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# The Marine Observer

*A quarterly journal of Maritime  
Meteorology*



Volume XXII      No. 155

January 1952

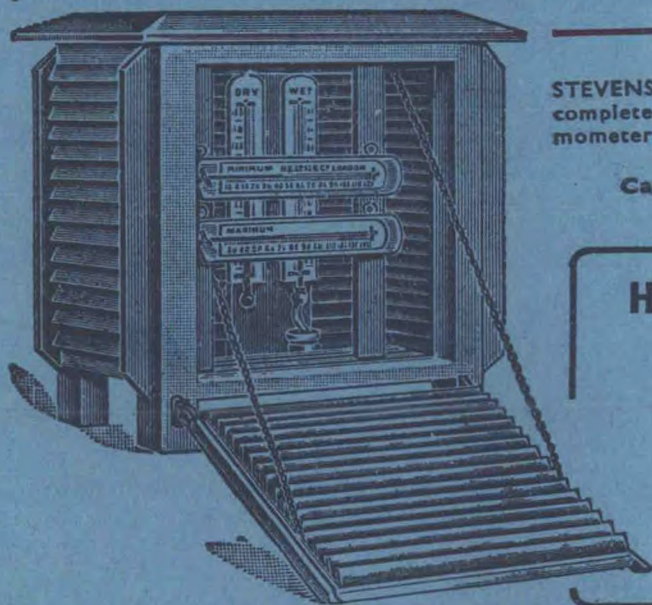
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# THE MARINE OBSERVER

A Quarterly Journal of Maritime Meteorology

prepared by the

Marine Branch of the Meteorological Office

VOL. XXII

No. 155

JANUARY 1952

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*Letters to the editor, and books for review, should be sent to The Editor, "The Marine Observer," Meteorological Office, Headstone Drive, Harrow, Middlesex.*

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## EDITORIAL

The birth of a new year seems a convenient occasion for taking stock—in fact one wonders sometimes why the financial year has to end on such an apparently untidy date as 31st March. Possibly the advent of spring has something to do with the latter event, which does approximately coincide with the vernal equinox—meteorology does seem to play a part in rather unexpected places.

A meteorological stock-taking over the last year produces quite a few satisfactory features—in fact, as we go on from year to year it seems that although the science of meteorology does not go forward with spectacular leaps, it does, on the other hand, show steady and ordered progress. During 1951, for example, we have learnt a lot more about the structure of the upper atmosphere, and world climatological maps up to 100 mb. (about 53,000 ft.) are being produced. Weather ship observations have undoubtedly helped a lot to build up this climatological picture, which is very much allied to the surface picture of which we already know quite a lot. Meteorological balloons and rockets have explored the atmosphere up to 100,000 ft.

New techniques to assist forecasters continue to develop with a better appreciation of how to utilise upper-air information and relate it to surface conditions. In Great Britain, for example, a technique of “thickness patterns” is now used rather extensively. The contours at various “pressure levels” (1,000, 700, 300 mb. corresponding to approximately surface, 10,000 and 30,000 ft. respectively) are first calculated on a pressure-temperature relationship, but instead of merely plotting them as contours, the thicknesses of the layers themselves are also plotted, thus giving the forecaster a better “picture” of the thermal structure of the atmospheric column. The aim of the meteorologist is not only to improve the accuracy of short-period forecasts, but also to be able to forecast the weather several days or weeks ahead. Considerable investigation into jet streams—those violent and as yet unpredictable phenomena of the upper-air circulation in which winds of up to 200 knots are found, and which can be a great danger to high-flying aircraft—has been made.

Agricultural meteorology and hydrology have played an increasingly important part in the work of the British and other Meteorological Offices, a sign of the increasing part that meteorology has to play in the world's quest for food and industrial efficiency. The formation of the World Meteorological Organisation shows recognition of the importance of meteorology by raising it to an inter-governmental level. It is to be hoped that international co-operation in this sphere will be as fruitful and whole-hearted as it was under its more informal predecessor, the International Meteorological Organisation, which did this job so effectively since about 1870. For meteorology to advance as a science it is necessary to learn more about the world picture of weather, and it is here that the voluntary work of officers in Selected Ships has played a big part during the year in question. There are over 1,900 Selected Ships in the world, and of these over 800 belong to the British Commonwealth; when one considers the world-wide nature of their voyages and the number of countries to which they send their weather reports, this is a fine contribution to international meteorology.

As an illustration of the value of ships' observations for the study of world meteorology, all observations of British ships made in the southern hemisphere



have, throughout the year, after extraction from the logbooks and punching on Hollerith cards, been sent to the U.S.A. for a special synoptic study which is being made in that country of southern hemisphere weather.

The programme of the infant National Institute of Oceanography has shown how closely the sciences of meteorology and oceanography are allied, especially on the boundary between ocean and atmosphere, where such important physical developments and interaction take place.

And now as we enter 1952, let us consider what the future may have in store for us. But first, on behalf of the Director and staff of the Meteorological Office, we send to all our readers, be they afloat or ashore a New Year greeting—may 1952 be a year of health and happiness for you and may it be peaceful.

At 0001 on 1st January, 1952, all navigating officers of British ships will have their first taste in practice of a new nautical almanac. A nautical almanac may not have much to do with meteorology except that, were there no meteorological phenomena such as cloud and fog and precipitation, all navigation could be done by celestial and other visual observations and we would not need electronic aids. Every officer who has taken morning star sights will know how infuriatingly frequent is the arrival of a light cloud cover just at "star time". Some comments about this new almanac appear on another page.

January, 1952, will also see another event of importance to young officers and apprentices in the Merchant Navy—the introduction of the new examinations for Masters and Mates. These "exams" have known quite a few changes since they first came into being in 1852; the last memorable change was in 1932 when the Central Board of Examiners was instituted, thus making a common standard of marking, the Second Mate's "Knowledge of Principles" paper was introduced, and the Extra Master's examination was stiffened up so considerably. The 1952 syllabus does not seem to bring in anything very revolutionary. The Second Mate's "Knowledge of Principles" paper has been split into two sections, "Mathematics" and "Principles of Navigation", and the old "Cargo Work and Ship Construction" has been brought up to date and renamed "General Ship Knowledge". A major change in the First Mate's syllabus is the addition of "Elementary Magnetism and the Gyro Compass". The Master has somewhat more advanced questions on the gyro compass added to his "Magnetism" paper, questions about electricity and electronic navigational aids have been added to his "Engineering" paper and he will find that "English" is deleted from his syllabus. Meteorology still appears in both the Mate's and Master's examinations, but the syllabus has been somewhat modernised and includes questions about the practical use of meteorological codes and (for Masters) an analysis message. Altogether it seems that the general purpose of the changes in the examinations is to bring them up to date, which is all to the good.

