, and these can only be obtained by those who go down to the sea in ships.

The problem of obtaining fuller knowledge of the general circulation of the atmosphere is not merely of academic interest—it has many important applications of a practical nature. The advance in long-distance aviation, particularly lighter-than-air craft, demands accurate information of winds in regions for which no observations are available.

More knowledge of the dynamical and physical processes in the atmosphere may lead to further accuracy in forecasting, and it is reasonable to hope that a knowledge of the general circulation over regions where tropical storms occur may show that these phenomena are preceded by well-marked variations in the circulation which will lead to the possibility of giving a warning of the formation and travel of these storms which would undoubtedly be a safeguard to seamen, and of great economic value.

In the West Indies certain Colonial Governments are undertaking upper air observations in the hopes of solving the problem of the origin of hurricanes, but to be of real value these observations must also be extended over the sea; such observations have already been commenced by Captain DOUGLAS and are being continued by the present commission of H.M.S. *Ormonde*.

Captain BROOKE SMITH, the Marine Superintendent, in Chapter X. of his "Wireless and Weather, an Aid to Navigation," No. 10, Vol. I., says: "Until fairly extensive observations have been made in the upper air by ships at sea we have to conjecture much of what happens

aloft." This is only too true, and to the hope he expressed that the co-operation of the Navy will be obtained, I can only reply that the observations undertaken in H.M.S. *Ormonde* and the cruise in H.M.S. *Kellett* are a move in the right direction.

NOTES UPON AVERAGE CONDITIONS IN THE INDIAN OCEAN, NORTH OF LATITUDE 35° S.

V. May.

THE normal reading for the month in the area of lowest pressure situated over northern India is 1004 mb. (29·65 in.) whence it increases in a southerly direction to about 1008 mb. (29·77 in.) at the equator.

South of the equator pressure increases to the centre of the permanent high pressure system 1022 mb. (30·18 in.) situated in approximately Latitude 30° S., so that a ship steaming north over this area would obtain a steadily falling barometer the decrease in pressure from south to north being 18 mb. (·53 in.).

Over the Arabian Sea, the isobars run in an approximately west to east direction. Curving southward over the Indian Peninsula, they recurve in a N.E.'ly direction over the Bay of Bengal. The winds, following the general trend of the isobars, are mainly S.W. in the western half and N.W. in the eastern half of the Arabian Sea. South of the Sea to the equator the direction of the wind varies between S.W. and N.W. Eastward of the 80th meridian from the equator northward over the Bay of Bengal the general wind direction is S.W., excepting in the N.E. corner of the Bay, where S.E.'ly winds predominate. The average force of the above winds is between 3 and 4, but may occasionally rise to force 8.

In the South Indian Ocean between the equator and Lat. 5° S., west of the 60th meridian, there are light variable winds with a high percentage of calms off the west coast of Sumatra.

The S.E. trades blow steadily between the west coast of Australia and Madagascar from about Latitude 27° S. to Latitude 5° S., and extend west of the 60th meridian, between Latitude 10° S., and the equator to the African coast. Their average strength varies between forces 3 and 5, but in the heart of the trades, the wind not infrequently blows with the force of a moderate gale. In the Mozambique Channel North of the 20th parallel, the winds light to moderate in force come mainly from a S.E.'ly direction. South of the 20th parallel winds are variable.

South of the Trade wind belt there is an area of variable winds which frequently attain gale force.

Cyclonic Storms.—During May cyclonic storms of extreme violence may form in any part of the Arabian Sea south of Latitude 16° N., and travel in any direction between west and N.E. During the years 1890—1912, five storms occurred in this month, giving a percentage frequency of 11 per cent.

In the Bay of Bengal violent cyclonic storms originate in the south during the first half of the month but during the latter half of the months, may form in any part of the Bay. Their direction of travel is such that any part of the Bay may be visited.

For the years 1877—1912, twenty-one storms were recorded in this month, giving a percentage frequency of 6 per cent. See chart giving tracks of above storms in Vol. I, No. 5.

South Indian Ocean.—For the years 1848–1917 twenty-five storms or 5 per cent. of the total number recorded occurred in this month. Their tracks are similar to those of preceding months, but they originate further to the eastward between the 70th and 90th meridians, rarely travelling west of Rodrigues.

Air Temperature.—There is little difference in the normal air temperature over the whole ocean north of the Equator in this month. In the north of the Arabian Sea, the average temperature is approximately 84° F., decreasing to 83° F., at the Equator. In the north of the Bay of Bengal average temperature is about 85° F., whence it decreases to 83° F. at the Equator. South of the Equator temperature decreases with increased Latitude, being about 65° F. in Latitude 35° S.

Sea Surface Temperature.—The normal sea surface temperature for the month is about 83° F., at the head of the Arabian Sea, 85° F. in the centre and 84° F. in the south. In the Bay of Bengal the normal sea surface temperature is about 85° F. over the whole Bay, excepting close in to the land where it rarely rises above 84° F.

Between Latitudes 5° north and south the normal temperature is between 83° and 84° F., whence it gradually decreases to the southward, being about 65° F. in Latitude 35° S.

Currents.—In the south Indian Ocean, east of the 60th meridian, between the Equator and Latitude 8° S., and between Latitudes 20° and 35° south the sea surface currents are weak and irregular. The S.E. trade drift flows steadily west between the 8th and 20th parallels. On reaching the 60th meridian, it branches, running north and south off Madagascar. The stream setting north of the Island again splits off Cape Delgado, one branch flowing S.W. and the other north along the African coast.

The stream setting down the coast meets that flowing south of Madagascar, off Delagoa Bay and combining continues S.W. keeping parallel with the land around the Cape of Good Hope as the Agulhas Stream.

North Indian Ocean.—The current setting up the East African coast on reaching the Equator divides into two. One stream turning east flows in that direction between Latitudes 2° north and south to the 80th meridian when it gradually turns to the N.E. flowing into the Bay of Bengal. The other stream continuing up the Somali coast passes between Guardafui and Sokotra and keeping parallel with the land flows clockwise around the Arabian Sea. On the western side of the Sea, offshoots from the main stream gradually turning to the S.E. set across and down the centre of the Sea, and reinforcing the set down the west coast of the Indian Peninsula rounds Ceylon and flows in a north and N.E. direction over the Bay of Bengal.

WEATHER SIGNALS.

II. WIRELESS WEATHER BULLETINS.

SPAIN.

C.W. Issues.

Madrid (Carabanchel) W/T Station, approximate Latitude 40° 24' N., Longitude 3° 50' W., call sign EGC, transmits weather bulletins on a wave length of 2,650 metres (C.W.), thrice daily, times of sending as follows:—

0900 G.M.T. (observations of 0700 G.M.T. taken at the stations given below).

1530 G.M.T. (observations of 1300 G.M.T. taken at the stations given below).

2030 G.M.T. (observations of 1800 G.M.T. taken at the stations given below).

Indicator Letters.	Station.	Position (approx.). Lat. Long.	Indicator Letters.	Station.	Position (approx.). Lat. Long.
MD	Madrid ...	40°24'N. 3°41'W.	ME	Melilla ...	35°16'N. 2°58'W.
LC	Corunna ...	43°23'N. 8°25'W.	TE	Tetuán ...	35°32'N. 5°22'W.
SF	San Fernando ...	36°27'N. 6°13'W.	IZ	Izaña (Teneriffe) ...	28°15'N. 16°40'W.
BA	Barcelona ...	41°23'N. 2°09'E.	BI	Bilbao (Algorta) ...	43°15'N. 2°55'W.
SA	Santander ...	43°29'N. 3°49'W.	MG	Málaga ...	36°44'N. 4°26'W.
VD	Valladolid ...	41°39'N. 4°43'W.	VA	Valencia ...	39°28'N. 0°22'W.
ZA	Saragossa ...	41°38'N. 0°53'W.	LA	Larache ...	35°15'N. 6°09'W.
MA	Mahon ...	39°54'N. 4°16'E.	SE	Seville ...	37°23'N. 6°00'W.
BD	Badajoz ...	38°54'N. 6°58'W.	GR	Granada ...	37°11'N. 3°38'W.
CD	Cordova ...	37°53'N. 4°49'W.	TN	Santa Cruz (Teneriffe).	28°30'N. 16°19'W.
AI	Alicante ...	38°21'N. 0°30'W.			
AL	Almeria ...	36°50'N. 2°30'W.			

The bulletins commence with the letters "SME." Special code used in bulletins:—Station indicator letters followed by 4 groups of five figures in each group, then a number of groups containing only 4 figures in each, relating to upper wind observations.

Explanation of Code Figures used in the three Transmissions.

First Group. 1st three figures give the corrected barometer reading in millibars and tenths (initial 9 or 10 omitted). To convert to inches, *see* Table XIII., p. 16, January, 1925, "Marine Observer."

4th and 5th figures give the wind direction true (Table III., p. 13, January, 1925, "Marine Observer").

Second Group. 1st figure gives the wind force by Beaufort scale, forces 9 and above being sent as 9.

2nd and 3rd figures give the weather at the time of observation (Table XXX.).

4th and 5th figures give the temperature of the air in whole degrees Centigrade. (*See* Table XVII., p. 45, March, 1925, "Marine Observer" for conversion to Fahrenheit.)

Third Group. 1st figure gives the characteristic of barometric tendency (Table XXXI.).

2nd and 3rd figures give the amount of barometric tendency in millibars and tenths per three hours.

4th and 5th figures give the rainfall in millimetres, 0930 and 2030 messages only (*see* Note (3), and Table XXXII., for special meanings). In the 1530 message the 4th and 5th figures give the *past weather* (Table XXXIII.).

Fourth Group. 1st figure gives the form of low cloud observed (Table XXXIV.).

2nd figure gives the direction of motion of the low cloud, on scale 0-9; where 0 = no cloud, 1 = from N.E., 2 = from E., etc. 9 = no observation.

3rd figure gives the form of high cloud observed (Table XXXV.).

4th figure gives the direction of motion of high cloud; on same scale as that for low cloud.

5th figure. In the case of stations SF, LC and MA, gives the sea disturbance (Table XXXVI.); for the remaining stations it gives the cloudiness of the horizon (Table XXXVII.).

Remaining Groups. Generally five, containing 4 figures in each, give the direction and speed of the upper winds at various heights at each station. The 1st two figures giving the direction on the scale 01-32; where 08 = E., 16 = S., 24 = W. The 3rd and 4th figures give the wind speed in metres per second. The five groups refer respectively to the five heights as follows:—

(5)23881

Station ZA. } 500 m., 1,000 m., 2,000 m., 3,000 m., 4,000 m.
 " BD. }
 Station MD. }
 " GR. } 1,000 m., 2,000m., 3,000 m., 4,000m., 5,000 m.
 " VD. }
 Station IZ. 3,000 m., 4,000 m., 5,000 m., 6,000 m., 7,000 m.
 All other stations 250 m., 500 m., 1,000 m., 2,000 m., 3,000 m.

NOTE:—

(1) The 1530 G.M.T. transmission is followed by groups containing sea conditions and forecasts in special code.

(2) The 2030 G.M.T. transmission contains the 1800 G.M.T. observations of the first 4 stations only and is in the same form as the 0900 G.M.T. message, but it contains no observations of upper winds.

(3) For stations not reporting at 1800 G.M.T. the amount of rainfall given in the 0700 message refers to the preceding 24 hours. For stations reporting both at 0700 and 1800 G.M.T. the amount refers to the preceding 13 hours in the morning report and the preceding 11 hours in the evening report.

(4) Missing figures are replaced by the letter "X". If a complete set of observations is missing the word "falta" is transmitted after the Indicator letters of the station.

PORTUGAL.

C.W. and Spark Issues.

Monsanto W/T Station, approximate Latitude 38° 44' N., Longitude 9° 11' W., call sign CTV, broadcasts weather bulletins in code at the following times:—

0835 G.M.T. (containing observations of 0700 G.M.T., taken at the undermentioned stations, and also ships' observations).

1935 G.M.T. (containing observations of 1800 G.M.T. taken at the undermentioned stations, and also ships' observations).

Wave lengths used, 3000 metres C.W. for 0835 transmission, and 2400* metres (C.W.) for 1935 transmission. Stations:—

Indicator Letters.	Name.	Position (approximate).	
		Latitude.	Longitude.
Name sent in full.	Lisbon ...	38° 41' N.	9° 08' W.
	Oporto ...	41° 09' N.	8° 34' W.
	Coimbra ...	40° 12' N.	8° 30' W.
	Funchal (Madeira) ...	32° 37' N.	16° 54' W.
	Angra (Azores) ...	38° 39' N.	27° 14' W.

The bulletins are divided into two parts, Part I., containing the land stations' observations, and Part II. those from ships. They commence with the words "Météo Portugal."

Code used, New International.

0835 G.M.T. bulletin: expressed by symbols as follows:—

Part I. — (Station name in full) BBBDD FwwTT cbWVH ALaNh RRmmr mar pD₁D₁ k θ. For meanings and method of decode of the symbols *see* "Weather Signals" Holland (North Sea, C.W. Issue, Soesterberg W/T Station) p. 43, March, 1925, "Marine Observer." The 3rd and 4th symbols of the fifth group, above, (mm) give the minimum air temperature in the interval of 13 hours ending at 0700 G.M.T. The last group pD₁D₁ k θ

* Was shortly to be altered to 3,000 metres (C.W.), no further notice being given.

preceded by the identification letters "mar" gives observations of swell in a special code, viz.:

- p = period of swell in seconds, 0 = (10 seconds or more).
 D₁D₁ = direction from which swell comes (Table III, p.13, January, 1925, "Marine Observer").
 k = height of swell on a progressive scale from 0 to 9.
 θ = tendency of swell at time of observation, by the following scale.
- | | |
|-----------------------|-----------------------|
| 0 No change. | 7 Increasing slowly. |
| 1 Decreasing slowly. | 8 Increasing. |
| 2 Decreasing. | 9 Increasing rapidly. |
| 3 Decreasing rapidly. | |

Part II.—Ships' observations, preceded by the word "Navires"—PQLLL MGG BBDDF wvwKd. For meanings and method of decode of the symbols, see groups 1-4 of "Decode Form" p. 14, January, 1925, "Marine Observer". Barometric pressure is given in whole millimetres, initial 7 omitted. (See Table XV., p. 45, March, 1925, "Marine Observer" to convert to mbs. and ins.).

1935 G.M.T. bulletin—Part I. same form as Part I of 0835 G.M.T. bulletin, with the exception that the 3rd and 4th symbols of the fifth group are now MM and give the maximum air temperature from 0700-1800 G.M.T.

Part II.—same form as Part II. of 0835 G.M.T. bulletin.

Monsanto W/T Station also transmits a weather message at 1245 and 2300 G.M.T. *en clair*, in Portuguese and English, giving:—

- (1) The general pressure distribution at 0700 and 1800 G.M.T.
- (2) The state of the weather at 0700 and 1800 G.M.T. on the coasts of Portugal, Azores, Madeira, Strait of Gibraltar, and the Bay of Biscay.
- (3) A forecast of the weather for the following 24 hours.

Wave lengths used for the above transmissions 1,000 metres (spark) and a repetition, approximately 5 minutes afterwards, on 3,000 metres (C.W.) in each case.

AZORES.

Spark Issue.

Terceira-Faleiras W/T station, approximate Latitude 38° 40' N., Longitude 27° 08' W., call sign PQT, broadcasts weather bulletins in code on a wave length of 1,000 metres (spark), at the following times:—

0830 G.M.T.	(Observations of 0800 G.M.T. from the undermentioned stations).
1330 G.M.T.	(Observations of 1300 G.M.T. from the undermentioned stations).
1830 G.M.T.	(Observations of 1800 G.M.T. from the undermentioned stations).
2330 G.M.T.	(Observations of 2300 G.M.T. from the undermentioned stations).

Stations.	Latitude (Approximate).	Longitude (Approximate).
Angra	38° 39' N.	27° 14' W.
Horta	38° 32' N.	28° 38' W.
Ponta Delgada	37° 44' N.	25° 40' W.