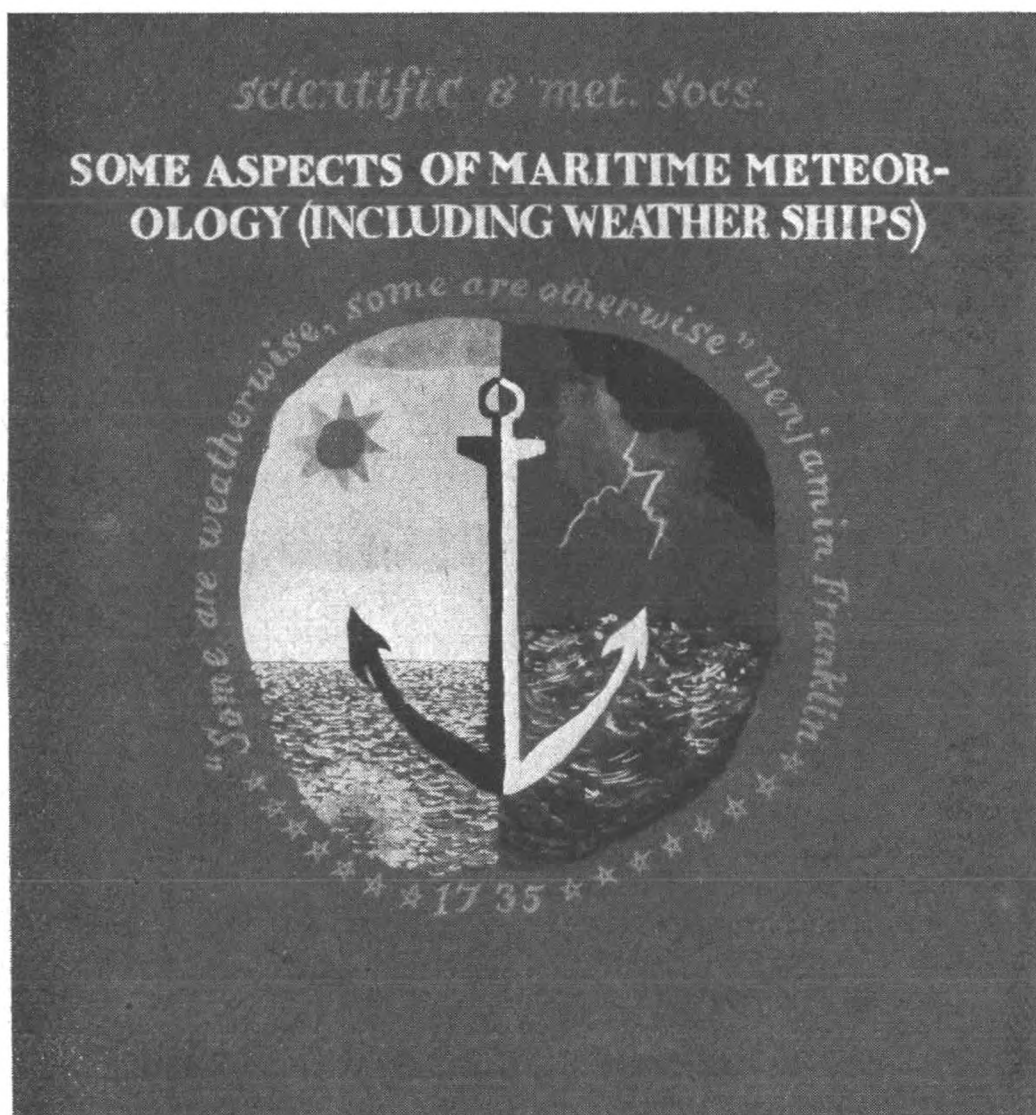
Toward the end of 1952 (when our present stock of logbooks is exhausted) the Meteorological Office intends introducing a new and somewhat simplified logbook for Selected Ships which it is hoped will make the marine observer's job of recording his observations somewhat easier than it has been in the past. A new Hollerith card, on which the data extracted from these logbooks will be punched, will come into use at the same time.

It is probable that during 1952 Technical Commissions of the W.M.O.

will meet to consider, among other matters, improvements which can be made in the Selected Ship scheme and means of achieving greater accuracy and simplicity in observations.

Whatever happens during the year as a result of man's cleverness or stupidity, there is no doubt that Nature will, through the medium of the atmosphere, play her benevolent part for the benefit of mankind. The seasons will follow each other in succession and will bring the fruits of the earth, and it is up to man to so use the talents he has been given that he takes advantage in the most efficient manner of what nature so bounteously provides for the common good. The meteorologist, be he professional or amateur, has quite a big part to play in this job.

MARINE SUPERINTENDENT.



This drawing was made by a boy at the Merchant Taylors' School to advertise a talk by the Marine Superintendent. The quotation is from Benjamin Franklin, scientist, statesman and a U.S. signatory to the Declaration of Independence. It has been adopted as the slogan of the Amateur Weather Men of America, a body attached to the Franklin Institute, whose bi-monthly magazine is appropriately named *Weatherwise*.





*The Marine Observers' Log* is a quarterly record of the most unusual and significant observations made by mariners.

The observations are derived from the logbooks of marine observers and from individual manuscripts. Photographs or sketches are particularly desirable.

Responsibility for each observation rests with the contributor.

## JANUARY, FEBRUARY, MARCH

### CURRENT RIPS

#### Red Sea

S.S. *City of Tokio*. Captain F. Sumpton. Liverpool to Calcutta. Observer, Mr. R. J. Thrubron, 2nd Officer.

21st January, 1951, 1155 G.M.T. The vessel encountered a strong current setting between  $075^{\circ}$  and  $090^{\circ}$ T. The line of demarcation was clearly visible on the surface of the water and the current strong enough to necessitate full starboard helm for a short time. The position was checked by terrestrial bearings. Draft forward 21 ft. 11 in., aft 25 ft. Wind SE's force 4. Course  $147^{\circ}$ . Speed 11.68 knots.

Position of ship:  $15^{\circ} 12' \text{N}$ ,  $41^{\circ} 55' \text{E}$ .

#### North Pacific Ocean

S.S. *Empire Viceroy*. Captain J. B. S. Bland. Vancouver to Balboa. Observer, Mr. C. D. Mason, 2nd Officer.

12th March, 1951, 2100 G.M.T. The vessel passed through five distinct current rips running SSW–NNE from horizon to horizon. They were marked by lanes of broken water about 30 yards wide, approximately 250 yards apart, having a very distinct line of demarcation on the northern side. They gave the appearance of five lanes of force 3 wind travelling over an otherwise calm sea. The sea temperature rose from  $76^{\circ}\text{F}$  to  $85^{\circ}$  and remained steady at  $85^{\circ}$  throughout the following day when, at noon, it was found that the vessel had experienced a favourable current of  $1\frac{1}{2}$  knots.

Position of ship:  $8^{\circ} 54' \text{N}$ ,  $85^{\circ} 22' \text{W}$ .

## LINE OF DEMARCATION

### Gulf of Oman

M.V. *Daressa*. Captain P. Wright. Basra to Bombay. Observer, Mr. G. T. Miller.

16th February, 1951, 0545 G.M.T. A line of disturbed water running NNW-SSE for about 5 miles was observed. On crossing the line the vessel took a sudden sheer to port of 5°.

I am of the opinion that the cause of this was some movement along the sea bed which in this area is charted as being of a volcanic nature. Air temp. 75°F, sea 73°. Sounding, no bottom at 600 fathoms. Course 072°T.

Position of ship: 24° 37'N, 61° 50'E.

The Meteorological Office, Poona, comments on his observations as follows:

"With regard to the observer's suggestion that the phenomenon might be due to some movement along the sea-bed, it may be mentioned that even the Benioff vertical seismographs at Poona did not record any significant earth movement. A brief note on the weather situation of the day is given below and it will be seen from this note that it is also difficult to explain the phenomenon on the basis of the prevailing weather.

"*Weather off the Mekran coast on the 16th February, 1951. On the morning of the 16th a western disturbance lay over south-west Iran. By the next morning it had moved into east Iran. Rain or showers were reported from the stations in the Persian Gulf on both days. The disturbance did not, however, affect the Mekran coast on the 16th. All the stations in that area reported clear skies at 1200 on that date.*

"The ship itself was experiencing clear skies, good visibility and a w'ly wind force 2 at about 0600 when she was crossing the line of disturbed water."

## DISCOLOURED WATER

### South Atlantic Ocean

Some bottles containing sea-water samples were sent in to the Meteorological Office by Captain R. Ross, Master of the S.S. *Malmesbury*.

They were taken on a passage from Montevideo to St. Vincent on 9th February, 1951, at 11° 28'S, 36° 06'W. Course 019°, speed 9 knots. Sea temp. 85°F, air 86°, dew point 71°. Wind 030°, 9 knots. Bar. 1014.5 mb. Partly cloudy. Wave direction 030°; period 4 sec., height 1 ft.

The vessel passed through numerous patches of brown, green or yellow coloured water during the day and they appeared to have a scum on the surface. No bottom was registered when soundings were taken. The depth of the patches was unknown.

*Note.* The samples were forwarded to the Director of the Marine Biological Association at Plymouth, whose comments are as follows:

"We thank you for your letter and the water samples. From their appearance, the colour is obviously caused by the presence of phyto-plankton and chemical analysis is not called for.

"Dr. T. J. Hart has kindly examined the samples for us, and has identified the plankton as predominantly *Trichodesmium Thiebautii* Gomont. There are several records of coloured patches in tropical waters caused by this plant, which is closely related to *Trichodesmium erythraeum*, abundant in the Red Sea, and by its reddish colour giving it the name.

"Samples such as this greatly interest Dr. Hart who will be glad to examine any sent to this laboratory. He says, however, that the plants would be much easier to identify if treated with a preservative, such as a few drops of 40 per cent formalin or of a strong solution of corrosive sublimate in each bottle-full, and would be grateful if this information could be brought to the attention of the officers of the ships making observations."



## PHOSPHORESCENCE

### Red Sea

M.V. *Cheshire*. Captain P. H. Potter. Suez to Aden. Observer, Mr. J. S. Brownlee, Senior 3rd Officer.

14th March, 1951, 0200 S.M.T. Phosphorescence was observed in the form of broad streaks, about 50 ft. apart, which stretched right across the horizon. It emitted a very bright glare which was first observed 8 to 10 miles away and resembled the lights of a large town showing on the horizon. On approaching, the streaks became clearly defined and looked exactly like waves breaking on a shore. On a course of  $147^{\circ}$  at 14.5 knots we continued through the phosphorescence for some 20 minutes; over this period the visibility was seriously affected, being reduced to 1-2 miles, and a strong, oily, fishy odour was present. As the phosphorescence passed astern the glare died away, finally disappearing a little over an hour after it was first observed. The wind was SE force 2, with negligible sea and swell. Air temp.  $79^{\circ}\text{F}$ , sea  $79^{\circ}$ .

Position of ship:  $15^{\circ} 50' \text{N}$ ,  $41^{\circ} 34' \text{E}$ .

## WIND OF HURRICANE FORCE

### North Atlantic Ocean

S.S. *Swainby*. Captain R. D. Sparling. Narvik to Baltimore. Observer, Mr. P. Henderson.

14th March, 1951, 0001 G.M.T. The wind was  $040^{\circ}$  force 6. Barometer 993.8 mb, falling. Course  $230^{\circ}$ , speed 10 knots. By 0200 a heavy N'y gale had caught up with the vessel, breaking doors and flooding storerooms. The ship was turned at once and hove-to, with the wind two points off the starboard bow. One heavy sea raked the starboard side, caving in part of the boatdeck and smashing a wooden lifeboat. Ports were also shattered and the fore bulkhead bent inwards by the sea three hours after the start of the gale. At 0600 the wind was force 12 or over, with an average wave height of 45 ft. By 1200 the wind had eased to  $010^{\circ}$ , force 10, with 30 ft. waves. Barometer 993.1 mb, rising slowly. At 1800 the wind was  $040^{\circ}$ , force 11, with 30 ft. waves. Barometer 995.7 mb, rising.

By 1800 on the 15th the wind had moderated to  $070^{\circ}$ , force 8, with waves from  $060^{\circ}$ , height 15 ft. Barometer 1006.4 mb, falling.

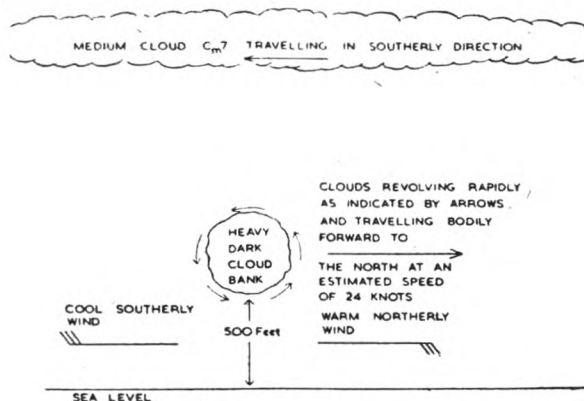
The vessel was hove-to for a period of 25 hours from 0200 on the 14th. Position of ship at 0200:  $59^{\circ} 30' \text{N}$ ,  $30^{\circ} 00' \text{W}$ .

## LINE SQUALL

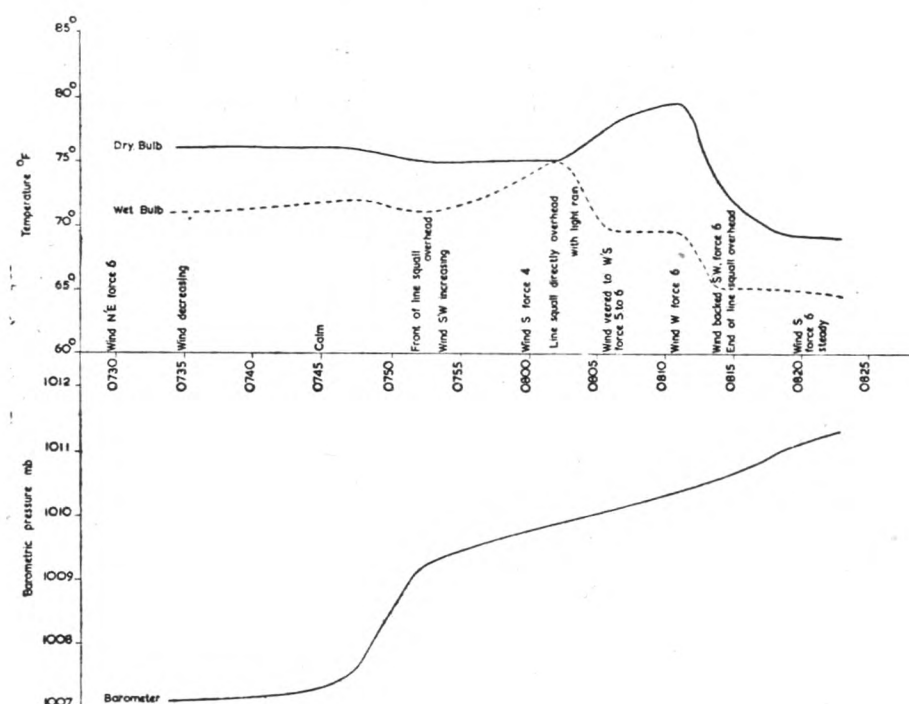
### Australian Waters

M.V. *Port Alma*. Melbourne to Sydney. Captain D. F. Morgan, Observers, Mr. W. M. G. Lloyd, 3rd Officer, and Mr. P. P. Crumpton, Apprentice.