The bulletins begin with the *name* of the observation station.

Code used:—New International, expressed by symbols as follows—

0830 G.M.T. Bulletin: BBBDD FwwTT cbVWH ALaNH RRSV_r MMmm—

1330 G.M.T. do. Same form as 0830 G.M.T. Bulletin, last two groups omitted.

1830 G.M.T. do. Same form as 0830 G.M.T. Bulletin last group omitted.

2330 G.M.T. do. Same form as 0830 G.M.T. Bulletin, last two groups omitted.

The first four groups of the bulletins can be decoded by reference to the explanation given for "Holland, North Sea (C.W. Issue) Soes-

terberg W/T station," p. 43. March, 1925, "Marine Observer." Groups five and six decode as follows:—

- RR = Rainfall, whole millimetres, in 0830 bulletin, for last 13 hours, in 1830 bulletin for last 10 hours. (See also Table XXIII, p. 46, March, 1925, "Marine Observer.")
 S = State of sea and swell (Table XXIV, p. 46, March, 1925, "Marine Observer").
 V_s = Visibility seawards (Table XX, p. 46, March, 1925, "Marine Observer").
 r = Time of commencement of precipitation.
 MM = Maximum air temperature in whole degrees Centigrade.
 mm = Minimum air temperature in whole degrees Centigrade. (To convert to Fahr. see Table XVII, p. 45, March, 1925, "Marine Observer.")

SPECIAL WEATHER TELEGRAPHY TABLES, NOT NEW INTERNATIONAL CODE.

Tables used in conjunction with Spanish Bulletins from Carabanchel W/T Station.

Table XXX.—Present Weather.

NOTE:—Numbers 00 to 49 refer to weather *without* precipitation.
 50 to 97 ,, with precipitation, except for 71,

72, 73.

Code
No.

00	Cloudless absolutely	= b	} No mist or fog.	
01	Some cloud, but less than $\frac{1}{2}$	= b ₁		
02	Sky about $\frac{1}{2}$ clouded	= bc		} Only used when none of the following are applicable.
03	Sky about $\frac{3}{4}$ clouded	= c		
04	Sky overcast, but small amount of blue visible	= o		
		= o		
05	Sky absolutely overcast		} Sky overcast, varying degrees of haze, mist or fog.	
06	Overcast and 1f	} Haze and mist		
07	Overcast and 2f			
08	Overcast and 3f			
09	Overcast and 4f			
10	Overcast and 5f			
11	Overcast and 6f			
12	Overcast and 7f			
13	Overcast and 8f			
14	Haze 1f	} Varying degrees of haze or fog. Information regarding state of sky given by cloud group.		
15	Haze 2f			
16	Fog 3f			
17	Fog 4f			
18	Fog 5f			
19	Fog 6f	} Varying degrees of mist or wet fog. Information regarding state of sky given by cloud group.		
20	Fog 7f			
21	Fog 8f			
22	Mist 1fe			
23	Mist 2fe			
24	Fog 3fe	} Miscellaneous Phenomena.		
25	Fog 4fe			
26	Fog 5fe			
27	Fog 6fe			
28	Fog 7fe			
29	Fog 8fe			
30	e (wet air)	} Miscellaneous Phenomena.		
31	Exceptional visibility			
32	Haze			
33	Dew			
34	Hoar Frost			
35	Rime			
36	Glazed Frost			
37	Glazed Roads			
38	Solar halo			
39	Lunar halo			
40	Solar corona			
41	Lunar corona			
42	Aurora			
43	Squalls			
44	Gale			
45	Gloom			
46	Ugly, threatening			
47	Thunder			
48	Lightning			
49	Thunder and lightning			

Code No.	
50	Slight rain and 2f or 3f
51	Moderate rain and 2f or 3f
52	Heavy rain and 2f or 3f
53	Slight rain and 4f or 5f
54	Moderate rain and 4f or 5f
55	Heavy rain and 4f or 5f
56	Slight rain and 6f to 8f
57	Moderate rain and 6f to 8f
58	Heavy rain and 6f to 8f
59	Slight rain and squalls of wind
60	Moderate rain and squalls of wind
61	Heavy rain and squalls of wind
62	Slight rain and hail and squalls
63	Moderate rain and hail and squalls
64	Heavy rain and hail and squalls
65	Slight sleet and squalls
66	Moderate sleet and squalls
67	Heavy sleet and squalls
68	Slight snow and squalls
69	Moderate snow and squalls
70	Heavy snow and squalls
71	Snow lying covering the whole country
72	Snow lying but patches of bare ground
73	Snow lying and deep drifts
74	
75	
76	
77	Slight drizzle
78	Moderate drizzle
79	Thick drizzle
80	Slight rain
81	Moderate rain
82	Heavy rain
83	Slight hail
84	Moderate hail
85	Heavy hail
86	Slight sleet
87	Moderate sleet
88	Heavy sleet
89	Slight snow
90	Moderate snow
91	Heavy snow
92	Slight thunderstorm
93	Moderate thunderstorm
94	Heavy thunderstorm
95	Slight thunderstorm
96	Moderate thunderstorm
97	Heavy thunderstorm

Table XXXI.—Characteristic of Barometric Tendency.

Code Figure.	Code Figure.
0	Steady.
1	Rising.
2	Rising then steady.
3	Rising then falling.
4	Falling or steady, then rising.
5	Falling.
6	Falling then steady.
7	Falling then rising.
8	Rising or steady, then falling.
9	Line squall.

Table XXXII.—Rainfall, special significance.

The following code figures are used with a special significance.

Code Figures.	
00	No precipitation.
99	Precipitation has occurred, but its amount has not been measured.
98	Precipitation exceeding 96 mm.
97	"Trace" of precipitation, amount less than 0.5 mm.

Amounts exceeding 96 mm. are reported in full at the end of the message, the figures 98 being inserted in the coded part

Table XXXIII.—Past Weather.

NOTES :—Numbers 00 to 49 refer to past weather where there has been no precipitation.
Numbers 50 to 97 refer to past weather where there has been precipitation.

Code No.	
00	Cloudless
01	Mainly b and bc; medium or high cloud
02	Mainly b and bc; low cloud
03	Mainly b and bc; mixed cloud
04	Mainly bc and c; medium or high cloud
05	Mainly bc and c; low cloud
06	Mainly bc and c; mixed cloud
07	Mainly c and o; medium or high cloud
08	Mainly c and o; low cloud
09	Mainly c and o; mixed cloud
10	Overcast, but occasional patches of blue sky visible; medium or high cloud.
11	Overcast, but occasional patches of blue sky visible; low cloud.
12	Overcast, but occasional patches of blue sky visible; mixed cloud.
13	Completely overcast, with no blue sky at all visible; low cloud or mixed cloud.
14	Mainly b and c; low cloud or mixed cloud
15	Overcast and 1f
16	Overcast and 2f
17	Overcast and 3f
18	Overcast and 4f or 5f
19	Overcast and 6f to 8f
20	Haze 1f
21	Haze 2f
22	Fog 3f
23	Fog 4f or 5f
24	Fog 6f or 8f
25	Mist 1fe
26	Mist 2fe
27	Fog 3fe
28	Fog 4fe or 5fe
29	Fog 6fe to 8fe
30	e (wet air)
31	Exceptional visibility
32	Haze
33	Dew
34	Hoar frost
35	Rime
36	Glazed frost
37	Glazed roads
38	Solar halo
39	Lunar halo
40	Solar corona
41	Lunar corona
42	Aurora
43	Squalls
44	Gale
45	Gloom
46	Ugly, threatening
47	Thunder
48	Lightning
49	Thunder and lightning
50	Passing showers slight
51	Passing showers moderate
52	Passing showers heavy
53	Passing showers slight
54	Passing showers moderate
55	Passing showers heavy
56	Passing showers slight
57	Passing showers moderate
58	Passing showers heavy
59	Passing showers slight
60	Passing showers moderate
61	Passing showers heavy
62	Occasional slight
63	Occasional moderate
64	Occasional thick
65	Occasional slight
66	Occasional moderate
67	Occasional heavy
68	Occasional slight
69	Occasional moderate
70	Occasional heavy
71	Occasional slight
72	Occasional moderate
73	Occasional heavy
74	Occasional slight
75	Occasional moderate
76	Occasional heavy

Without precipitation or fog.

Fog, but no precipitation.

Special phenomena without precipitation.

Rain

Hail or rain and hail

Sleet or rain and sleet

Snow

Drizzle

Rain

Rain and hail

Sleet or rain and sleet

Snow

Occasional precipitation.

Code

No.

77	Continuous or nearly continuous slight	}	Drizzle.
78	Continuous or nearly continuous moderate		
79	Continuous or nearly continuous heavy	}	Rain.
80	Continuous or nearly continuous slight		
81	Continuous or nearly continuous moderate		
82	Continuous or nearly continuous heavy	}	Rain and hail.
83	Continuous or nearly continuous slight		
84	Continuous or nearly continuous moderate	}	Sleet or rain and sleet.
85	Continuous or nearly continuous heavy.		
86	Continuous or nearly continuous slight	}	Snow.
87	Continuous or nearly continuous moderate		
88	Continuous or nearly continuous heavy		
89	Continuous or nearly continuous slight	}	Thunderstorm.
90	Continuous or nearly continuous moderate		
91	Continuous or nearly continuous heavy	}	without hail
92	Thunderstorm slight		
93	Thunderstorm moderate	}	with hail
94	Thunderstorm heavy		
95	Thunderstorm slight		
96	Thunderstorm moderate	}	Thunderstorm.
97	Thunderstorm heavy		

Definition of letter "f" in Tables XXX. and XXXIII.

Number.	Distance of most distant object visible
8f	Less than 25 metres (22½ yards).
7f	25 " "
6f	50 " (55 yards).
5f	100 " (110 yards).
4f	200 " (220 yards).
3f	500 " (550 yards).
2f	2,000 " (1¼ miles).
1f	10,000 " (6¼ miles).
0f	30,000 " (18¾ miles).

Table XXXIV.

Form of Low Cloud.

Code Figure.	
0	No low cloud.
1	Fracto-cumulus.
2	Mammato-cumulus.
3	Low strato-cumulus.
4	High strato-cumulus.
5	Nimbus.
6	Cumulus.
7	Cumulo-nimbus.
8	Stratus.
9	No observation.

Table XXXVI.

Sea Disturbance.

Code Figure.	
0	Sea calm.
1	Sea very smooth.
2	Sea smooth.
3	Sea slight.
4	Sea moderate.
5	Sea rather rough.
6	Sea rough.
7	Sea high.
8	Sea very high.
9	Sea phenomenal.

Table XXXV.

Form of High Cloud.

Code Figure.	
0	No high cloud.
1	Cirrus.
2	Cirro-stratus.
3	Cirro-cumulus.
4	False cirrus.
5	Thin alto-stratus.
6	Thick alto-stratus.
7	Alto-cumulus (low).
8	Alto-cumulus (high).

Table XXXVII.

Cloudiness of Horizon.

Code Figure.	
0	All horizon without cloud.
1	Clouds in N. part of horizon.
2	Clouds in E. part of horizon.
3	Clouds in S. part of horizon.
4	Clouds in W. part of horizon.
5	All horizon covered with clouds except 1st quadrant.
6	All horizon covered with clouds except 2nd quadrant.
7	All horizon covered with clouds except 3rd quadrant.
8	All horizon covered with clouds except 4th quadrant.
9	All horizon covered with cloud.

WIRELESS STORM WARNINGS.

SPAIN.

Madrid, Carabanchel W/T Station, call sign EGC, transmits a storm warning, when necessary, after the daily weather bulletin at 1530 G.M.T. Wave length used 2,650 metres (C.W.). The storm warning is preceded by the word "precaución," followed either by the letters Ci (indicating cyclonic depression) or Gr (indicating a squall) sent as follows:—

Precaución Ci LLGGBB; or

Precaución Gr LLGGBBDD.

LL = Latitude.

GG = Longitude (Greenwich).

BB = Barometer in whole millibars.

DD = Direction in which storm is proceeding, by Table III., p. 13, January, 1925, "Marine Observer."

} In degrees giving the position of the centre of the depression.

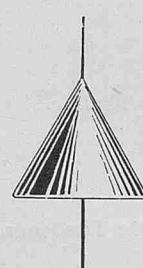
IV. VISUAL STORM WARNINGS.

SPAIN.

Storm signals are made at several Spanish ports in accordance with the system as explained under "Visual Storm Warnings" France, p. 64, April, 1925, "Marine Observer," but there is no system in general use.

PORTUGAL, WEST AND SOUTH COASTS.

A new system of storm signals, as explained below, has been established at semaphore stations and port offices on the coasts of Portugal.

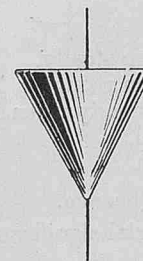


West Coast Signification.

Gale probable from W. to N.

South Coast Signification.

Gale probable from E. to S.



Gale probable from S. to W.

Gale probable from S. to W.

By night, at the port offices, the cone is replaced by three red lights in the form of a triangle.

LIST OF VOLUNTARY OBSERVING SHIPS.

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

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

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

Only in special cases will individual letters be sent.

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

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

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

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

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

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

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

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

No. = Keeps Ship's Meteorological Report Form 911 with ship's instruments.