27th March, 1951, 0800 G.M.T. A very distinct line squall was first observed at 0700. It extended from horizon to horizon in a W'-N-E's direction and was travelling N at an estimated speed of 24 knots. The associated clouds were black and resembled cumulonimbus. The middle clouds above were altocumulus ( $C_m7$ ) travelling in a S'ly direction.



Prior to the arrival of the line squall at the ship the wind was N'E force 6. When it was almost directly overhead, however, the wind dropped to a calm, then, as it passed over and ahead of the vessel, the wind shifted round to S'W and gradually increased in force. Over this period very marked changes in pressure and temperature took place, as shown on the accompanying graph.



Very light precipitation was experienced when the squall was directly overhead. Course 014°, speed 14 knots.

Position of ship: 36° 43'S, 150° 22'E.

*Note.* This is a very interesting observation, since the rotation in a vertical plane of a line or arch of squall cloud is not often reported. This rotation indicates a vertical eddy movement on the line of a cold front, the sense of the rotation being determined by the S'ly following wind at and above the surface and the N'ly wind at higher altitudes. The squall showed all the phenomena of a line squall at a cold front and was of the type known in Australian waters as a "southerly buster".

It is remarkable that a similar observation of a rotating squall lying in the same direction and approaching at the same speed was made in almost precisely the same place on 22nd February, 1947; this was published in *The Marine Observer*, January, 1948. It was recorded by M.V. *Brisbane Star* in 36° 45'S, 150° 22'E.



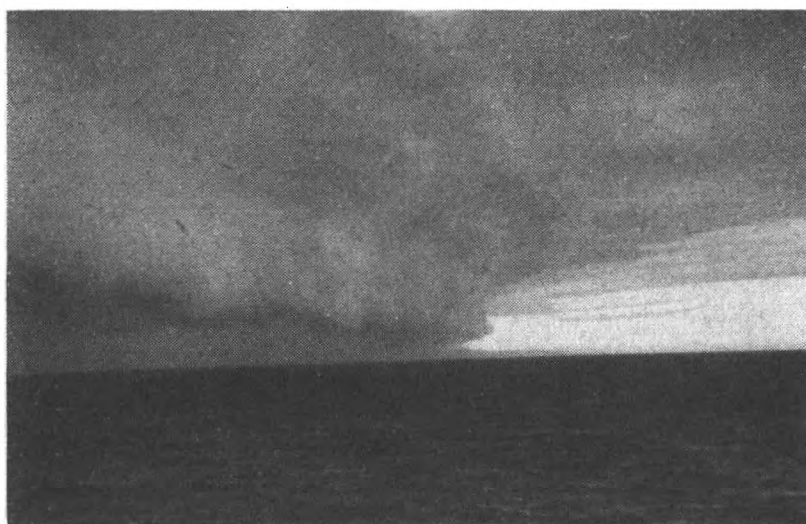
## PAMPERO

### South Atlantic Ocean

M.V. *Leverbank*. Captain D. Gillies. Santos to Montevideo. Observers, Mr. F. G. Howard, Chief Officer, Mr. A. Dorkins, 2nd Officer, and Mr. D. Moore, 3rd Officer.



1340 G.M.T., looking towards NW.



1345 G.M.T., looking towards SE.

16th March, 1951, 1350 G.M.T. The vessel passed under what appeared to be a "Pampero", which was bearing NW-SE. The barometer immediately rose from 1004.6 mb to 1006.1 mb, while the temperature dropped from 77° to 71°F. As the "Pampero" passed over heavy rain was experienced and the wind, gusting to force 7, began to back from the NNW until 1420, when it steadied at SW's force 5. During this time the sea appeared to be from ESE, of height 5 ft., and short.

Position of ship: 28° 10'S, 48° 23'W.

## LIGHTNING

### North Atlantic Ocean

M.V. *Armada*. Captain E. J. Ridout. Curaçao to Dunkirk. Observer, Mr. G. C. Elvidge, 2nd Officer.

27th February, 1951, 0315 G.M.T. A violent electric storm was experienced with heavy thunder, vivid lightning and torrential rain. The wind was light, variable. Both fork and sheet lightning were seen, the former being extremely vivid with a considerable number of branches covering a large area of the sky. Some of these flashes were yellow or yellowish-white in colour while others were a bright mauve. During the early part of the storm and before the rain started, the lightning was almost incessant and extremely vivid. It was noticed that once again the foremast took the brunt and the sparks could be seen travelling along the steel wire guides for the oil lamp. The barometer remained comparatively steady, but there was a drop in temperature of 7°F. The storm abated by 0350, but the lightning continued. At 0500 thunder was heard again and there was more rain which lasted till 0530.

Position of ship: 25° 30'N, 53° 00'W (approx.).

### Off Corsica

M.V. *King Robert*. Captain G. Craze. Port Said to Genoa. Observer, Mr. A. D. Terras, 3rd Officer.

27th February, 1951, 0945 S.A.T. Abeam of Africa Rock, 42° 21'N, 10° 04'E, a vivid flash of lightning of about five seconds duration struck the foremast, followed within two or three seconds by a deafening peal of thunder lasting about 15 seconds. A sizzling noise and hissing was heard as the lightning struck the mast and ran along the jumper stay. The weather at the time was very thick with continuous drizzle and distant thunder and lightning.

## SKY COLORATION

### Caribbean Sea

S.S. *San Felix*. Captain C. Summers. South Shields to Curaçao. Observers, Mr. R. Wilkinson, 2nd Officer, and Mr. J. F. Boon, 3rd Officer.

5th January, 1951, 1440 G.M.T. A portion of discoloured haze, apparently suspended in the sky from the horizon to about 6° altitude, was observed. The horizontal angle subtended by the phenomenon was about 8°. The patch interposed itself between Sombrero Lighthouse and the observer, thereby limiting its distance from 1 to 13 miles from the bridge, the bearing of the centre at that time being 350°T. Coloration was as follows: orange-red primarily, the phenomenon suffering a reduction in altitude and angular distance, then becoming maroon and finally purple, prior to disappearing completely, all three colours being considerably diffused. The time of duration was 10 minutes. The wind was W force 3. Sun's altitude 42° 21', bearing 148°.

The weather experienced over the three days prior to the observation: rain squalls and showers with frequent lightning. Winds mainly NW'ly force 4.

For the three days after: notable only for the lack of usual tradewind characteristics, i.e. winds and currents. Exceptional visibility.

Position of ship: 18° 23'N, 69° 29'W.

Note. We can give no explanation of this unusual phenomenon.



## ABNORMAL REFRACTION

### Caribbean Sea

S.S. *Imperial Toronto*. Observer, Mr. A. L. Smith, 2nd Officer.

7th January, 1951, 1030 G.M.T. Barbados was seen at a distance of 137 miles. The position by visual bearings from St. Lucia and the island of St. Vincent and by star observation, was in  $13^{\circ} 34' \text{N}$ ,  $61^{\circ} 57' \text{W}$ . The islands of St. Lucia and St. Vincent seemed to be very close and bearings were very easily observed at a distance of 65 miles. The island of Martinique was also observed at a distance of 100 miles, but no bearings were taken. As the sun was rising over the island of St. Vincent, bearing  $111^{\circ} \text{T}$ , the islands of Barbados and Martinique disappeared. The sky was cloudless and the sea smooth. Air temp.  $79^{\circ} \text{F}$ , sea  $80^{\circ}$ .

### Gulf of Suez

S.S. *Paparoa*. Captain N. Thomas. Aden to Suez. Observers, Mr. F. I. Christall, 3rd Officer, and Mr. M. J. Blake, 4th Officer.

2nd March, 1951, 1840 ship's time. Ras Zafarana Light was sighted at a distance of 40.5 miles, and while approaching it the light appeared to change colour, appearing from time to time as green, blue and orange. At 1945 Ras Abu Daraz Light was sighted at a distance of 39 miles and this light also flashed in various colours. At 2000 a ship was sighted dead ahead, which was later found to be bound opposite, but it was not until 2130 that it was abeam. The vessel was of the average type 12-knot cargo ship, giving a converging speed of the two vessels of 28 knots, which means that the vessel was sighted at a distance of over 40 miles. During the whole of the watch, land was clearly visible on both sides of the Gulf at distances up to 20 miles, although at the time there was no moon. At 2100 Ras Gharib Oil Flare was still visible at a distance of 45 miles, and later the lights of Suez and the red light at Newport Rock were sighted at a distance of over 30 miles. Weather conditions at the time were: air temp.  $72^{\circ} \text{F}$ , dew point  $58^{\circ}$ , sea  $70^{\circ}$ . The wind was apparently NNW force 2, though the sea remained glassy and unrippled. The sky was cloudless.

Position of ship at 1840:  $28^{\circ} 32' \text{N}$ ,  $33^{\circ} 04' \text{E}$ .

*Note.* In cases of abnormal refraction such as the above, a note of the display on the ship's radar screen might considerably enhance the value of the observation. It is possible that unusual radar reception such as that experienced by the *Paparoa* on the previous day (see page 14) may have been also experienced on this occasion.

## LUNAR CORONA

### North Atlantic Ocean

S.S. *Matheran*. Captain H. E. MacGregor. Port Said to Boston. Observers, the Master, Mr. R. F. Holland, 3rd Officer, and Mr. A. Halstead, 2nd Radio Officer.

15th January, 1951, 2345 G.M.T. With the moon in its first quarter, bearing  $236^{\circ}$ , approximate altitude  $55^{\circ}$ , a brilliantly coloured corona of approx. diameter  $8^{\circ}$ – $10^{\circ}$  was observed, in which four distinct colours could be seen. The inner rim was white/yellow, outside which were bands of blue, red and green; a separate rim of faint blue encircled the whole. The phenomenon was visible for about three minutes. The cloud consisted of  $2/8 \text{ As}$ , not actually covering the moon but developing from the W and eventually covering the whole sky.

Position of ship:  $39^{\circ} 06' \text{N}$ ,  $51^{\circ} 36' \text{W}$ .

## GREEN FLASH AT SETTING OF PLANET VENUS

### Off Montevideo

S.S. *Polar Maid*. Captain J. W. Ross. South Shields to South Georgia. Observers, the Master and Mr. D. A. Watt, Chief Officer.

12th March, 1951, 2320 G.M.T. While approaching Banco Ingles light vessel the planet Venus was seen to set, first turning red and then disappearing with a green flash.

Position of ship:  $35^{\circ} 12'S$ ,  $55^{\circ} 30'W$ .

### AURORA

#### North Atlantic Ocean

S.S. *Cairnesk*. Captain I. G. Foster. Grangemouth to St. Johns, N.B. Observer, Mr. A. R. Fairley, 3rd Officer.

13th March, 1951, 2240 G.M.T. The phenomenon took the form of several arcs of different sizes whose colour varied from the pale green of the most extreme arc to the deeper and more brilliant green of the most central. The whole display increased in brilliancy and extent until at 2255 it covered an arc of  $150^{\circ}$  of the northern sky, from  $268^{\circ}$  to  $058^{\circ}T$ , and reached a maximum altitude of  $50^{\circ}$  on a bearing of  $350^{\circ}T$ . At 2305 the display was obscured by cloud; when it next appeared it had faded appreciably and could be identified only on the most N'ly bearing as a faint white band.

Position of ship:  $53^{\circ} 41'N$ ,  $29^{\circ} 58'W$ .

### METEORS

#### Mediterranean Sea

M.V. *Worcestershire*. Captain F. C. Brooks. Port Said to Tilbury. Observer, Mr. R. Phillips, Senior 3rd Officer.

1st February, 1951, 2110 G.M.T. A meteor was observed bearing  $265^{\circ}$ , altitude  $35^{\circ}$ , travelling in a N'ly direction. It disappeared bearing  $285^{\circ}$ , altitude  $28^{\circ}$ , near Hamal, the time of flight being three to three-and-a-half seconds. Its colour and brilliance were similar to that of the full moon and the short trail exhibited a ruddy glow near to the main body.

Position of ship:  $32^{\circ} 12'N$ ,  $30^{\circ} 04'E$ .

#### South African Waters

S.S. *Argyll*. Captain J. Dodds. Lourenço Marques to Takoradi. Observer, Mr. L. Lumby, 2nd Officer.

10th February, 1951, 0215 G.M.T. A very brilliant meteor fell from an altitude of about  $50^{\circ}$ , bearing  $340^{\circ}T$ , to about  $5^{\circ}$  altitude, bearing  $330^{\circ}T$ , leaving a distinct orange-coloured trail. It appeared to disintegrate in a blue flash which illuminated the whole of the NW quadrant. The meteor itself was of a bluish-white colour and appeared as a revolving mass of white-hot metal. The time of flight was about four seconds. The sky was cloudless.

Position of ship:  $33^{\circ} 38'S$ ,  $17^{\circ} 52'E$ .

#### South Pacific Ocean

S.S. *Flamenco*. Captain P. L. Hockey. Observers, the Master and Cadet D. J. Good.

5th March, 1951, 0916 G.M.T. A very bright meteor was observed bearing

020°, starting at about 60° altitude and ending at about 10° above the horizon. It first appeared as a blue streak, then changed to orange and dispersed with a very bright bluish-green flash which lit up the surroundings like daylight. We were partially blinded by the flash. The time of flight was a good two seconds.

Position of ship: 25° 38'S, 70° 45'W.

## SOLAR ECLIPSE

### Caribbean Sea

M.V. *Rangitoto*. Captain C. R. Pilcher, O.B.E. Curaçao to Colon. Observer, Mr. J. D. Hellings, 3rd Officer.

7th March, 1951. An annular eclipse of the sun occurred on this date. The ship's position, 12° 26'N, 70° 37'W, was almost on the middle line of the eclipse at sunset, and at 2230 G.M.T., when the sun was about 5° altitude



above the horizon, a large partial eclipse was observed as shown in the photograph. There were few clouds in the vicinity. The sun set at 2255.

*Note.* The apparent width of the uncovered part of the sun in the photograph is enlarged by the spread of light action on the film ("halation") and the cusps are blunted for the same reason. These effects are, of course, magnified in the resulting enlargement from a small negative. The ship was not quite in the narrow region from which the eclipse could be seen as an annular one. An annular eclipse is one in which the centres of the sun and moon coincide but the moon is farther from the earth than its average distance. It is thus not large enough to cover the sun completely, but leaves a very fine ring of the sun's surface showing. In a total eclipse of the sun, the moon is appreciably nearer and completely covers the sun's disc for a short time. The line from which the annular eclipse could be observed on 7th March, 1951, started in the West Indies region and then crossed the South Pacific to the region of New Zealand.