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

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

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.3.25.	Date Received.
<i>Aba</i> ...	Hughes, J. ...	G. Pugh Williams ...	No.	Elder Dempster ...	Form 911 11.12.24 to 15.1.25...	21.1.25.
<i>Abinsi</i> ...	Wright, J. B. ...	W. Borrows ...	"	Elder Dempster ...	" 24.12.24 to 30.1.25...	5.2.25.
<i>Actor</i> ...	Haylett, E. ...	W. Rennie ...	"	Harrison ...	" 22.8.24 to 6.9.24 ...	7.10.24.
<i>Adda</i> ...	Toft, J. T. ...	J. E. Wood, E. H. Gatward ...	"	Elder Dempster ...	" 12.6.24 to 18.7.24 ...	21.7.24.
50 <i>Adriatic</i> ...	Beadnell, F. E. ...	J. Collins, R. Hawkins, A. C. ...	W.T.	White Star ...	W.T. Reg. 10.11.24 to 29.11.24...	4.12.24.
	Commr., R.N.R.	I. Anson, L. G. A. Farmer.			Form 911 14.2.25 to 6.3.25 ...	13.3.25.
<i>Agapenor</i> ...	Ramsay, J. ...	J. P. Makepeace ...	No.	A. Holt ...	" 31.8.24 to 10.9.24 ...	23.9.24.
<i>Alban</i> ...	Torrible, R. H. ...	G. E. Freeman ...	"	Booth ...	" 20.1.25 to 2.2.25 ...	9.3.25.
<i>Albania</i> ...	Gronow, S. ...	E. W. Connell ...	"	Cunard ...	" 3.11.24 to 11.11.24...	28.11.24.
<i>Algerian Prince</i> ...	Rowlands, D. ...	G. Potts ...	"	Prince ...	" 30.9.24 to 12.10.24...	16.10.24.
<i>Alipore</i> ...	Gordon, L. M., R.D.	F. R. W. Page ...	"	P. and O. ...	" 11.1.25 to 3.2.25 ...	11.3.25.
	Commr., R.N.R.					
<i>Almanzora</i> ...	Mackenzie, G. A. ...	A. P. Portsmouth ...	"	R.M.S.P. ...	" 28.11.24 to 11.1.25...	16.1.25.
<i>Alondra</i> ...	J. J. Prendergast ...	H. Martin ...	"	Yeoward ...	" 31.1.25 to 22.2.25 ...	2.3.25.
<i>Ampetco</i> ...	Verstichelen, A. ...	E. Smet ...	"	American Petroleum... L.M. & S. Rly.	" 14.12.24 to 21.1.25...	13.3.25.
<i>Anglia</i> ...	Sorge, P. ...	W. H. Hughes ...	C.C.	Form 911 21.12.24 to 9.1.25 ...	Telegraphic Report 11.4.24 ...	11.4.24.
<i>Antiochus</i> ...	Wilkinson, H. ...	A. C. D. Howes ...	No.	A. Holt ...	" 21.12.24 to 9.1.25 ...	20.2.25.
<i>Aorangi</i> ...	Crawford, R. ...	R. B. Denniston ...	M.L.	Canadian-Australasian Elder Dempster	" 9.7.24 to 21.12.24 ...	29.12.24.
<i>Appam</i> ...	Yardley, H. A. ...	B. Holt, J. Doyle, P. Marriott	M.L.		Met. Log. 9.7.24 to 21.12.24 ...	29.12.24.
30 <i>Aquitania</i> ...	Charles, Sir J. T. ...	W. K.B.E., C.B., R.D. Commadore, R.N.R.	W.T.	Cunard ...	W.T. Reg. 13.2.25 to 26.2.25 ...	2.3.25.
	Gordon, A. S. ...	R. Lloyd Harry ...	No.	Eastern and Australian Union Castle	Form 911 17.8.24 to 18.10.24...	15.12.24.
<i>Armada Castle</i> ...	Millard, L. A. ...	M. M. Tomkins ...	"	"	" 2.1.25 to 18.1.25 ...	10.2.25.
<i>Arracan</i> ...	Willis, M. ...	McInnes, M. S. Stuart, A. McCullum, R. Morrison.	M.L.	P. Henderson ...	Met. Log. 27.9.24 to 7.2.25 ...	25.2.25.
<i>Arundel</i> ...	Short, H. ...	Mr. Hill ...	C.C.	Southern Rly. Union Castle	Telegraphic Report 1.2.25 ...	1.2.25.
<i>Arundel Castle</i> ...	Hague, J. W. Commr., R.N.R.	G. Blaiklock, C. Williams, F. Granger.	M.L.	"	Met. Log. 12.9.24 to 4.1.25 ...	12.1.25.
<i>Assyria</i> ...	Erskine, E. ...	J. Hamilton ...	No.	Anchor ...	Form 911 9.11.24 to 3.12.24 ...	12.12.24.
<i>Astronomer</i> ...	Booth, W. M. ...	L. Harriman, H. Thomas, E. Shatton.	M.L.	Harrison ...	Met. Log. 11.11.24 to 8.2.25 ...	18.2.25.
<i>Athenic</i> ...	Jones, J. L. ...	C. Cochrane ...	No.	White Star ...	Form 911 2.11.24 to 24.12.24...	12.1.25.
<i>Atsuta Maru</i> ...	Furuhashi, M. ...	S. Mizoguchi ...	"	Nippon Yusen Kaisha ...	" 3.1.25 to 2.2.25 ...	9.3.25.
<i>Auditor</i> ...	Owen, W. F. ...	T. E. Steel ...	"	Harrison ...	" 18.1.25 to 20.2.25 ...	23.2.25.
<i>Auldmuir</i> ...	Ramsay, J. D. ...	J. A. S. Adams ...	"	Glen & Co. ...	" 11.10.24 to 27.10.24 ...	11.11.24.
<i>Ausonia</i> ...	Gibbons, G., R.D. Commr., R.N.R.	A. T. Hamer ...	"	Cunard ...	" 27.9.24 to 18.10.24...	30.10.24.
<i>Avon</i> ...	Matthews, J. E. P. ...		No.	R.M.S.P. ...	Form 911 ...	...
51 <i>Baltic</i> ...	A. Holme ...	E. A. A. Crowley, J. Law, F. Patchett.	W.T.	White Star ...	W.T. Reg. 26.1.24 to 15.2.25 ...	17.2.25.
<i>Bambra</i> ...	Wyles, W. S. ...	G. Buckridge, H. W. Norris, J. Eggleston, W. Walters.	M.L.	State Service, Australia	Form 911 26.1.25 to 15.2.25 ...	18.2.25.
<i>Bampton Castle</i> ...	Swiney, W. A. ...	L. C. Chapman, H. A. Deiler, C. B. Hoggan.	"	Union Castle ...	Met. Log. 28.6.24 to 11.11.24...	10.2.25.
<i>Banbury Castle</i> ...		C. C. Page ...	No.		" 25.1.24 to 7.10.24 ...	20.10.24.
<i>Banffshire</i> ...	Wynne, R. H. ...	J. M. Bowie ...	"	Turnbull Martin ...	Form 911 27.10.24 to 4.12.24...	16.1.25.
<i>Barambah</i> ...	Daniel, F. ...	T. Swann ...	"	Commonwealth Govt. Hogarth & Sons	" 29.11.24 to 18.12.24 ...	9.3.25.
<i>Baron Cawdor</i> ...	Baillie, T. ...	A. Campbell ...	"	"	" 15.8.24 to 28.8.24 ...	16.10.24.
<i>Barpeta</i> ...	Beeble, T. S. ...	W. G. E. Rawlingson ...	"	British India ...	" 24.12.24 to 25.1.25...	16.2.25.
<i>Beaufort</i> ...	Rice, W. V., D.S.O., D.S.C., Commr., R.N.	H. M. S. Forbes ...	M.L.	His Majesty's Ship ...	Met. Log. 28.7.24 to 3.11.24 ...	28.11.24.
59 <i>Belgenland</i> ...	Bradshaw, J. ...	C. J. Murray, J. M. Appleby, H. H. Grace.	W.T.	Red Star ...	W.T. Reg. 21.7.24 to 11.9.24 ...	1.11.24.
					Form 911 26.9.24 to 16.10.24...	20.10.24.
<i>Bennider</i> ...	Cole J. H. D.S.C. ...	W. M. Webster ...	No.	Ben Line ...	Form 911 26.9.24 to 15.10.24...	20.10.24.
<i>Benloe</i> ...	McCorquodale, A. ...	G. M. Duff ...	"	Ben Line ...	" 14.1.25 to 22.2.25 ...	23.2.25.
31 <i>Berengaria</i> ...	Irvine, W. R. D., R.D. Capt., R.N.R.	R. F. Boyce, C. H. Morris, A. G. S. Caldwell, J. A. Myles.	W.T.	Cunard ...	W.T. Reg. 25.11.24 to 13.12.24 ...	20.12.24.
					Form 911 29.1.25 to 12.2.25 ...	16.2.25.
					" 19.2.25 to 5.3.25 ...	9.3.25.
					Form 911 28.1.25 to 13.2.25 ...	16.2.25.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.3.25.	Date Received.
Bernini ...	Evans, W. ...	H. L. Rudd ...	No.	Lampport & Holt ...	Form 911 21.11.24 to 31.1.25...	16.2.25
Berrima ...	Townshend, W. P. ...	H. C. Slinn ...	No.	P. & O. Branch ...	28.10.24 to 11.11.24 ...	15.12.24
Bogota ...	Dunn, R. E. ...	W. E. Mc. Mullen ...	No.	R.M.S.P. Co. ...	3.10.24 to 22.12.24...	8.1.25
Bolingbroke ...	Stewart, A. ...	C. E. Duggan ...	M.L.	Canadian Pacific ...	Met. Log. 25.8.24 to 23.9.24 ...	2.10.24
Borda ...	Holland, R. ...	S. W. Keay ...	No.	P. & O. Branch ...	Form 911 4.9.24 to 15.1.25 ...	6.2.25
Bothwell ...	Hamilton, G. ...	W.J.P. Roberts, G.B. Marriott ...	"	Canadian Pacific ...	23.1.25 to 27.2.25 ...	2.3.25
Brandon ...	Mc. Combie, G. F. G. ...	W.J.P. Roberts, G.B. Marriott ...	"	"	22.12.24 to 24.1.25 ...	30.1.25
Brecon ...	J. Newman... ..	J. Mackenzie, H. C. Waters, T. J. Webster, D. Durin, N. B. Goater, T. Golby.	M.L.	"	Met. Log. 2.12.24 to 24.2.25 ...	4.3.25
Brenda ...	Murdoch, R. G. ...	F. R. Ness ...	No.	Scottish Fishery Board	Form 911 1.2.25 to 24.2.25 ...	10.3.25
Brighton ...	Hill, A. ...	Mr. Munton ...	C.C.	Southern Railway ...	Telegraphic Report 13.3.25 ...	13.3.25
British Advocate ...	Taylor, R. J. ...	"	No.	British Tankers ...	"	"
British Engineer... ..	T. W. Jours ...	E. L. Miller ...	No.	"	Form 911 2.12.24 to 1.1.25 ...	16.2.25
Browning ...	Connorton, C. A. ...	W. E. Johnston ...	"	Lampport & Holt ...	" 17.11.25 to 6.2.25 ...	23.2.25
Brugere ...	Denson, W. ...	C. E. Legg ...	"	"	" 11.1.25 to 4.2.25 ...	11.3.25
Cambria C.S. ...	Wightman, H. G. E., D.S.C. ...	E. N. L. Staples ...	M.L.	Eastern Tel. Co. ...	Met. Log. 8.7.24 to 5.10.24 ...	27.1.25
Cambria ...	"	V. S. Phillips ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report 12.3.25 ...	12.3.25
Camito... ..	Scudamore, J. H. H., D. S. C., R. D., Commr., R.N.R. ...	D. A. Jack, R. M. Cossantine, S. Borrie, S. Ray.	M.L.	Elders & Fyffes ...	Met. Log. 8.7.24 to 13.12.24 ...	10.12.24
Canada ...	Jones, T. ...	F. W. Laws ...	No.	White Star-Dominion	Form 911 29.11.24 to 20.12.24 ...	30.12.24
Canadian Importer ...	"	K. Macleod ...	No.	Canadian Govt. Mercantile Marine.	Form 911 ...	"
Canadian Inventor ...	Roberts, R. P. ...	S. M. Holinden ...	"	Canadian Govt. Merchant Marine.	" 16.12.23 to 6.2.24 ...	24.3.24
Canadian Raider ...	Dixon, C. G. ...	H. W. Mosher ...	No.	Canadian Govt. Mercantile Marine.	Form 911 28.12.24 to 10.1.25...	13.3.25
Canadian Scottish	Forson, A. ...	S. Fieldhouse ...	"	"	" 8.1.25 to 24.1.25 ...	9.2.25
Canadian Skirmisher.	Millar, W. H. ...	C. W. Crofts ...	"	" " "	Form 911 21.1.25 to 1.3.25 ...	3.3.25
Canadian Winner	Hocking, N. P. ...	R. D. Ranns ...	"	"	" 10.11.24 to 15.1.25...	3.3.25
Carlou Castle ...	Whitfield, G. J. ...	L. H. Stevens ...	"	Union Castle ...	" 21.8.24 to 3.1.25 ...	6.1.25
35 Carmania ...	McNeil, S. G. S., R.D., Capt., R.N.R. ...	D. S. Kite, W. M. Stewart, T. A. O. Ellis. ...	W.T.	Cunard ...	W.T. Reg. 1.12.24 to 20.12.24...	23.12.24
34 Caronia ...	Diggle, E. G., R.D., Capt., R.N.R. ...	J. A. Quarrie, E. R. Taylor, P. Clarke. ...	W.T.	Cunard ...	Form 911 14.2.25 to 8.3.25 ...	10.3.25
Cassandra ...	Mitchell, W. E. ...	G. M. Sime ...	No.	Anchor Donaldson ...	W.T. Reg. 1.2.25 to 20.2.25 ...	25.2.25
52 Cedric ...	Hickson, V. W. ...	A. E. Weller, G. T. Kavanagh, W. Pearson. ...	W.T.	White Star ...	Form 911 8.10.24 to 16.12.24...	18.12.24
53 Celtic ...	Berry, G. ...	R. S. Walker, D. W. Chamberlain, R. H. Shaw. ...	W.T.	" " "	Form 911 15.2.25 to 7.3.25 ...	10.3.25
Centaur ...	Rose, A. F. ...	L. Johnstone ...	No.	A. Holt & Co. ...	W.T. Reg. 10.2.25 to 7.3.25 ...	11.3.25
Ceramic ...	Summers, F. F. ...	E. E. Burt ...	"	White Star... ..	Form 911 2.2.25 to 21.2.25 ...	25.2.25
Changsha ...	Gambrell, F. C. ...	A. M. Frame, F. G. Stratford, H. Lishman, L. A. Bailie, W. Bailey.	M.L.	Yuill & Co....	Form 911 1.2.25 to 21.2.25 ...	24.2.25
Chignecto ...	Green, J. ...	A. F. Walker ...	No.	R.M.S.P. Co. ...	Met. Log. 12.11.24 to 16.12.24 ...	29.12.24
China ...	King, A. D.S.C. ...	E. Cox Walker ...	"	P. & O. ...	Met. Log. 25.4.24. to 2.10.24...	10.3.25
Chindwara ...	Brisley, P. L. ...	A. G. Earl ...	"	British India ...	Form 911 19.1.24 to 26.2.24 ...	7.4.24
Chindwin ...	Esslemont, C. ...	J. Summers, W. Wilson, C. Owen, J. G. Walker. ...	M.L.	P. Henderson ...	Form 911 9.4.24 to 20.5.24 ...	26.5.24
Chinhua ...	Byers, G. ...	Messrs. Stringer, Taylor, W. E. Chapman, L. V. Rowe. ...	"	China Nav. Co. ...	Met. Log. 2.10.24 to 12.11.24...	1.12.24
City of Alexandria	Bedford, G. B. ...	T. Telleson ...	No.	Ellerman ...	Met. Log. 6.9.24 to 20.11.24 ...	10.12.24
City of Baroda ...	Houghton, W. ...	A. D. Henderson ...	M.L.	"	" 10.7.24 to 15.11.24...	3.2.25
City of Batavia ...	Sproule, A. ...	"	"	"	Form 911 9.2.25 to 16.2.25 ...	25.2.25
City of Benares ...	Nancollas, H. E. ...	S. J. Nash ...	No.	"	Form 911 27.12.24 to 25.1.25...	9.3.25
City of Benares ...	McArthur, J. ...	A. A. Fullerton ...	"	"	" 6.12.24 to 17.12.24...	26.1.25
City of Brisbane ...	Seaborne, F. O. ...	W. E. Fletcher ...	"	"	" 29.12.24 to 23.1.25...	2.2.25
City of Canterbury	Macdonald, K., O.B.E. ...	A. M. Hamilton ...	"	"	" 3.9.24 to 9.11.24 ...	14.11.24
City of Chester ...	Teague, R. E. ...	F. C. Wilson ...	M.L.	"	Met. Log. 29.4.24 to 27.10.24...	18.11.24
City of Edinburgh	Spencer, H. ...	E. V. Henday ...	No.	"	Form 911 31.8.24 to 30.9.24 ...	16.10.24
City of London ...	Martin, D. ...	J. L. Mumford ...	"	"	" 11.2.25 to 23.2.25 ...	3.3.25
City of Marseilles	Brown, G. ...	W. J. Nixon ...	"	"	" 5.12.24 to 28.12.24...	6.1.25
City of Rangoon...	Williams, T. L. ...	W. Ibbotson, S. L. Hoare, T. A. Dexter.	M.L.	"	Met. Log. 25.4.23 to 9.8.23 ...	16.8.23
City of Valencia...	Williamson, W. A., R.D., Lieut-Commr. R.N.R. ...	C. C. Duncan ...	No.	"	Form 911 14.11.24 to 4.2.25 ...	20.2.25
City of Yokohama	Jinks, J. W. ...	R. Moloney ...	"	"	" 22.11.24 to 8.12.24...	22.12.24
Clan Cumming ...	McLean, J. G. ...	S. M. Werrey Easterbrook ...	"	Clan	" 25.12.24 to 29.1.25...	9.3.25
Clan Lindsay ...	Worthington, C. D. ...	G. K. Johnson ...	"	"	Form 911 8.10.24 to 13.11.24...	19.11.24
Clan Macbeth ...	Young, A. H., R.D., Lieut.-Commdr., R.N.R. ...	T. Lund ...	"	"	" 4.1.25 to 21.1.25 ...	23.2.25
Clan Macgillivray	West, W. F. ...	P. G. de Gruchy ...	"	"	" 4.2.25 to 19.2.25 ...	26.2.25
Clan Macindoe ...	Miller, W. ...	F. G. Darnborough ...	"	"	" 24.9.24 to 27.11.24 ...	3.12.24
Clan Mackellar ...	Jones, M. H. ...	E. N. Stewart ...	"	"	" 28.9.24 to 14.11.24...	3.12.24
Clan Mackenzie ...	Young, G. ...	W. G. Arthur, F. B. Fairweather.	"	"	" 7.11.24 to 21.11.24...	12.12.24
Clan Mackinnon	Mackie, R. W. ...	W. S. Holden, T. V. Wilson, C. Jones.	M.L.	"	Met. Log. 6.9.24 to 15.12.24 ...	22.1.25
Clan Macphee ...	Gourlay, J. B. ...	W. D. E. Campbell, F. Buckley, E. C. Carter.	M.L.	"	Met. Log. 13.6.24 to 26.12.24...	2.3.25
Clan Maclaggart...	Gray, J. N. ...	T. Walls ...	No.	"	Form 911 7.12.24 to 2.1.25 ...	27.1.25
Clan Macraicar ...	Phillips, G. P. ...	L. S. Murray ...	"	"	" 3.1.25 to 30.1.25 ...	24.2.25
Clan Malcolm ...	Higgins, C. J. ...	T. G. Young, R. F. Buckley	M.L.	"	Met. Log. 4.5.24 to 7.9.24 ...	22.9.24
Clan Morrison ...	Porterfield, W. M. ...	G. Morren ...	No.	"	Form 911 11.10.24 to 19.11.24 ...	9.12.24
Clan Murdoch ...	Pagan, J. C. ...	C. W. Thomas ...	"	"	" 10.1.25 to 5.2.25 ...	2.3.25
Clan Ranald ...	Openshaw, L. G. ...	W. H. D. Stephen ...	"	"	" 8.11.24 to 21.11.24...	29.12.24
Clan Ross ...	Jones, R. C. ...	G. Short ...	"	"	" 25.10.24 to 2.12.24...	9.12.24
Clan Sinclair ...	Neill, G. A. ...	F. B. Parker ...	"	"	" 21.12.24 to 31.1.25...	5.2.25
Clan Stuart ...	Stenson, F. J., R. D., Commr. R.N.R. ...	R. Silk ...	"	"	" 20.11.24 to 26.11.24 ...	16.1.25
Clan Urquhart ...	Gibb, A. F. W. ...	R. H. Law ...	"	"	" 23.1.25 to 1.3.25 ...	3.3.25
Colonia, C.S. ...	Campos, V., O.B.E., Lt.-Commr., R.N.R. ...	S. A. Garnham, A. S. Muir, J. M. Matthews, W. Sangwine.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 4.10.24 to 21.1.25 ...	30.1.25
Colonial ...	Barrow, R. K. ...	A. V. Jones ...	No.	Harrison ...	Form 911 23.8.24 to 28.11.24...	3.12.24
Colonian ...	Gittins, R. P. ...	W. R. Vaughan ...	"	Leyland ...	" 16.1.25 to 12.2.25 ...	20.2.25
Columbia ...	Gemmell, W. ...	S. G. Taylor ...	"	Anchor ...	" 8.2.25 to 1.3.25 ...	4.3.25