## NIGHT SKY PHENOMENON

### North Pacific Ocean

S.S. *Walvis Bay*. Captain H. Gentles. Panama to British Columbia. Observer, Mr. N. B. Smith, Chief Officer.

6th February, 1951, 1348 G.M.T. A brilliant blue-white flash, which illuminated the whole sky and lasted for a period of three seconds, was observed to starboard. According to information received later in the day from U.S.A. radio stations, this phenomenon coincided with the detonating of an atom bomb near Las Vegas, Nevada, some 1,000 miles from our position. The weather was fine and clear.

Position of ship:  $37^{\circ} 15' \text{N}$ ,  $123^{\circ} 9' \text{W}$ .

## ABNORMAL RADIO RECEPTION

### North Atlantic Ocean

S.S. *Swainby*. Captain R. D. Sparling. Narvik to Baltimore. Observer, Mr. P. Henderson.

17th March, 1951, 0001 G.M.T. The radio officer made contact with EJK (Valentia Radio) on medium-wave at a range of 1,033 miles. EJK reported the strength of signal as excellent.

The weather was overcast after intermittent rain and a moderate gale was blowing from the NE. Air temp.  $40^{\circ}\text{F}$ , wet bulb  $39^{\circ}$ , sea  $39^{\circ}$ . Visibility good.

Position of ship:  $53^{\circ} 31' \text{N}$ ,  $37^{\circ} 06' \text{W}$ .

## UNUSUAL RADAR PERFORMANCE

### Red Sea

S.S. *Paparoa*. Captain N. Thomas. Aden to Suez. Observers, Mr. F. I. Christall, 3rd Officer, and Mr. J. D. Cubitt, 2nd Officer.

1st March, 1951. Approaching Daedalus Reef, at a distance of about 40 miles, the radar was brought into use on the extreme range of 60,000 yd. Shortly after tuning in a very pronounced echo was observed, fine on the starboard bow, at a distance of 55,000 yd. This echo remained on the screen until at a distance of 45,000 yd. it faded away. It had then travelled across the screen on a course directly opposite to that of the ship. Later, when the lights of a ship were sighted fine on the starboard bow, its echo was observed on the screen at a distance of 28,000 yd. During the remainder of the night further pronounced echoes were observed at distances up to 60,000 yd., all of which remained on the screen until they finally faded out at about 50,000 yd., reappearing at about 30,000 yd. It can only be assumed that these echoes were from ships not yet visible to the naked eye, as in each case a ship was later seen in a position corresponding to that in which the echo would have been had it remained visible on the screen throughout. The Daedalus Reef Light was eventually seen by the naked eye at an approximate distance of 20 miles, but was not picked up by the radar until it was only 26,000 yd. off. Weather conditions at the time were: air temp.  $74^{\circ}\text{F}$ , sea  $76^{\circ}$ , dew point  $66^{\circ}$ . Wind N'W force 2. Barometer 1010.0 mb. Sky cloudless. The radar used was Admiralty Pattern Type 268, the approximate height of the aerial above waterline being 80 ft.

*Note.* This report conforms with the known effect of super-refraction, viz. a lifting of the refracting layer from the sea surface. This will give rise to the skip-distance,

so well demonstrated above. In the immediate vicinity of the set the radar is restricted to its orthodox coverage; beyond this is a blind area in which it is not possible to plot radar echoes. Outside this zone plotting is again possible up to quite long ranges. The warm, dry NW wind blowing over the waters of the Red Sea would create ideal conditions for super-refraction.

The following comments upon this report have been received:

*From Naval Weather Service.* "The data quoted indicate that meteorological conditions adequately account for the extended ranges noted by the *Paparoa*."

*From Ministry of Transport.* "This seems to be a case of super-refraction in which echoes were perceived at their true distances although these distances were much greater than the usual detection ranges for such targets. The chief point of interest seems to be the skip between 15 and 25 miles in which the echoes did not appear. Their reappearance at a greater distance would seem to argue that the radar beam having left the earth's surface at 15 miles was either refracted or reflected so as to meet the earth again at about 25 miles.

"It would be helpful in these reports (not necessarily the one under discussion) if the rate of travel of echoes across the screen could be given, i.e. the times at which they were observed and the distance travelled, as this might facilitate a solution by eliminating unlikely causes. Otherwise the reports seem to be very carefully prepared and are most interesting to us."

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### NEW ZEALAND METEOROLOGICAL SERVICE

The following is an extract of a letter received from the Director of the New Zealand Meteorological Service:

"We continue to receive excellent co-operation from all British 'Selected' and 'other' ships. Since 1st January, 1951, we have recruited 56 'other' ships to report in our area. Of these 44 were British (including seven tankers).

"For their evident interest in marine meteorology and the continuity of their reports the following non-Selected Ships deserve mention: *City of Edinburgh* (Captain J. W. Wotherspoon), *Kindat* (Captain H. V. Poole), *British Prospector* (Captain P. Quenet)."

### OCEAN CURRENT OBSERVATIONS BY LORAN

A rather unusual use of Loran is reported in a recent issue of the U.S. Hydrographic Bulletin. Detail of the direction and force of the Gulf Stream between Key West and Cape Hatteras is being investigated by the U.S. Hydrographic Office in an effort to determine how these currents may be most advantageously used by coastwise shipping. For 12 months a group of Loran-equipped oil tankers has been forwarding detailed hour-by-hour reports of position, dead-reckoned speed, course, sea temperature and meteorological conditions in this area. Although it is said to be too early to make conclusive recommendations, the initial results show that for the year beginning 1st May, 1950, it was practicable to pick out favourable north-bound and south-bound routes whereby vessels travelling up and down that coast could save from three to 10 hours steaming time on the passage. It will be very interesting to learn the final results of these investigations.

C. E. N. F.

## FORECASTING FOR THE D-DAY LANDINGS

BY C. K. M. DOUGLAS, O.B.E.

The following account of the D-Day forecast has been written from the point of view of one of the forecasters at the British Central Forecasting Office, which along with its counterparts in the Admiralty and in the Weather Service of the U.S. Air Forces then in this country, took part in the meteorological conferences by telephone, which invariably preceded the formulation of the weather forecasts given to the Supreme Commander. The account draws largely on the report to the Supreme Commander made by Group-Captain J. M. Stagg, Chief Meteorological Officer, SHAEF.

The wind and weather are vital factors in all modern operations of war. The demands of all the Services for forecasts really require a much higher standard than is at present attainable, or is likely in any near future. This refers more especially to the length of the time interval, but in the case of some operations, particularly air operations, the degree of precision required is sometimes difficult to attain even for short periods ahead. Nevertheless the Service Chiefs have always been grateful for anything they can get in the way of forecasts. Meteorology was quite important in the first World War, and still more important in the second, and in spite of the difficulties of forecasting the relations between the meteorologists and the Service Chiefs have been on the whole very good.

A sea-borne invasion of a strongly defended area is an exceptionally difficult operation, and in a region like the northern French coast it is by no means free from major weather hazards at any season of the year. It is only from May to September that it could seriously be contemplated. It is not only necessary to secure a footing in enemy-held territory, but also to build up rapidly a properly equipped force, large enough to withstand the concentrated attacks of the enemy, which can be brought to bear within a few days. It was considered important to have 10 days of reasonably quiet weather after the first landings. The probability of this can only be deduced from climatological statistics, but synoptic forecasting can be helpful for the vital first few days. The task of the meteorologists would have been greatly eased if the date of the assault could have been decided at short notice when the weather conditions were really settled, but that was impossible owing to the special tidal conditions required for an invasion of Normandy. In any case there was no settled spell during June or July, 1944, and it would have been impossible to keep a large invading force waiting indefinitely for suitable weather. The carrying out of the operation in unsettled weather involved a small but definite element of serious risk. Though the chances of two or three successive days of very adverse weather in summer are small, they are not negligible. Such a development did in fact occur on 19th to 21st June, when there was a spell of north-east wind of force 6 to 7, unprecedented at such an advanced period in the summer. Had this occurred immediately after D-day the result might well have been catastrophic. Owing to the tidal factor D-day would have been on 17th or 18th June, had it not been for the courage of General Eisenhower in issuing orders to go ahead in a rather marginal situation in the early morning of 5th June. In the event the result was satisfactory from the standpoint of meteorology. The date of the assault was postponed from 5th till 6th June as the result of meteorological advice, to the great advantage of the operation, and the forecasts for 6th June enabled the assault to proceed. The actual conditions on D-day were good on the



western beaches sheltered by the Cherbourg Peninsula, and though further east the sea was distinctly rough, this was unavoidable and the difficulties were successfully overcome.

### **The period of preparation**

The synoptic climatology of the area was studied well in advance by the meteorological services who would be jointly responsible for the forecasts, namely, the Meteorological Office, the Naval Meteorological Service and the Weather Service of the U.S. Army Air Force. Statistics showed that June was the best month, but the postponement from the date originally planned in early May was due entirely to the fact that more time was required for the military preparations. In 1944 May was a much better month than June, so that the postponement was very regrettable, though unavoidable. The fine weather was not wholly wasted as there was heavy bombing of railway targets in France. Past records showed that a combination of the good weather wanted for the whole period of the landings, and at one time thought necessary, along with suitable tidal conditions, was unlikely to occur, and it became necessary to define a set of minimum meteorological conditions which could be accepted by all arms as being the worst conditions in which the operation could be launched. These were never wholly accepted by all the forces, but they represented the conditions which the meteorological section at SHAEF (General Eisenhower's headquarters) kept in mind. These minimum conditions included a wind of not more than force 3 onshore or force 4 offshore from D-day to D-day plus 2. The actual conditions on the western beaches on D-day and the following day were slightly worse than this, which shows how very marginal the position was. It was also necessary to have cloud conditions in which our bombers could operate successfully, and this included suitable weather in the base area.

In February, 1944, telephone conferences were instituted between the three Central Forecasting Centres at Dunstable, the Admiralty and Widewing. The last-mentioned was the headquarters of the U.S. Army Air Force and was in the same set of buildings as SHAEF. The Chief Meteorological Officer at SHAEF (Group-Captain J. M. Stagg) or his deputy (Colonel Yates of the U.S.A.A.F.) acted as chairman of the conference. The early conferences were held two or three times a week with the idea of producing an agreed five-day forecast. This attempt was made in response to strong pressure from the Services, but the experiment soon showed, as one would expect, that except in settled weather the forecasts of the three centrals differed widely, so that an agreed forecast had low confidence and meant very little. As the time of the operation approached there was an increasing concentration on the first 48 hours, and though some sort of outlook for the following three days was given, it was nearly always with low confidence, and it is unlikely that it had much practical application. From mid-April onwards the conferences were held twice daily, and during much of May, when operational forecasts were required for preliminary manoeuvres in the Channel, they were held three times daily. The Meteorological Staff Officer of the Naval Commander-in-Chief and the Chief Meteorological Officer at Headquarters, Allied Expeditionary Air Force, also took part in these conferences. On the days immediately preceding D-day a further conference was held at 0300 (double summer time) each morning, on which to base the final advice given to the Supreme Commander's meetings at 0415.

The important forecasts of sea and swell were done throughout the period by the Forecasting Office at the Admiralty. They had carried out extensive researches into this subject, particularly the swell from Atlantic depressions. The disadvantage of swell diminished as larger landing craft became available, but nevertheless a heavy swell had to be avoided.

### The operational period

Shortly before D-day observations became available from meteorological ships in the Atlantic. During most of the war the lack of information from the Atlantic was a serious handicap. Reconnaissance flights were of immense value, but they could not be made frequently enough or go far enough to west to enable the forecaster to obtain an accurate picture of the Atlantic situation. The charts accompanying this article show that by D-day there was a very considerable amount of information available. Lack of information

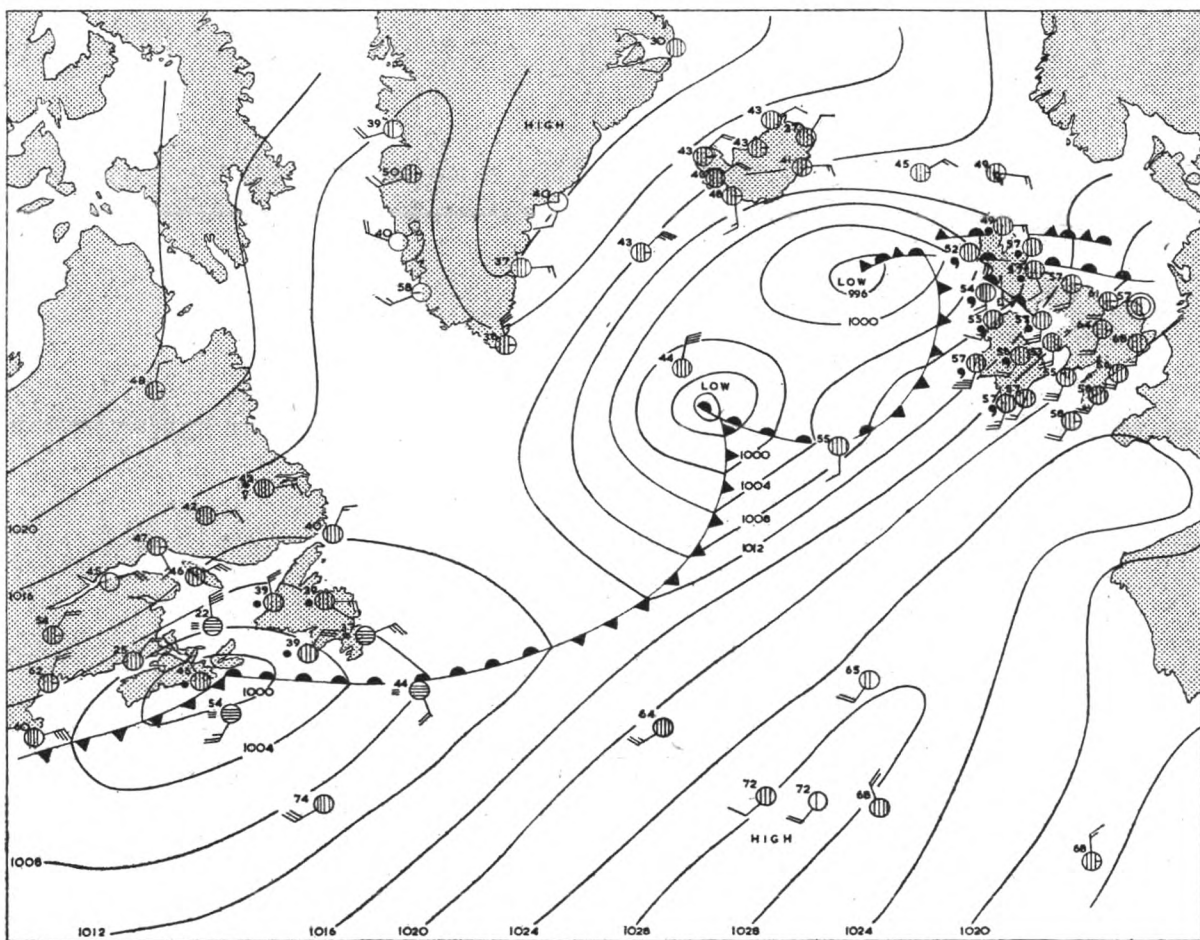


Fig. 1

Weather Map for 1800 G.M.T., 3rd June, 1944. This weather map is broadly the one on which the decision to postpone the assault from the 5th till the 6th June was made.