LIST OF VOLUNTARY OBSERVING SHIPS

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Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.3.25.	Date Received.
<i>Concordia</i> ...	Lawson, P. ...	...	M.L.	Anchor Donaldson ...	Met. Log. ...	22.10.24.
<i>Comino</i> ...	Nuttall, E. L. ...	A. McVicar ...	No.	Furness Withy ...	Form 911 9.9.24 to 14.10.24 ...	7.10.24.
<i>Coose</i> ...	Festa, M. ...	C. Keen ...	...	Commonwealth Govt. ...	9.8.24 to 29.8.24 ...	7.10.24.
<i>Corinthic</i> ...	Hart, F. ...	...	M.L.	White Star ...	Met. Log. 13.6.24 to 3.10.24 ...	7.10.24.
<i>Cornish City</i> ...	Bowen, T. S. ...	G. S. Dawes ...	No.	Reardon Smith ...	Form 911 8.1.24 to 16.2.24 ...	7.4.24.
<i>Cornwall</i> ...	Robertson, H. W. ...	W. W. Glover ...	...	Dowie, J., & Co. ...	12.9.24 to 18.10.24 ...	18.11.24.
<i>Crawford Castle</i> ...	Hughes, E. G. ...	J. C. Brown, J. Allan ...	...	Union Castle ...	27.9.24 to 1.2.25 ...	17.2.25.
<i>Culebra</i> ...	Mackay, A. S. ...	A. H. Dabree, S. J. Hill, R. Hocken. ...	M.L.	R.M.S.P. Co. ...	Met. Log. 17.8.24 to 14.10.24 ...	7.11.24.
<i>Cuthbert</i> ...	Reynolds, W. H. B. ...	K. S. Monro, J. Watson ...	No.	Booth ...	Form 911 24.12.24 to 13.2.25 ...	9.3.25.
<i>Cyclops</i> ...	Cosker, W. ...	R. W. Ellis ...	...	A. Holt ...	5.12.24 to 27.2.25 ...	3.3.25.
<i>Dardanus</i> ...	Shaw, A. T. ...	...	No.	A. Holt ...	11.1.25 to 21.1.25 ...	29.1.25.
<i>Darian</i> ...	Masters, W. ...	A. S. Holland ...	...	Leyland ...	18.1.25 to 29.1.25 ...	5.2.25.
<i>Darro</i> ...	Smith, W. E., D.S.O., R.D., Commr., R.N.R. ...	W. H. Fowler ...	...	R.M.S.P. Co. ...	29.11.24 to 24.1.25 ...	28.1.25.
<i>Daytonian</i> ...	Walker, C. J., D.S.C. ...	W. T. Godwin ...	...	Leyland ...	1.2.25 to 4.3.25 ...	13.3.25.
<i>Della</i> ...	Brooks, C., D.S.O., R.D., Commr., R.N.R. ...	J. O. V. Young ...	...	P. & O. ...	28.6.24 to 8.8.24 ...	13.8.24.
<i>Demerara</i> ...	Willan, F. C. L. ...	E. Hewitt ...	...	R.M.S.P. Co. ...	10.1.25 to 29.1.25 ...	23.2.25.
<i>Demosthenes</i> ...	Williams, W. J. ...	R. A. Alcock ...	...	Aberdeen ...	31.1.25 to 19.2.25 ...	10.3.25.
<i>Deseado</i> ...	Wakeman, E. C. ...	S. G. Dawson ...	...	R.M.S.P. Co. ...	21.11.24 to 10.1.25 ...	16.1.25.
<i>Desna</i> ...	Shillito, B., R.D., Commr., R.N.R. ...	A. Hambly ...	...	...	27.12.24 to 21.2.25 ...	3.3.25.
<i>Deucalion</i> ...	Findlay, J. ...	P. W. Savery, O. Thomas ...	...	A. Holt ...	24.12.24 to 16.1.25 ...	19.1.25.
<i>Devon</i> ...	Gardner, H. W. ...	A. Bell ...	...	New Zealand S.S. Co. ...	20.12.23 to 11.5.24 ...	4.6.24.
<i>Dieppe</i> ...	Marmery, S. ...	Mr. Parsons ...	O.C.	Southern Railway ...	Telegraphic Report 12.3.25 ...	12.3.25.
<i>Digby</i> ...	Westgarth, W. A., D.S.C. ...	J. Pascoe, J. W. Murphy, W. P. Paterson. ...	M.L.	Furness Withy ...	Met. Log. 17.4.24 to 9.11.24 ...	26.11.24.
<i>Dimboola</i> ...	Chambers, F. W., D.S.C. ...	...	...	...	...	...
<i>Discoverer</i> ...	Roy, C. M. ...	G. A. Molyneux ...	No.	Melbourne S.S. Co. ...	Form 911 21.11.24 to 16.12.24 ...	19.1.25.
<i>Dogra</i> ...	Ling, J. T. ...	J. Richardson ...	...	Harrison ...	30.11.24 to 9.3.25 ...	11.3.25.
<i>Domala, M.V.</i> ...	Hartock, L. ...	B. C. Akers ...	...	Asiatic S.N. Co. ...	27.12.24 to 12.1.25 ...	2.2.25.
<i>61 Doric</i> ...	Buswell, W. ...	C. E. Merchant ...	...	British India ...	1.2.25 to 11.2.25 ...	2.3.25.
	S. Bolton ...	S. Fieldwood, T. F. Pratt, O. V. Lucas. ...	W.T.	White Star ...	W.T. Reg. 9.2.25 to 1.3.25 ...	5.3.25.
<i>Doric Star</i> ...	Thomas, R. T. ...	A. S. Menzies ...	No.	Blue Star ...	Form 911 29.9.24 to 27.10.24 ...	5.12.24.
<i>Dorington Court</i> ...	Isaacs, W. A. ...	E. V. Quickenden ...	...	Haldin & Co. ...	17.8.24 to 8.9.24 ...	18.9.24.
<i>Dorsel</i> ...	Kettlewell, C. R. ...	H. S. White, H. Neagle, J. S. Bloomfield, L. Cann. ...	M.L.	New Zealand S.S. Co. ...	Met. Log. 3.4.24 to 6.10.24 ...	10.10.24.
<i>Dromore Castle</i> ...	Linklater, H. ...	S. S. Smith ...	No.	Union Castle ...	Form 911 16.12.24 to 9.1.25 ...	30.1.25.
<i>Dryden</i> ...	Knight, R. A. ...	G. D. Oldfield ...	...	Lampert & Holt ...	28.9.24 to 7.12.24 ...	6.1.25.
<i>Dundrum Castle</i> ...	Kershaw, H. J. ...	R. May ...	...	Union Castle ...	29.11.24 to 30.12.24 ...	16.1.25.
<i>Dundes</i> ...	Pape, E. R. ...	D. P. Morgan ...	...	Pacific S.N. Co. ...	22.11.24 to 24.12.24 ...	29.12.24.
<i>Duffield</i> ...	King A. ...	T. S. Robertson ...	...	Hunting & Sons ...	10.11.24 to 9.12.24 ...	16.12.24.
<i>Duquesa</i> ...	Pearson, J. M. ...	C. P. Lane ...	...	Furness Withy ...	Form 911 25.10.24 to 31.12.24 ...	5.1.25.
<i>Durenda</i> ...	Wilson, W. ...	W. H. Creese ...	...	British India ...	6.10.24 to 12.11.24 ...	15.12.24.
<i>Edinburgh Castle</i> ...	Strong, H., R.D., Commr., R.N.R. ...	...	M.L.	Union Castle ...	Met. Log. 11.4.24 to 12.10.24 ...	27.10.24.
<i>Eemland</i> ...	Van Noppen, C. D. ...	J. G. Sander ...	No.	Holland Lloyd ...	Form 911 27.11.24 to 4.2.25 ...	10.3.25.
<i>El Cordobes</i> ...	Noton, F. G. ...	N. H. Oldham ...	...	British & Argentine S.N. Co. ...	29.11.24 to 29.12.24 ...	16.1.25.
<i>Elmina</i> ...	Millson, H. E. ...	R. Wilkinson, C. Cryer, R. Griffiths. ...	M.L.	Elder Dempster ...	Met. Log. 10.10.24 to 21.2.25 ...	11.3.25.
<i>El Paraguay</i> ...	Ellis, F., D.S.C. ...	W. E. Williams ...	No.	Houlder Bros. ...	Form 911 8.11.24 to 8.1.25 ...	16.1.25.
<i>Elpenor</i> ...	T. W. Hannay ...	P. E. Wright, W. T. Pennington. ...	M.L.	A. Holt ...	Met. Log. 3.11.24 to 18.2.25 ...	23.2.25.
<i>Elysia</i> ...	Kinnaird, J. ...	A. Grant ...	No.	Anchor ...	Form 911 16.2.24 to 8.3.24 ...	1.4.24.
<i>Empress of Asia</i> ...	Douglas, L. D., R.D., Lt. - Commr., R.N.R. ...	G. H. Blyth, A. M. Barff, D. Smith, L. Johnston ...	M.L.	Canadian Pacific ...	Met. Log. 25.9.24 to 26.1.25 ...	3.3.25.
<i>Empress of Australia</i> ...	Halley, A. J. ...	C. Critchley, R. A. Leicester, A. B. Smith ...	M.L.	...	24.4.24 to 28.10.24 ...	24.11.24.
<i>Empress of Canada</i> ...	Robinson, S., C.B.E., R.D., Commr., R.N.R. ...	W. S. Halliday, L. C. Barry ..	M.L.	...	Met. Log. 19.6.24 to 13.11.24 ...	29.12.24.
<i>Empress of France</i> ...	Griffiths, E. ...	O. Pennington, E. Roberts, A. W. Patrick. ...	M.L.	...	7.6.24 to 11.11.24 ...	18.11.24.
<i>Empress of Russia</i> ...	Hosken, A. J. ...	— Reid ...	M.L.	...	28.8.24 to 8.12.24 ...	26.1.25.
<i>Empress of Scotland</i> ...	Gillies, J., C.B.E. ...	B. Grant, S. C. Fox, D. Loram, L. W. Akerman, W. J. Phillips. ...	M.L.	...	Met. Log. 26.4.24 to 29.10.24 ...	11.12.24.
<i>Endeavour</i> ...	Commr. S. A. Geary-Hill, D.S.O., R.N. ...	M. L. Harrison, E. V. B. Baker, E. H. B. Baker. ...	M.L.	His Majesty's Ship ...	Met. Log. 2.10.24 to 29.1.25 ...	3.3.25.
<i>Essequibo</i> ...	Duncan, E. E. ...	L. W. Hanson ...	No.	R.M.S.P. Co. ...	Form 911 6.11.24 to 23.12.24 ...	5.1.25.
<i>Eumaeus</i> ...	Read, J. W. ...	E. R. Pritchard ...	...	A. Holt ...	9.2.25 to 16.2.25 ...	25.2.25.
<i>Euripides</i> ...	Collins, P. J., O.B.E. ...	H. S. Cox, G. R. Fisher, F. Fuller. ...	M.L.	Aberdeen ...	Met. Log. 10.10.24 to 2.2.25 ...	9.2.25.
<i>Eurybates</i> ...	Lloyd, R. ...	J. J. Goldsmith ...	No.	A. Holt ...	Form 911 12.1.25 to 4.3.25 ...	12.3.25.
<i>Explorer</i> ...	Lamont, A. ...	Scientific Staff ...	M.L.	Scottish Fishery Board ...	Met. Log. 20.6.24 to 27.9.24 ...	24.10.24.
<i>Fitzroy</i> ...	Silk, H. V., Lt.-Commr., R.N. ...	C. W. Sabine ...	M.L.	His Majesty's Ship ...	24.7.24 to 31.10.24 ...	11.11.24.
<i>Flandria</i> ...	Veldkamp, G. J. ...	T. Doornbosch ...	No.	Holland Lloyd ...	Form 911 13.12.24 to 30.1.25 ...	2.2.25.
<i>Flinders</i> ...	Henderson, D. A., Lt.-Commr., R.N. ...	K. F. Boxall ...	M.L.	His Majesty's Ship ...	Met. Log. 26.7.24 to 30.10.24 ...	18.11.24.
<i>Francisco</i> ...	Wilkins, J., O.B.E. ...	C. Leonard ...	No.	Ellerman Wilson ...	Form 911 16.1.25 to 23.2.25 ...	3.3.25.
<i>Frankenfels</i> ...	Cartmer, G. E., O.B.E. ...	L. M. Burfitt, J. H. A. Mackie, J. Garmory. ...	M.L.	India Office Shipping ...	Met. Log. 1.11.24 to 5.2.25 ...	14.2.25.
<i>Freienfels</i> ...	Cleugh, J. W. ...	C. H. Porter, V. R. Watkins, H. Wilson. ...	...	...	7.9.24 to 7.12.24 ...	17.12.24.
<i>Freya</i> ...	Hughes, W. ...	J. H. Hennessey ...	No.	Scottish Fishery Board ...	Form 911 6.2.25 to 27.2.25 ...	6.3.25.
<i>Gallie</i> ...	Summers, F. F., R.D., Commr., R.N.R. ...	W. G. O. Jones ...	...	White Star ...	Met. Log. 3.8.24 to 9.12.24 ...	12.12.24.
<i>Galtymore</i> ...	Ledsome, J. S. ...	N. Goubrough ...	...	Furness Withy ...	Form 911 12.1.25 to 20.1.25 ...	23.1.25.
<i>Garret</i> ...	Visser, C. W. ...	F. Weeda ...	...	Rotterdam Lloyd ...	19.11.24 to 6.1.25 ...	12.1.25.
<i>Gascoyne</i> ...	Mills, A. ...	P. G. Collins ...	...	Dalgaty & Co. ...	21.10.24 to 1.2.25 ...	9.3.25.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log Register, or Report Contributed. Received up to 13.3.25.	Date Received.
<i>Gelria</i> ...	Kolkman, J. M. ...	J. N. F. Cordijs ...	No.	Holland Lloyd ...	Form 911 21.11.24 to 12.1.25...	16.1.25.
<i>Glenamoy</i> , M.V. ...	Angier, J. ...	L. C. Riggs ...	"	Glen Line ...	" 15.4.24 to 11.5.24 ...	18.8.24.
<i>Glenapp</i> , M.V. ...	Griffith, J. E. ...	F. Poate ...	"	" ...	" 17.12.24 to 28.12.24 ...	8.1.25.
<i>Glenluce</i> , M.V. ...	Barkeley, E. ...	J. D. Richards ...	"	" ...	" 22.12.24 to 16.1.25...	23.2.25.
<i>Glenishane</i> ...	Roberts, W. E. ...	V. Rowe, R. A. Dale ...	"	" ...	" 22.12.24 to 16.1.25...	23.2.25.
<i>Gloucestershire</i> ...	Robin, E. ...	T. E. Field ...	"	Bibby ...	" 27.9.24 to 4.12.24 ...	8.12.24.
<i>Gorgon</i> ...	Hughes, J. W. ...	W. E. Crompton ...	"	A. Holt & Co. ...	" 31.10.24 to 23.12.24 ...	22.1.25.
<i>Gourko</i> ...	Montgomery, H. ...	G. H. Kirk, N. J. Donovan...	M.L.	Ellerman Wilson ...	Met. Log. 22.5.24 to 2.11.24 ...	11.11.24.
<i>Haliartus</i> ...	Marsh, L. V. ...	W. H. Upton ...	No.	R. P. Houston ...	Form 911 2.12.24 to 2.1.25 ...	6.2.25.
<i>Harmonides</i> ...	Hughes, W. J. ...	D. L. Roberts ...	"	" ...	" 11.1.25 to 4.2.25 ...	12.3.25.
<i>Harmony</i> , Auxy. ...	Jackson, J. C. ...	A. W. Bush ...	"	Moravian Mission ...	" 4.12.24 to 20.12.24...	6.1.25.
<i>Hatarana</i> ...	Mardon, T. T. ...	J. L. Durkee, F. Wells, E. B. ...	M.L.	British India ...	" 12.9.23 to 26.3.24 ...	22.4.24.
<i>Hauraki</i> , M.V. ...	Woodget, H. T. ...	Heath, E. C. McGuinness. ...	"	" ...	" ...	" ...
<i>Henry Holmes</i> , C.S. ...	Frew, J. D. ...	E. A. Buckingham ...	No.	Union S.S. Co., N.Z....	" 10.11.24 to 1.12.24...	12.1.25.
<i>Herald</i> ...	Bicker Caarten, A. ...	E. S. C. Hale ...	"	W. I. & Panama Tele-graph Co. ...	" 19.12.24 to 27.1.25...	9.3.25.
<i>Herefordshire</i> ...	Harvey, J. R., O.B.E., Commr., R.N. ...	W. C. Jenks ...	M.L.	His Majesty's Ship ...	Met. Log. 6.6.24 to 3.10.24 ...	29.12.24.
<i>Herschel</i> ...	Stanley, W. ...	P. Flood, G. Whitworth, P. S. Cooper, S. M. Burton, G. Holdsworth. ...	"	Bibby ...	" 1.3.24 to 19.8.24 ...	8.9.24.
<i>Hibernia</i> ...	Carey, W. J. ...	A. N. Blundell ...	No.	Lampport & Holt ...	Form 911 15.11.24 to 9.1.25 ...	16.1.25.
<i>Highland Enterprise</i> ...	Tanner ...	R. Woodall ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report. 7.2.25 ...	7.2.25.
<i>" Glen</i> ...	Pond, R. H. ...	D. R. S. Webster ...	No.	Nelson ...	Form 911 29.3.24 to 12.6.24 ...	8.7.24.
<i>" Heather</i> ...	Jones, T. J. ...	C. M. Best ...	"	" ...	" 14.12.24 to 2.1.25 ...	16.1.25.
<i>" Laddie</i> ...	Powell, G. A. ...	G. L. Goodman ...	M.L.	" ...	" ...	" ...
<i>" Piper</i> ...	Alford, C. ...	A. S. Jones, J. S. Collins. ...	M.L.	" ...	Form 911 16.9.24 to 8.11.24 ...	22.12.24.
<i>" Pride</i> ...	Collings, D. ...	G. E. Leech. ...	"	" ...	Met. Log. 21.7.24 to 8.12.24 ...	17.12.24.
<i>" Rover</i> ...	Robinson, R. H. ...	H. McKinnon, F. Falconer, R. R. Soanes, G. E. Leech. ...	"	" ...	" 25.9.24 to 17.2.25 ...	3.3.25.
<i>" Warrior</i> ...	Ashby Graves, F. ...	F. W. Harvey, H. Thomas, F. Abbott. ...	"	" ...	" 24.10.24 to 21.12.24 ...	29.12.24.
<i>Hildebrand</i> ...	Davis, G. O. ...	G. I. Evans ...	No.	Booth ...	Form 911 22.12.24 to 8.2.25 ...	17.2.25.
<i>Hobsons Bay</i> ...	Maddrell, J. ...	F. M. Lyons ...	"	Commonwealth Govt. ...	" 17.9.24 to 31.10.24 ...	3.11.24.
<i>Holbein</i> ...	Kydd, O. J. ...	J. E. Williams O. J. Edwards, M. P. Pearce. ...	M.L.	" ...	Met. Log. 29.7.24 to 2.11.24 ...	13.11.24.
<i>54 Homeric</i> ...	Gough, W. A. ...	G. P. Kitto, D. B. Woods ...	No.	Lampport & Holt ...	Form 911 8.12.24 to 27.12.24...	16.2.25.
<i>Honorius</i> ...	Metcalfe, G. R., Lt.-Commr., R.N.K. ...	H. Clark, H. Yates, A. Griffiths. ...	W.T.	White Star ...	W.T. Reg. 13.11.24 to 28.11.24 ...	2.12.24.
<i>Hororata</i> ...	Samuels, C. ...	J. E. Martin, W. G. Idles ...	No.	R. P. Houston ...	Form 911 5.1.25 to 2.2.25 ...	9.2.25.
<i>Huanchaco</i> ...	Haines, F. P. ...	" ...	"	New Zealand S.S. Co. ...	" ...	" ...
<i>Hubert</i> ...	Redyard, A. ...	A. G. Litherland ...	"	Pacific S.N. Co. ...	" 15.7.24 to 5.8.24 ...	15.8.24.
<i>Hurumi</i> ...	Jones, W. C. H. ...	S. G. Edwards ...	"	Booth ...	" 7.12.24 to 21.2.25 ...	24.2.25.
<i>Ibez</i> ...	Burton Davies, J. ...	P. McCallum, C. D. Watt, L. A. Beale. ...	M.L.	New Zealand S.S. Co. ...	Met. Log. 29.8.24 to 24.10.24...	29.10.24.
<i>Ikala</i> ...	Langdon, C. ...	" ...	C.C.	G.W. Railway ...	Telegraphic Report. 12.3.25 ...	12.3.25.
<i>Intaba</i> ...	Meetham, J. T. ...	E. Lightfoot ...	No.	J. H. Welsford & Co. ...	Form 911 8.11.24 to 24.11.24...	15.12.24.
<i>Intombi</i> ...	Cibbings, W. A. ...	T. B. Littlechild ...	"	Harrison ...	" 29.11.24 to 14.1.25...	21.1.25.
<i>Ionic Star</i> ...	Sawyer, E. I. ...	J. Richardson ...	"	" ...	" 3.8.24 to 19.10.24 ...	22.10.24.
<i>Iroquois</i> ...	Wilson, G. ...	J. Sinclair ...	"	Blue Star ...	" 29.1.24 to 26.3.24 ...	29.3.24.
<i>Ixon</i> ...	Tinson, C. W., O.B.E., Commr., R.N. ...	G. A. R. J. Leslie, R. H. Lucy, G. A. Gould. ...	M.L.	His Majesty's Ship ...	Met. Log. 15.7.24 to 7.11.24 ...	3.2.25.
<i>John Pender</i> , C.S. ...	Carnon, C. G. ...	A. R. Cook ...	No.	A. Holt ...	Form 911 3.12.24 to 12.2.25 ...	4.3.25.
<i>Junin</i> ...	Smythe, T. W., O.B.E. ...	B. C. Farrow... ...	No.	Eastern Tel. Co. ...	" 5.12.24 to 13.12.24...	18.12.24.
<i>Kaikoura</i> ...	Benson, C. W. ...	R. D. Eckford ...	"	Pacific S.N. Co. ...	" 19.6.24 to 7.10.24 ...	14.10.24.
<i>Kaiser-i-Hind</i> ...	Downton, M. ...	H. E. Reilly, F. T. Bisley, G. T. Webb, F. Vesington. ...	M.L.	New Zealand S.S. Co. ...	Met. Log. 15.7.24 to 19.12.24...	29.12.24.
<i>Kamo Maru</i> ...	Manley, G. ...	T. F. Wrigley ...	No.	P. & O. ...	Form 911 6.12.24 to 23.12.24...	1.1.25.
<i>Kangaroo</i> ...	Okano, Y. ...	F. Takaku ...	"	Nippon Yusen Kaisha ...	" 6.12.24 to 6.1.25 ...	16.2.25.
<i>Karoo</i> ...	Norris, H. C. ...	C. M. C. Clayton, R. J. Sinclair ...	M.L.	State Service Australia ...	Met. Log. 26.2.24 to 14.8.24 ...	17.10.24.
<i>Kashmir</i> ...	Robinson, T. ...	F. Humble. ...	No.	Ellerman Bucknall ...	Form 911 2.6.24 to 16.6.24 ...	25.6.24.
<i>Kellett</i> ...	Stringer, R. H., O.B.E., R.D., Commr. R.N.R. ...	H. J. Perrett ...	"	P. & O. ...	" 24.8.24 to 8.9.24 ...	18.11.24.
<i>Kenilworth Castle</i> ...	Haselfoot, F. E. B., D.S.O., Commr., R.N. ...	F. Hopkins ...	"	" ...	" ...	" ...
<i>Khiva</i> ...	E. H. B. Baker, R. A. Stephens ...	" ...	M.L.	His Majesty's Ship ...	Met. Log. 30.7.24 to 15.10.24...	20.10.24.
<i>Khyber</i> ...	Millard, L. A. ...	A. E. Denn, W. M. Tomkins ...	M.L.	Union Castle ...	" 16.5.24 to 25.1.25 ...	6.2.25.
<i>Kia Ora</i> ...	George J. O.B.E. ...	May. ...	"	" ...	" ...	" ...
<i>Kildonan Castle</i> ...	Randall, H.W. R.D., Capt., R.N.R. ...	L. Fraser, K. H. Cummins, G. K. Fox. ...	M.L.	P. & O. ...	" 24.10.24 to 31.1.25...	5.2.25.
<i>Kinderdijk</i> ...	Pinckney, L. D., O.B.E. ...	N. B. S. Hewett ...	No.	" ...	Form 911 6.4.24 to 11.5.24 ...	14.5.24.
<i>Kilano Maru</i> ...	McIntosh, A. ...	J. C. Kelly Rogers ...	"	Shaw Savill & Albion ...	" 25.12.24 to 31.1.25...	5.2.25.
<i>Knight Companion</i> ...	Wilford, T.H. ...	R. S. W. Harris ...	"	Union Castle ...	" 17.10.24 to 7.12.24...	10.12.24.
<i>Kovno</i> ...	Jochems, A. B. ...	A. Stenger ...	"	Holland America ...	" 27.3.24 to 3.5.24 ...	8.5.24.
<i>Kyogle</i> ...	Gotoh, M. ...	R. Nakane ...	"	Nippon Yusen Kaisha ...	" 11.2.25 to 7.3.25 ...	13.3.25.
<i>Lady Denison Pen-der</i> , C.S. ...	Beale, H. E. ...	A. M. Hunter ...	"	A. Holt ...	" 19.12.24 to 6.1.25 ...	2.2.25.
<i>Laguna</i> ...	Casson, D. H., R.D., Commr., R.N.R. ...	E. R. Massam, L. Griffiths, J. Sanders, T. Fea. ...	M.L.	Ellerman Wilson ...	Met. Log. 16.12.23 to 22.7.24...	2.9.24.
<i>Lalande</i> ...	Coalstad, C. ...	C. B. Odman, E. W. Hughes ...	No.	Commonwealth Light-house Service. ...	Form 911 13.11.24 to 13.12.24 ...	19.1.25.
<i>Lancashire</i> ...	West, G. W. ...	F. Lawrence ...	"	Eastern Tel. Co. ...	" 4.12.24 to 31.12.24...	24.2.25.
<i>La Paz</i> , M.V. ...	Mander, F. ...	F. W. Parker ...	"	Pacific S.N. Co. ...	" 22.3.24 to 14.4.24 ...	28.4.24.
<i>Laplace</i> ...	Bambra, W. A. ...	H. Phillips ...	"	Lampport & Holt ...	" 7.1.25 to 26.1.25 ...	23.2.25.
<i>55 Lopland</i> ...	Beckett, F. W. ...	W. M. S. Higginson ...	"	Bibby ...	" 26.10.24 to 1.1.25 ...	12.1.25.
<i>Lassell</i> , M.V. ...	Smith, A. H. ...	A. J. Barclay ...	"	A. Holt ...	" 19.11.24 to 23.12.24 ...	5.1.25.
<i>Leicestershire</i> ...	Ross, J. ...	A. Lyall ...	"	Pacific S.N. Co. ...	" 20.1.25 to 10.2.25 ...	25.2.25.
<i>Leitrim</i> ...	Davies, G. W. ...	W. Boyde, R. B. Langley ...	"	Lampport & Holt ...	" 24.8.24 to 11.11.24...	17.11.24.
<i>Llanstephan Castle</i> ...	Howell, T. ...	W. N. Jenkins ...	W.T.	Red Star ...	W.T. Reg. 2.1.25 to 20.1.25 ...	30.1.25.
<i>Loch Katrine</i> ...	Hickman, V. T. ...	H. G. Cuthill... ...	No.	" ...	Form 911 1.1.25 to 25.1.25 ...	30.1.25.
<i>Lough Katrine</i> ...	English, G. L. ...	W. White-ide, P. H. Potter, D. Sharrock, W. H. Muirhead. ...	M.L.	Bibby ...	Met. Log. 3.11.24 to 28.11.24...	19.12.24.
<i>Lough Katrine</i> ...	Robertson, A. ...	E. F. C. Higgins ...	No.	" ...	" 6.12.24 to 12.2.25 ...	18.2.25.
<i>Lough Katrine</i> ...	Waterson, W. H. V. ...	" ...	"	Dowie, J., & Co. ...	Form 911 20.12.24 to 16.1.25...	3.3.25.
<i>Lough Katrine</i> ...	Owen, S. H. ...	J. B. M. Reynolds... ...	"	Chungghwa Nav. Co. ...	" 27.10.23 to 12.1.24...	22.4.24.
<i>Lough Katrine</i> ...	Matthews, G. P. ...	C. Noakes ...	"	Union Castle ...	" 20.9.24 to 25.11.24...	29.11.24.
<i>Lough Katrine</i> ...	" ...	" ...	"	R.M.S.P. Co. ...	" 9.11.24 to 6.2.25 ...	13.3.25.

LIST OF VOLUNTARY OBSERVING SHIPS

V

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.3.25.	Date Received.
<i>London Commerce</i>	Young, H. J., D.S.C.	P. G. Leverett ...	No.	Furness Withy	Form 911 20.12.24 to 20.1.25...	29.1.25.
<i>Loreto M.V.</i> ...	Barkley, E.	F. Binnion ...	"	Pacific S.N. Co.	" 18.5.24 to 7.6.24 ...	12.6.24.
<i>Losada M.V.</i> ...	Meldrum, G. W.	A. H. Turner ...	"	"	" 4.10.24 to 24.10.24...	27.10.24.
<i>Macedonia</i> ...	Potter, H. W., R.D., Commr., R.N.R.	J. B. Buggi ...	No.	P. & O.	" 6.7.24 to 14.7.24 ...	28.7.24.
<i>Macharda</i> ...	Cochran, G.	W. Moore ...	"	Brocklebank	" 6.9.24 to 24.11.24 ...	5.12.24.
<i>Mahana</i> ...	Kershaw, W. A. R.	F. Gilroy ...	"	Shaw Savill & Albion	" 21.12.24 to 2.2.25 ...	9.2.25.
<i>Maharaja</i> ...	Pett, T. M.	R. C. P. Boermel ...	"	Asiatic S.N. Co.	" 29.10.24 to 30.11.24 ...	29.12.24.
<i>Maihar</i> ...	Rowe J. P.	C. Shaw L. Robertson, R. G. Widdon.	M.L.	Brocklebank	Met. Log. 26.1.24 to 26.5.24 ...	23.6.24.
<i>Maimyo</i> ...	Richardson, T.	P. Yates ...	No.	"	Form 911 12.12.24 to 15.1.25 ...	19.1.25.
<i>Maine</i> ...	Seymour, H.	S. C. Skinner ...	"	Atlantic Transport	" 24.10.24 to 26.11.24 ...	1.12.24.
<i>58 Majestic</i> ...	Hayes, Sir B. F., K.C.M.G., D.S.O., R.D., Commodore, R.N.R.	A. F. Butcher, W. W. Pearson	W.T.	White Star ...	W.T. Reg. 10.12.24 to 22.12.24...	29.12.24.
<i>Makambo</i> ...	Brown, T. M.	F. C. Ree, H. Mann, D. G. Irvine, D. Wilson, J. Abbot, K. Thompson.	M.L.	Burns Philp	Form 911 9.12.24 to 22.12.24...	29.12.24.
<i>Makura</i> ...	Barlow A. E., Showman, A. C., Mawson, J.	G. O. Knaggs, J. D. Lundie, W. A. Todd, J. Joyes.	M.L.	Canadian-Australasian	Met. Log. 3.7.24 to 17.10.24 ...	5.1.25.
<i>Malancha</i> ...	Whitman, F.	A. Hill ...	No.	Brocklebank	Form 911 14.11.24 to 29.1.25...	2.2.25.
<i>Malda</i> ...	Gray, T. N.	W. E. Murphy ...	"	British India	" 16.1.25 to 20.2.25 ...	24.2.25.
<i>Manchester Corporation.</i>	Everest J. E.	W. L. Lavers ...	"	Manchester Liners	" 24.1.25 to 28.2.25 ...	3.3.25.
<i>Manchester Marine.</i>	Riley, J. E.	C. E. Stocker, J. F. Fisher, W. H. Downing.	M.L.	"	Met. Log. 23.3.24 to 25.11.24...	5.12.24.
<i>Manchester Merchant.</i>	Barclay J.	A. H. Boyd, A. C. Rickett ...	No.	"	Form 911 6.2.25 to 19.2.25 ...	27.2.25.
<i>Mandasor</i> ...	Kershaw, R. W.	W. Baxter ...	"	Brocklebank	" 16.12.24 to 28.12.24 ...	2.2.25.
<i>Manhattan</i> ...	Hutchison J. G.	R. Day ...	"	Atlantic Transport	" 10.11.24 to 18.12.24 ...	22.12.24.
<i>Manipur</i> ...	Scurr, T. W.	G. W. Barker ...	"	Brocklebank	" 12.10.24 to 1.1.25 ...	3.1.25.
<i>Manistee</i> ...	Isaacson, J. M.	S. Browne, J. Blower, F. R. Inch.	M.L.	Elders & Fyffes	Met. Log. 26.7.24 to 7.12.24 ...	16.12.24.
<i>Mantua</i> ...	Cherry, W. G. W.	J. B. Hewson, T. Fisher ...	No.	P. & O.	Form 911 ...	...
<i>29 Marburn</i> ...	Stewart, A.	T. W. Burdis, D. Pemberton, K. L. Thomson, W. McBride, A. M. Hill.	W.T.	Canadian Pacific	W.T. Reg. 18.1.25 to 7.2.25 ...	10.2.25.
<i>Marella</i> ...	Mortimer S.	L. T. Hale, F. Elgin, J. E. Stott, W. G. Pearce, E. Wood.	M.L.	Burns Philp	Form 911 18.1.25 to 7.2.25 ...	10.2.25.
<i>Marengo</i> ...	Bean, A.	J. Strachan, P. Wright, H. E. Evans.	"	Ellerman Wilson	" 24.11.23 to 17.4.24...	2.12.24.
<i>Margha</i> ...	Milne, A. R., R.D., Commr., R.N.R.	T. H. Wilson, C. Mowatt ...	"	British India	" 12.9.24 to 21.2.25 ...	25.2.25.
<i>Marglen</i> ...	Griffiths, J. N.	J. McLellan, C. Crawley, C. Draper.	No.	Canadian Pacific	" 25.10.24 to 4.1.25 ...	21.1.25.
<i>27 Marloch</i> ...	Hamilton, G.	A. C. Clay ...	W.T.	"	W.T. Reg. 23.1.25 to 7.2.25 ...	13.2.25.
<i>Maryland</i> ...	Hutt, F. C.	R. C. Baker ...	No.	Atlantic Transport	Form 911 9.11.24 to 28.11.24...	4.12.24.
<i>Masrah</i> ...	Thowless, E.	E. Richardson ...	"	Brocklebank	" 9.11.24 to 28.11.24...	5.12.24.
<i>Massilia</i> ...	Henderson, J. L.	A. Chrystal, D. N. MacGregor.	"	Anchor	" 16.1.25 to 18.2.25 ...	24.2.25.
<i>Matakana</i> ...	Bosker, V. J.	E. H. Doughty ...	"	Shaw, Savill & Albion	" 4.4.24 to 25.4.24 ...	26.5.24.
<i>Mataram</i> ...	Kenworthy, V.	J. A. Embley, J. Robertson, S. C. Cramb.	"	Burns Philp & Co.	" 12.9.24 to 20.9.24 ...	22.9.24.
<i>Matheran</i> ...	Williams, D. J.	H. H. Armstrong ...	M.L.	Brocklebank	" 5.7.24 to 25.11.24 ...	10.12.24.
<i>Mathura</i> ...	Hanna, R. G.	W. G. Bussey ...	No.	British India	Met. Log. 19.11.24 to 22.12.24 ...	3.2.25.
<i>Matiana</i> ...	Langlands, D. H.	"	"	Union S.S. Co.	Form 911 18.11.24 to 16.2.25...	23.2.25.
<i>Maungamui</i> ...	Rostron, A. H., C.B.E., R.D., A.-d.-C., Capt., R.N.R.	J. A. Myles, A. N. Sargent, R. Allen.	No.	Cunard	Form 911 16.12.24 to 1.1.25 ...	26.1.25.
<i>32 Mauretania</i> ...	Maughan ...	"	W.T.	"	" 6.11.24 to 24.1.25 ...	5.2.25.
<i>Media</i> ...	Berry, G.	H. J. C. Day, R. Conway ...	No.	T. & J. Brocklebank...	W.T. Reg. 2.11.24 to 7.11.24 ...	20.11.24.
<i>56 Megantic</i> ...	Clews, A. H.	H. A. MacCullum, W. E. Bacon, A. Benshaw, C. C. Mucklestone, J. McLennan.	W.T.	White Star	" 22.11.24 to 8.12.24...	12.12.24.
<i>22 Melita</i> ...	Salter, G. H.	E. D. Potts ...	No.	Canadian Pacific	" 18.10.24 to 7.11.24...	12.11.24.
<i>Memnon</i> ...	Pollard, W.	A. Smith ...	"	"	" 15.11.24 to 5.12.24...	2.3.25.
<i>Menominee</i> ...	Gardner, J.	R. Hughes ...	"	A. Holt	" 8.2.25 to 26.2.25 ...	2.3.25.
<i>Mercian</i> ...	Henderson, W.	B. Leslie A. M. Watt, E. V. Glennie.	No.	Atlantic Transport	Form 911 7.2.25 to 27.2.25 ...	2.3.25.
<i>21 Metagama</i> ...	Maxwell Brown, W. E.	G. McKee ...	W.T.	Leyland	" 3.10.24 to 19.10.24...	21.10.24.
<i>Miami</i> ...	Tribe, A. E.	L. A. Williams ...	"	Canadian Pacific	" 17.1.25 to 26.1.25 ...	9.2.25.
<i>Michigan</i> ...	Richardson, E.	B. J. Bennie, W. J. McPhedron, J. H. Oxtan.	M.L.	West Australia Nav. Co.	" 19.1.25 to 2.3.25 ...	6.3.25.
<i>Minderoo</i> ...	Mackenzie, G. G.	D. Rattray ...	No.	Scottish Fishery Board	W.T. Reg. 29.11.24 to 18.12.24 ...	22.12.24.
<i>Minna</i> ...	Notley, A.	G. Carter, — Soame, — Mackenzie.	W.T.	Canadian Pacific	Form 911 16.12.24 to 20.1.25...	26.1.25.
<i>23 Minnedosa</i> ...	Gates, T. F.	H. E. McCartney ...	No.	Atlantic Transport	W.T. Reg. 11.6.24 to 20.6.2 ...	25.6.24.
<i>Minnewaska</i> ...	Claret, F.	W. S. Mackie ...	"	"	Met. Log. 13.6.24 to 26.11.24...	4.3.25.
<i>Mirror, C.S.</i>	Gibson, L.	C. E. F. St. John ...	"	Eastern Tel. Co.	" 18.12.24 to 9.2.25 ...	13.2.25.
<i>Mississippi, M.V.</i>	Wylie, J. T. J.	H. K. Cockerill ...	"	Atlantic Transport	Form 911 6.9.24 to 24.9.24 ...	26.9.24.
<i>Moena</i> ...	Morzer Bruyns, M. F.	G. H. Vander Roest ...	"	Nederland	" 16.2.25 to 7.3.25 ...	10.3.25.
<i>Moldavia</i> ...	Burleigh, C. W., D.S.O., Capt., R.N.R.	D. C. S. Cook ...	"	P. & O.	" 2.2.25 to 21.2.25 ...	24.2.25.
<i>Mongolian Prince</i>	Durrant, G. D.	P. F. Owens ...	"	Prince	" 19.11.24 to 17.1.25...	19.2.25.
<i>Monkbarns, Ship</i>	Davies, W.	R. Baise, J. Williams ...	"	J. Stewart & Co.	" 7.1.25 to 19.1.25 ...	22.1.25.
<i>24 Montcalm</i> ...	Sibbons, H.	H. McFadyen ...	W.T.	Canadian Pacific	W.T. Reg. 10.10.24 to 26.11.24 ...	5.2.25.
<i>25 Montclare</i> ...	Webster, G. S., R.D., Commr., R.N.R.	R. Fegan, W. Phillips, H. S. Knight.	"	"	W.T. Reg. 15.2.25 to 5.3.25 ...	9.3.25.
<i>28 Montlaurier</i> ...	Henderson, W.	F. E. Williams ...	No.	Burns, Philp & Co.	Form 911 31.12.24 to 28.2.25...	23.2.25.
<i>Montoro</i> ...	Landy, E.	T. Beck, A. Mansey, C. Clarke.	"	Canadian Pacific	W.T. Reg. 1.2.25 to 19.2.25 ...	23.2.25.
<i>26 Montrose</i> ...	Latta, R. G.	F. E. Williams ...	"	"	W.T. Reg. 26.1.25 to 12.2.25 ...	17.2.25.
<i>20 Montroyal</i> ...					Form 911 ...	...

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.3.25.	Date Received.
<i>Morvada</i> ...	Mills, T. L., O.B.E., R.D., Commr., R.N.R.	J. Norris, C. L. Hazeldine ...	M.L.	British India ...	Met. Log. 5.1.24 to 24.7.24 ...	11.9.24.
<i>Mulbera</i> ...	Steadman, W. R. ...	E. Holland ...	No.	British India ...	Form 911 11.12.24 to 21.12.24 ...	2.3.25.
<i>Nagara</i> ...	Purvis, A. ...	H. V. Todd ...	"	R.M.S.P. Co. ...	" 13.12.24 to 12.2.25 ...	16.2.25.
<i>Nardana</i> ...	Moth, F. L. ...	S. C. T. Smith ...	"	British India ...	" 17.11.24 to 28.12.24 ...	11.2.25.
<i>Nariva</i> ...	Buret T. J. C. ...	H. M. S. Laidlaw, C. Waterhouse, E. N. Giller, D. Parsons.	M.L.	R.M.S.P. Co. ...	Met. Log. 4.10.24 to 4.12.24 ...	10.12.24.
<i>Nascopie</i> ...	Smellie, T. F. ...	A. S. Watts, T. D. Roseburgh ...	M.L.	Hudson's Bay Co. ...	" 16.6.24 to 17.10.24 ...	23.10.24.
<i>Navasota</i> ...	Willan, F. G. L., R.D., Commr., R.N.R.	W. A. Delap ...	No.	R.M.S.P. Co. ...	Form 911 23.6.24 to 20.8.24 ...	28.8.24.
<i>Nawab</i> ...	Smith J. F. ...	" ...	"	Asiatic S.N. Co. ...	" 20.7.24 to 27.9.24 ...	22.12.24.
<i>Nebraska</i> ...	Collins, A. R. D., O.B.E., R.D., Lt.-Commr., R.N.R.	A. F. Walker ...	"	R.M.S.P. Co. ...	" 15.3.24 to 21.4.24 ...	5.5.24.
<i>Nellore</i> ...	Murray, F. S., R.D., Lt. Commr., R.N.R.	G. E. Owen ...	"	P. & O. ...	" 5.12.24 to 5.2.25 ...	13.2.25.
<i>Nestor</i> ...	Owen, R. D., O.B.E.	W. H. Newby, C. J. Beasley, F. J. Silva.	M.L.	A. Holt ...	" 12.10.24 to 12.2.25 ...	20.2.25.
<i>Nevasa</i> ...	Swanson, C. J. ...	D. Lorie ...	No.	British India ...	" 13.10.24 to 30.12.24 ...	6.1.25.
<i>Newby Hall</i> ...	Kendall, J. W. ...	A. Martin ...	M.L.	Ellerman ...	Met. Log. 12.9.24 to 10.1.25 ...	27.1.25.
<i>Niagara</i> ...	Rolls J. T. ...	R. B. Denniston, T. A. Macpherson, J. V. Bray, J. Dawson.	M.L.	Canadian-Australian ...	" 19.7.24 to 13.11.24 ...	8.12.24.
<i>Ningchow</i> ...	Wilson, C. A. ...	R. A. Hannay ...	No.	A. Holt ...	Form 911 14.10.24 to 8.1.25 ...	16.1.25.
<i>Nore</i> ...	Parker, J. W. ...	R. W. Mackie, C. B. Roche, R. H. Turner, G. Haughey.	M.L.	P. & O. ...	Met. Log. 6.11.24 to 24.1.25 ...	29.1.25.
<i>Norman</i> ...	Morton Betts W. ...	D. A. Hodgson ...	No.	Union Castle ...	Form 911 1.12.24 to 20.12.24 ...	19.1.25.
<i>Norna</i> ...	Wright, J. ...	T. Mather ...	"	Scottish Fishery Board ...	" 1.2.25 to 28.2.25 ...	3.3.25.
<i>Norseman, C.S.</i> ...	W. Douglas ...	" ...	M.L.	Western Tel. Co. ...	Met. Log. 16.8.24 to 30.1.25 ...	3.3.25.
<i>Nortonian</i> ...	McCormick, J. ...	T. Griffiths ...	No.	Leyland ...	Form 911 2.8.24 to 30.9.24 ...	4.10.24.
<i>Nubian</i> ...	Watmough, T. M. ...	H. R. Gaskill ...	"	" ...	" 21.12.24 to 2.1.25 ...	6.1.25.
<i>Nyanza</i> ...	Carpendale, F. W. J.	G. D. Brown, C. H. Hand, S. Ferguson.	M.L.	P. & O. ...	Met. Log. 20.10.24 to 4.1.25 ...	9.1.25.
<i>Oaklands Grange</i> ...	Routledge, R. ...	E. A. Insley ...	No.	Houlder Bros. ...	Form 911 18.10.24 to 2.2.25 ...	19.2.25.
<i>42 Ohio</i> ...	Nicholson, M. S., R.D., Capt., R.N.R.	R. W. Morford ...	W.T.	R.M.S.P. Co. ...	" 31.1.25 to 1.3.25 ...	6.3.25.
<i>Olympia</i> ...	A. R. Duncan ...	D. R. Urquhart, G. Lynas, C. Mortimer.	M.L.	Anchor ...	" 29.10.24 to 14.2.25 ...	23.2.25.
<i>57 Olympic</i> ...	Metcalfe, G. R. ...	J. C. M. Boyce, G. W. Couch, C. J. Warltire.	W.T.	White Star ...	W.T. Reg. 5.2.25 to 19.2.25 ...	23.2.25.
<i>Orama</i> ...	Staunton, H. G., C.B.E., R.D., Commr., R.N.R.	L. J. Vesty, F. Butler, M. C. Lester, J. S. Metcalf.	M.L.	Orient ...	Form 911 5.2.25 to 20.2.25 ...	23.2.25.
<i>Oranian</i> ...	Hoskins, W. ...	D. Hewett ...	No.	Leyland ...	Met. Log. 16.11.24 to 18.2.25 ...	20.2.25.
<i>Orari</i> ...	Robinson, F. W. ...	R. Newman, T. Breen, F. Longhead, C. Wilkinson, H. Farrant.	M.L.	New Zealand S.S. Co. ...	Form 911 4.9.24 to 17.11.24 ...	24.11.24.
<i>40 Orbita</i> ...	Parker, W. H., C.B.E., R.D., Capt. R.N.R.	R. V. Rutley, C. Frankom ...	W.T.	R.M.S.P. Co. ...	Met. Log. 9.8.24 to 20.1.25 ...	27.1.25.
<i>Orcoma</i> ...	Dominy, R. H., C.B.E., Commr., R.N.R.	G. B. Wardale, L. Jones, W. Billington.	M.L.	Pacific S.N. Co. ...	Form 911 11.1.25 to 4.2.25 ...	10.2.25.
<i>41 Orduna</i> ...	Warner, G. E., R.D., Commr., R.N.R.	R. W. Sumpton, J. Vivian, H. D. Hooper, G. F. Russell.	W.T.	R.M.S.P. Co. ...	Met. Log. 20.11.24 to 4.2.25 ...	9.2.25.
<i>Oriana</i> ...	{ Daniel, T. ... }	" ...	M.L.	Pacific S.N. Co. ...	W.T. Reg. 11.1.25 to 6.2.25 ...	10.2.25.
<i>Orita</i> ...	{ Kite, E. ... }	" ...	M.L.	" ...	Form 911 10.1.25 to 6.2.25 ...	9.2.25.
<i>Ormonde</i> ...	Splatt, W. A. ...	J. G. Harvey, T. R. Scott, D. W. Hutchinson, C. P. D. Dean.	M.L.	" ...	Met. Log. 15.2.24 to 24.10.24 ...	8.11.24.
<i>Ormonde</i> ...	Knowles, C. H., D.S.O., Commr., R.N.	A. M. Hughes ...	M.L.	His Majesty's Ship ...	Met. Log. 19.9.24 to 6.12.24 ...	19.12.24.
<i>Ormonde</i> ...	Coad, A. J., Commr., R.N.R.	N. Savage, T. B. Grieve, N. A. Winfield, W. A. Wickham.	M.L.	Orient ...	Met. Log. 8.11.24 to 6.12.24 ...	31.12.24.
<i>Ormuz</i> ...	James L. V., D.S.C.	C. Fox, J. C. K. Dowding, H. MacLean, L. A. Keeble, F. S. Shurrock.	M.L.	" ...	Met. Log. 14.9.24 to 16.12.24 ...	31.12.24.
<i>Oreya</i> ...	Pearce, A. ...	S. Lewis ...	No.	Pacific S.N. Co. ...	Met. Log. 19.10.24 to 22.1.25 ...	28.1.25.
<i>Orsova</i> ...	Matheson, C. G., D.S.O., R.D., Commr., R.N.R.	M. J. Sarson, A. J. Croft Cohen, C. V. Dodgson, P. P. Murphy, L. E. Fordham.	M.L.	Orient ...	Form 911 29.10.24 to 5.1.25 ...	12.1.25.
<i>Ortega</i> ...	Pleignier, H. S. ...	C. Leatherbarrow ...	No.	Pacific S.N. Co. ...	Met. Log. 12.10.24 to 13.1.25 ...	19.1.25.
<i>Orieto</i> ...	Simner, G. L., R.D., Commr., R.N.R.	M. Petit Daun, G. E. Martin	M.L.	Orient ...	Form 911 9.12.24 to 16.2.25 ...	25.2.25.
<i>Osterley</i> ...	Cameron, E. P. ...	F. G. Goodman, E. Hatch, J. C. Jackson, H. Tanner	M.L.	" ...	Met. Log. 9.11.24 to 10.2.25 ...	14.2.25.
<i>Othello</i> ...	Pearson, Z. C. ...	J. W. Botheroyd ...	No.	Ellerman Wilson ...	" 17.8.24 to 19.11.24 ...	28.11.24.
<i>Otira</i> ...	Elford, H. E. ...	J. H. Fuller ...	"	Shaw, Savill & Albion ...	Form 911 31.12.24 to 19.1.25 ...	9.2.25.
<i>Ovid</i> ...	Groom, A. C. B. ...	" ...	"	" ...	" 19.12.24 to 8.1.25 ...	3.2.25.
<i>Oxfordshire</i> ...	Crumplin, W. E. ...	F. C. Brooks ...	"	Shakespear Shipping Co. ...	" 20.1.25 to 6.2.25 ...	2.3.25.
<i>Pacific Shipper, M.V.</i> ...	Newman, G. W. A.	J. W. Woodward ...	"	Bibby Bros. ...	" 17.1.25 to 14.2.25 ...	9.3.25.
<i>Pakeha</i> ...	W. P. Clifton Mogg	M. F. Armitage ...	M.L.	Furness Withy ...	" 8.9.24 to 24.9.24 ...	22.10.24.
<i>Paparoa</i> ...	Ashworth, F. ...	C. J. Brewer ...	No.	Shaw, Savill & Albion ...	Form 911 1.7.24 to 10.8.24 ...	15.8.24.
<i>Pareora</i> ...	Evans, J. O. ...	R. F. Hillings ...	"	New Zealand S.S. Co. ...	" 23.1.25 to 8.3.25 ...	13.3.25.
<i>Paris</i> ...	Cook, C. L. ...	Mr. Biles ...	C.C.	Hain S.S. Co. ...	" 31.12.24 to 6.2.25 ...	21.2.25.
<i>Patia</i> ...	Bostock, R. J. ...	W. McIlwaine ...	No.	Southern Ry. ...	Telegraphic Report. 19.2.24 ...	19.2.24.
<i>Patrol, C.S.</i> ...	Welsh, T. K. ...	H. A. Davison, B. L. Vinden, A. T. Morrell.	M.L.	Blders & Fyffes ...	Form 911 17.1.25 to 4.2.25 ...	2.3.25.
<i>Persic</i> ...	Davies, E. ...	H. Williams ...	No.	Eastern Extension (A. & C.) Telegraph Co. ...	Met. Log. 11.2.24 to 13.7.24 ...	25.8.24.
<i>Peshawur</i> ...	Hester, C. W., R.D., Commr., R.N.R.	D. G. Baillie, E. J. R. North, J. R. Alleyne.	M.L.	White Star ...	Form 911 19.10.24 to 1.12.24 ...	3.12.24.
<i>Pharos</i> ...	Ewing, T. N. ...	D. Tullock, A. McLachlan ...	No.	P. & O. ...	Met. Log. 24.7.24 to 4.12.24 ...	10.12.24.
<i>Philadelphum</i> ...	Baker, J. A. ...	W. Lawton ...	No.	Northern Lighthouse Board ...	" ...	"
<i>Polypheumus</i> ...	Hatfield, J. ...	R. E. Wilkes ...	"	Leyland ...	Form 911 2.10.24 to 20.11.24 ...	26.11.24.
<i>Poona</i> ...	Cherry, W. G. W. ...	F. R. W. Page ...	"	A. Holt ...	" 1.2.25 to 23.2.25 ...	25.2.25.
			"	P. & O. ...	" 21.7.24 to 31.8.24 ...	15.9.24.

LIST OF VOLUNTARY OBSERVING SHIPS

vii

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received to 13.3.25.	Date Received.
<i>Port Adelaide</i> ...	Hayter, S. W. ...	... ..	M.L.	Commonwealth & Dominion.	... ..	...
„ <i>Albany</i> ...	Robinson, C. A. ...	A. Jenkyns, W. B. Craig, A. G. Newbury, W. Eastoe.	M.L.	„ „ „	Met. Log. 4.5.24 to 3.10.24 ...	30.10.24.
„ <i>Augusta</i> ...	Sawbridge, I. R. ...	G. T. C. Harris, R. C. Carter, C. F. Coate.	M.L.	„ „ „	„ 6.4.24 to 15.10.24...	7.11.24.
„ <i>Caroline</i> ...	Renaut, F. A. ...	H. Smith, T. Copeland, E. Fenton, C. Chamberlin.	M.L.	„ „ „	„ 16.8.24 to 17.12.24...	22.12.24.
„ <i>Curtis</i> ...	Van den Bergh, C. ...	W. H. Miles ...	No.	„ „ „	Form 911 10.11.24 to 21.11.24	6.12.24.
„ <i>Darwin</i> ...	Brown, A. H. ...	E. T. N. Lawrey, E. W. R. Young.	„	„ „ „	„ 24.12.24 to 12.1.25...	10.2.25.
„ <i>Denison</i> ...	Ferris, J. ...	Rowland Hill ...	„	„ „ „	„ 3.11.24 to 17.12.24...	26.1.25.
„ <i>Hacking</i> ...	Williams, R. ...	A. Cooper, C. F. Post, J. T. Weldin.	M.L.	„ „ „	Met. Log. 13.10.24 to 2.3.25 ...	9.3.25.
„ <i>Hunter</i> ...	Cottell, S. C. ...	D. G. H. Bradley, J. A. Fairbairn, C. Newton.	M.L.	„ „ „	„ 13.3.24 to 25.7.24 ...	6.8.24.
„ <i>Melbourne</i> ...	Kearney, F. J. ...	E. A. Leavett, C. R. Townshend, G. G. Langford.	M.L.	„ „ „	„ 12.3.24 to 14.8.24 ...	9.9.24.
„ <i>Nicholson</i> ...	Hoad, A. C. ...	H. C. Jeffery, W. G. Jones, J. T. Nicholson, E. G. L. Jones.	M.L.	„ „ „	„ 9.8.24 to 13.12.24...	19.12.24.
„ <i>Pirie</i> ...	Higgs, W. G. ...	A. W. Sams, C. Groves, A. M. Stanton, G. Freeman-Pannett.	M.L.	„ „ „	„ 13.6.24 to 15.11.24...	18.11.24.
„ <i>Sydney</i> ...	Lea, W. H. ...	E. G. Fullick, R. T. R. Tomsett, W. Pickup.	M.L.	„ „ „	„ 4.10.24 to 9.2.25 ...	14.2.25.
„ <i>Victor</i> ...	Swan, L. H. ...	E. E. Henry ...	No.	Pacific S.S. Co. ...	Form 911 4.1.25 to 24.1.25 ...	4.3.25.
<i>President Jackson</i> ...	Griffith, J. ...	Woodhouse, A. F. B., Lt.-Commr., R.N.	„	South African Naval Service.	„ 8.9.24 to 28.9.24 ...	21.10.24.
<i>Protea</i> , H.M.S.A.S.	Elford, W. J. ...	W. Owen ...	No.	A. Holt ...	„ 6.1.25 to 10.2.25 ...	23.2.25.
<i>Pyrhus</i> ...	Smith, R. G. ...	A. Hulme, N. E. Banks, W. Daman.	W.T.	White Star-Dominion	W.T. Reg. 25.1.25 to 15.2.25 ...	23.2.25.
<i>60 Regina</i> ...	Mulhall, W. ...	... ..	C.C.	G.W. Railway	Form 911 25.1.25 to 14.2.25 ...	19.2.25.
<i>Reindeer</i> ...	Fowler, W. H. ...	A. E. Warburton ...	No.	Houlder Bros.	Telegraphic Report. 12.2.25 ...	12.2.25.
<i>Rhodesian Transport.</i>	Mordue, J. A. ...	... ..	M.L.	Ellerman Bucknall ...	Form 911 5.7.24 to 28.9.24 ...	2.10.24.
<i>Rialto</i> ...	Rimutaka ...	H. Horwood, R. S. Cox, O. M. Watts.	„	New Zealand S.S. Co.	Met. Log. 24.12.24 to 4.2.25 ...	3.3.25.
<i>Risaldar</i> ...	Park, G. ...	H. Gibson, N. W. Heard, T. E. Ward.	„	Asiatic S.N. Co. ...	„ 9.3.24 to 26.8.24 ...	3.9.24.
<i>Romney</i> ...	Syms, G. ...	W. H. Underhill ...	No.	Lamport & Holt ...	„ 8.3.24 to 13.10.24...	18.11.24.
<i>Royal Fusilier</i> ...	Dawson, J. ...	J. Fraser ...	„	London & Edinburgh S.S. Co.	Form 911 24.12.24 to 5.2.25 ...	6.3.25.
<i>Royal Transport</i> ...	Dove, J. ...	R. Martin ...	M.L.	Houlder Bros.	„ 28.1.25 to 8.3.25 ...	10.3.25.
<i>Ruapehu</i> ...	McKellar, A. W. ...	P. J. Connolly, G. E. Hargreaves, F. Cooke.	„	New Zealand S.S. Co.	Form 911 11.1.25 to 8.2.25 ...	10.3.25.
<i>Sachem</i> ...	Westgarth, W. A. ...	C. Waldron, E. Sainty ...	M.L.	Furness Withy ...	Met. Log. 26.4.24 to 17.9.24 ...	4.9.24.
<i>St. Albans</i> ...	Pilcher, E. ...	W. McIntyre ...	No.	Eastern and Australian Scientific Expeditionary Research Assocn.	Form 911 2.11.24 to 14.12.24...	15.12.24.
<i>St. George</i> ...	Blair, D., O.B.E., R.D., Commr., R.N.R.	... ..	M.L.	„	„ 10.9.24 to 18.11.24...	19.1.25.
<i>St. Patrick</i> ...	Bearpark, E. W. ...	J. Hill ...	No.	Rankin Gilmour ...	„	...
<i>Salaga</i> ...	Sola, P., D.S.O. ...	F. A. Elston ...	„	Elder Dempster ...	Form 911 2.1.25 to 26.1.25 ...	27.2.25.
<i>Samaria</i> ...	Horsburgh, G. O.B.E.	R. P. Cambell ...	„	Cunard ...	„ 31.1.25 to 13.2.25 ...	2.3.25.
<i>Sandown Castle</i> ...	Jackson, C. R. ...	E. H. de Heaume ...	„	Union Castle ...	„ 25.1.25 to 15.2.25 ...	21.2.25.
<i>10 Saturnia</i> ...	Black, J. ...	T. Ure ...	W.T.	Anchor Donaldson ...	„ 20.11.24 to 19.12.24	16.1.25.
<i>Saxoleine</i> ...	Biddick, E. ...	T. Redford ...	No.	Hunting & Son ...	W.T. Reg. 26.10.24 to 14.11.24	18.11.24.
<i>Saxon</i> ...	Stanley, W. F., R.D., Commr., R.N.R.	R. S. W. Harris ...	„	Union Castle ...	Form 911 25.10.24 to 15.11.24	19.11.24.
<i>Saxonia</i> ...	Jones, R. D. ...	H. A. D. Waterhouse ...	„	Cunard ...	„ 14.12.24 to 1.1.25 ...	21.1.25.
<i>Scholar</i> ...	McCullum, J. ...	A. L. Cresswell ...	„	Harrison ...	„ 8.8.24 to 29.9.24 ...	1.10.24.
<i>Scientist</i> ...	Hansen, W. A. ...	D. G. Russell ...	„	Anchor ...	„ 7.9.24 to 7.10.24 ...	16.10.24.
<i>Scindia</i> ...	Smart, R. W. ...	H. D. Campsie ...	„	L.M. & S. Ry. ...	„ 30.9.24 to 16.12.24...	22.12.24.
<i>Scotia</i> ...	Telfer ...	O. W. L. Jones ...	C.C.	Tankers Ltd. ...	„ 21.5.24 to 9.8.24 ...	12.8.24.
<i>Scottish Bard</i> ...	McDonnell, S. ...	S. W. Watts ...	No.	„	„ 4.10.24 to 17.12.24...	29.12.24.
<i>Scottish Borderer</i> ...	Thompson, F. ...	G. F. Widger ...	„	„	Telegraphic Report 7.3.25 ...	7.3.25.
<i>Scottish Strath</i> ...	French, A. L. ...	W. Black ...	W.T.	Cunard ...	Form 911 31.12.24 to 19.1.25...	26.1.25.
<i>33 Seythia</i> ...	Prothero, W. ...	T. Parry, G. Overton, W. B. Tannet.	„	„	„ 12.6.24 to 13.7.24 ...	21.7.24.
<i>Sheafdart</i> ...	... ..	T. B. Griffiths ...	No.	Kaitan Mining Administration.	„ 9.11.24 to 14.12.24...	3.1.25.
<i>Sheaf Mount</i> ...	Groves, C. V. ...	C. A. Goold ...	M.L.	Souter, W. A. ...	W.T. Reg. 12.1.25 to 18.1.25 ...	10.2.25.
<i>Sheaf Spear</i> ...	Whitfield, G. A., O.B.E.	A. E. Harvey, W. H. Grise-wood.	„	„	Form 911 11.1.25 to 7.2.25 ...	16.2.25.
<i>Sicilia</i> ...	Davis, H. C., D.S.C., R.D., Commr., R.N.R.	R. Rowe ...	No.	P. & O. ...	„ 17.8.24 to 26.8.24 ...	1.9.24.
<i>Socrates</i> ...	James, F. R. ...	E. R. Hartley ...	„	Lamport & Holt ...	Met. Log. 17.7.24 to 13.11.24...	1.1.25.
<i>Soekaboemi</i> ...	Ter Malsch, K. J. ...	W. N. de Wijn ...	No.	Rotterdam Lloyd ...	„ 3.12.24 to 5.1.25 ...	22.1.25.
<i>Somerset</i> ...	Barnett, H. ...	J. J. Youngs ...	M.L.	N.Z.S. Co. ...	Form 911 25.11.24 to 28.12.24	31.12.24.
<i>Somersetshire</i> ...	Adamson, B. W. ...	P. Hawkins, J. Cullen, M. Simmons.	„	Bibby ...	Met. Log. 9.11.24 to 11.2.25 ...	6.3.25.
<i>Somme</i> ...	Spriddell, F. G. ...	K. W. Simpton, H. Chamberlian, V. Hill, C. C. Prosser.	M.L.	R.M.S.P. Co. ...	„	...
<i>Songster</i> ...	Miles, F. R., Commr., R.N.R.	W. F. O'Neill ...	M.L.	Harrison ...	„ 7.9.24 to 7.10.24 ...	16.10.24.
<i>Spectator</i> ...	Richardson, R. ...	D. Fraser, G. Orton ...	No.	Ellerman Wilson ...	„ 30.9.24 to 16.12.24...	22.12.24.
<i>Spero</i> ...	French, H. E. ...	E. A. Gould, G. Mussared, R. Higginbottom, J. Ruth-erford.	M.L.	„	„ 21.5.24 to 9.8.24 ...	12.8.24.
<i>Stephan, C.S.</i> ...	Carlton, G. F., O.B.E., Commr., R.N.R.	S. G. Elcoate, F. B. Boling-broke, W. E. Allen, T. J. Horan.	M.L.	Telegraph Construction & Maintenance	„ 4.10.24 to 17.12.24...	29.12.24.
<i>Stuart Prince</i> ...	Field, H. E. B. ...	G. B. Taylor ...	No.	Prince Federal ...	Form 911 31.12.24 to 19.1.25...	26.1.25.
<i>Surrey</i> ...	Upton, E. C. S. ...	W. A. Ewington ...	„	Shaw, Savill & Albion	„ 12.6.24 to 13.7.24 ...	21.7.24.
<i>Sussex</i> ...	Hartman, W. H. ...	P. S. Horwood ...	„	„	„ 9.11.24 to 14.12.24...	3.1.25.
<i>Tainui</i> ...	Summers, W. G. ...	S. A. Bannister ...	„	„	„ 12.6.24 to 13.7.24 ...	21.7.24.
<i>Tairoa</i> ...	... ..	... ..	„	„	„ 9.11.24 to 14.12.24...	3.1.25.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.3.25.	Date Received.
<i>Tahiti</i> ...	Hamilton, H. E. ...	T. M. Young, W. Bailey, ...	No M.L.	Union S.S. Co. ...	Form 911 ...	...
<i>Taiyuan</i> ...	Thomas, R. D. ...	A. M. Frame. ...	...	Yuill & Co. ...	Met. Log. 11.7.24 to 15.12.24...	10.2.25.
<i>Talhybius</i> ...	Duggan, C. ...	P. Elder ...	No.	A. Holt ...	Form 911 23.12.24 to 7.1.25 ...	23.2.25.
<i>Tandø</i> ...	Pieker, E. ...	H. Van Manen ...	M.L.	E. & A. S.S. Co. ...	Form 911 ...	...
<i>Tambora</i> ...	Rihaek, H. G. ...	R. S. Young ...	No.	Rotterdam Lloyd ...	23.10.24 to 10.12.24 ...	22.12.24.
<i>Teiresias</i> ...	Holden, W. R. F. ...	G. Lancaster ...	"	A. Holt ...	8.1.25 to 23.1.25 ...	2.2.25.
<i>Teucer</i> ...	Hodgson, R. N. ...	W. T. Sargent ...	"	Aberdeen ...	27.11.24 to 12.12.24 ...	5.1.25.
<i>Themistocles</i> ...	Jernyn, W. M. ...	J. T. Pettis ...	"	A. Holt ...	22.10.24 to 6.12.24 ...	15.12.24.
<i>Theseus</i> ...	Batt, A. E. ...	G. Gow, L. Horton, S. C. Timmouth. ...	M.L.	"	25.1.25 to 3.2.25 ...	12.2.25.
<i>Titan</i> ...	Wilkinson, T. G. ...	"	"	"	Met. Log. 6.6.24 to 12.10.24 ...	11.12.24.
<i>Tolmie, S.F.Bqtn.</i>	Stewart, J. C. ...	E. F. Collins ...	No.	B. C. Mills, Tug and Barge Co. ...	Form 911 1.11.24 to 24.12.24...	2.3.25.
<i>Tottori Maru</i> ...	Matsukura, B. ...	S. Ibori ...	"	Nippon Yusen Kaisha ...	" 7.9.24 to 13.10.24 ...	20.10.24.
<i>Traveller</i> ...	Worthington, B. ...	A. Robertson ...	"	Harrison ...	" 19.6.24 to 18.7.24 ...	22.7.24.
<i>Trematon</i> ...	Hicks, F. H. ...	J. Christopher, D. Thomas, ...	M.L.	"	Met. Log. 31.3.23 to 24.9.24 ...	14.10.24.
<i>Tuscania</i> ...	Evans, B. ...	F. J. Webb, S. Smith, C. Mayberry. ...	"	"	"	"
<i>Tyndareus</i> ...	Bone, D. W. ...	J. W. Cherry ...	No.	Anchor ...	Form 911 10.1.25 to 20.2.25 ...	9.3.25.
<i>Ulimaroa</i> ...	Adcock, F. ...	D. L. Hoare ...	"	A. Holt ...	" 17.5.24 to 22.8.24 ...	10.9.24.
<i>Ulysses</i> ...	Wyllie, W. J. ...	J. Gilbertson ...	"	Huddart Parker, Ltd. ...	" 17.10.24 to 23.11.24 ...	19.1.25.
<i>Umtali</i> ...	McHutcheon, W. ...	T. R. Phillips ...	"	A. Holt ...	" 20.12.24 to 8.1.25 ...	3.2.25.
<i>Valencia</i> ...	Barnes, E. W. ...	W. H. Foster ...	"	Bullard King ...	" 15.11.24 to 5.12.24...	28.1.25.
<i>Valdura</i> ...	Doyle, M. ...	N. Grayson ...	"	Cunard ...	" 15.2.25 to 26.2.25 ...	2.3.25.
<i>Vardulia</i> ...	Mitchell, A. ...	H. J. Maughan, J. Anderson, ...	M.L.	Gow Harrison ...	Met. Log. 19.6.24 to 20.11.24...	8.12.24.
<i>Vasconia</i> ...	Murchie, P. A., R.D., Commr., R.N.R. ...	A. M. S. Well. ...	No.	Cunard ...	Form 911 8.2.25 to 20.2.25 ...	27.2.25.
<i>Vellavia</i> ...	Inch E. ...	J. E. Deans ...	"	"	" 7.1.25 to 21.1.25 ...	16.2.25.
<i>Ventura de Lar-rinaga</i> ...	Fear, E. T. C. ...	E. Gleave ...	"	"	" 30.3.24 to 11.4.24 ...	22.4.24.
<i>Verbania</i> ...	Keay, W. S. ...	H. H. Kidwell ...	"	Larrinaga ...	" 2.10.24 to 4.11.24 ...	25.11.24.
<i>Verentia</i> ...	Hatcher, W. H. ...	H. J. Kay ...	"	"	"	"
<i>Vigilant</i> ...	Edkin, E. ...	J. G. Wiseman ...	"	Cunard ...	" 7.1.25 to 9.2.25 ...	12.2.25.
<i>Waiotapu</i> ...	Simpson, E. S. S. ...	A. F. Watts ...	No.	Scottish Fishery Board ...	Form 911 20.12.24 to 24.1.25...	5.2.25.
<i>Walmer Castle</i> ...	Davey, A. ...	J. Hunter ...	No.	Canadian-Australasian ...	Form 911 18.1.25 to 6.3.25 ...	10.3.25.
<i>Wangaratta</i> ...	Stanley, W. P., R.D., Commr., R.N.R. ...	B. S. Cave ...	No.	Union Castle ...	Form 911 2.10.24 to 22.10.24...	9.12.24.
<i>Warfield</i> ...	Scutt W. ...	C. Aylen ...	"	"	" 2.1.25 to 23.2.25 ...	24.2.25.
<i>War Nizam</i> ...	Steel, R. ...	T. W. Wordingham, W. C. Cripps, K. M. Morrison. ...	M.L.	British India ...	Met. Log. 30.6.24 to 26.11.24...	1.12.24.
<i>Welshman</i> ...	Putt, R. O. ...	E. V. Wilkinson ...	No.	"	Form 911 18.11.24 to 12.1.25...	16.1.25.
<i>Woodarra</i> ...	Rollerson, W. ...	D. Beaumont ...	"	British Tankers ...	" 3.1.25 to 8.2.25 ...	26.2.25.
<i>Yorkshire</i> ...	Harrocks W. ...	W. A. Fletcher ...	"	White Star-Dominion ...	" 29.1.25 to 26.2.25 ...	6.3.25.
<i>Zealand</i> ...	Reilly, J. V. ...	W. E. Boyle ...	"	Leyland ...	" 14.12.24 to 19.1.25...	2.2.25.
<i>Conway H.M.S.</i>	Millson, G. C. ...	L. D. Graham, A. V. Fisher, ...	M.L.	British India ...	Met. Log. 3.4.24 to 22.6.24 ...	2.8.24.
<i>Pangbourne Nautical College.</i>	Thomas, A. J. ...	L. C. Comber, J. Wallace. ...	No.	Bibby ...	Form 911 8.11.24 to 15.1.25 ...	19.1.25.
<i>Worcester, H.M.S.</i>	Tracy, A. F. G., Commr., R.N. ...	E. Jones ...	No.	Red Star ...	Form 911 13.2.25 to 6.3.25 ...	9.3.25.
<i>Abaco</i> ...	Sayer M. B., O.B.E., R.D., Capt., R.N.R. ...	J. Cross ...	"	"	"	"
<i>Cay Lobos</i> ...	The Senior Cadets... ...	"	Cadets' M.L.	"	Cadets' Met. Log. 21.8.24 to 13.12.24 ...	19.12.24.
<i>Double Headed Shot</i> ...	"	"	"	"	Cadets' Met. Log. 21.9.24 to 13.12.24 ...	19.12.24.
<i>Inagua</i> ...	"	"	"	"	Cadets' Met. Log. 26.9.24 to 17.12.24 ...	19.12.24.
<i>Sombrero</i> ...	The Keepers ...	"	Lighthouse Register.	"	"	"
<i>Walling Island</i> ...	"	"	"	"	Lighthouse Register 7.7.24 to 14.1.25 ...	9.3.25.
<i>Cape Pembroke (Falkland Is.).</i>	"	"	"	"	Lighthouse Register 1.7.24 to 31.12.24 ...	9.3.25.
	"	"	"	"	Lighthouse Register 1.7.24 to 31.12.24 ...	9.3.25.
	"	"	"	"	Lighthouse Register 1.7.24 to 31.12.24 ...	9.3.25.
	"	"	"	"	Lighthouse Register 11.7.24 to 18.1.25 ...	9.3.25.
	"	"	"	"	Lighthouse Register 1.7.24 to 31.12.24 ...	10.2.25.
	"	"	"	"	Lighthouse Register 1.7.24 to 31.12.24 ...	9.3.25.
	"	"	"	"	Lighthouse Register 1.7.24 to 30.12.24 ...	4.3.25.

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

Name of Vessel.	Captain.	Observing Officer.	Line.	Last Case of Water Samples, Reports, etc., Received up to 28.2.25.	Date Received.
<i>Alban</i> ...	Whayman, W. R. ...	R. Griffiths ...	Booth ...	Water Samples ...	23.4.24.
<i>Denis</i> ...	Harris, F. C. P. ...	Mr. Heyburn ...	" ...	" ...	24.2.25.
<i>Hildebrand</i> ...	Maddrell, J. ...	R. S. Hulme Goodier ...	" ...	" ...	13.1.25.
<i>Patia</i> ...	Bostock, R. J. ...	W. Mellwaine ...	Elder & Fyffes ...	" ...	21.1.25.
<i>Tortuguero</i> ...	Martin ...	H. H. Dunning ...	" ...	" ...	31.1.25.