from certain areas gave rise to some difficulties during the D-day period, but the information actually obtained was vital and indeed indispensable to the 48-hour forecasts. Radio soundings of upper-air temperature were also carried out, and there was enough information to determine the main features of the distribution of upper-air pressure and therefore of wind across the Atlantic.

A fine quiet spell in late May, 1944, was followed by a change to an unsettled westerly type of weather. A few days before 5th June, the date originally fixed for the landings, it looked as if the weather in the Channel area would be marginal in type, in the intermediate region between a belt of high pressure over France and depressions to northward. It was impossible to hold out a favourable prospect, but until the evening of 3rd June the outlook was too doubtful to justify a definite postponement of the landings, a contingency to be avoided if possible. The provisional decision to postpone the assault for 24 hours was made at the Supreme Commander's meeting at 2130 on 3rd June, after the evening meteorological conference, and this decision was made final after the meeting at 0415 (double summer time) on the 4th, following another meteorological conference. The 1800 chart on the 3rd is shown in Fig. 1. Two depressions on the Atlantic were moving ENE toward the Orkney-Shetland area, and the rate of fall of pressure in the north-west part of the British Isles was in itself sufficient to ensure that the wind in the English Channel would freshen from the south-west, bringing in low clouds from the Atlantic. This happened next day, as can be seen in Fig. 2, the 1800 chart for 4th June. A cold front went through the Channel

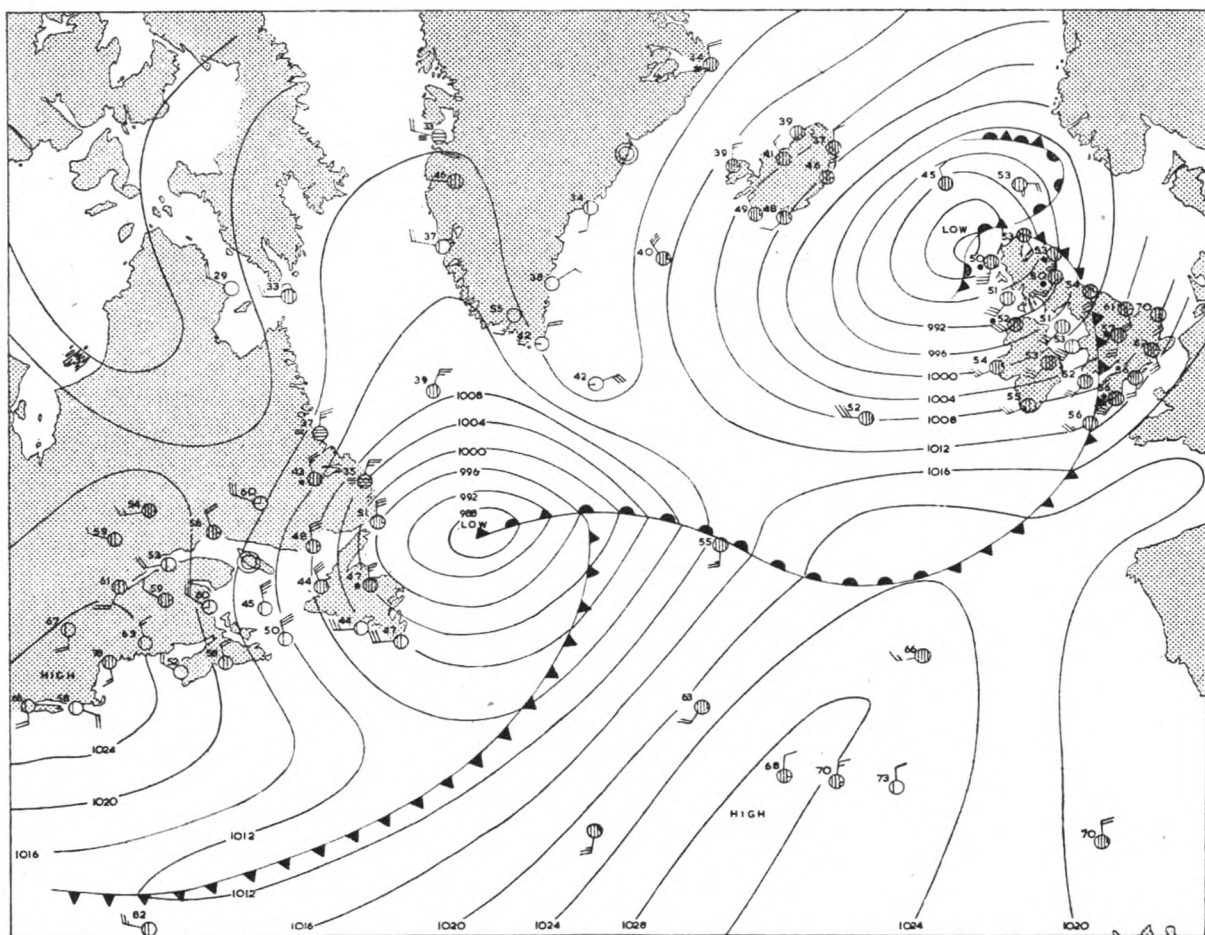


Fig. 2

Weather Map for 1800 G.M.T., 4th June, 1944. The weather map on which the decision was made to launch the assault on 6th June.

area during the early hours of the 5th, and behind it the wind moderated, but around dawn the sea must still have been rough and the cloud conditions were quite unsuitable for the airborne landings or for bombing. Thus the



decision to postpone the landings on meteorological grounds was fully justified by the event.

Provisional instructions to launch the assault at 0630 on the morning of Tuesday, 6th June, were issued after the Supreme Commander's meeting at 2100 (double summer time) on Sunday, 4th June, following the evening meteorological conference. During the morning of the 4th it became clear that the cold front which reached the Irish coast soon after 1000 G.M.T. would go well south of the French coast and that a relatively fair interval would follow. The final and irrevocable decision to launch the assault was made after the meeting at 0415 (double summer time) on Monday 5th, which was preceded by another meteorological conference. Fig. 2 shows the last main chart available at the time of the conference. The advice given at the Supreme Commander's meeting was as follows:

The fair to fine interval which by 0415 had begun at Portsmouth will probably last into the forenoon of Tuesday. During this interval, cloud will be mainly less than 5/10, with base at 2,500–3,000 ft.

Wind on the beaches in the assault area will probably not exceed force 3 in this interval and will be westerly. Visibility will be good.

During Tuesday cloud will very probably increase again from the west, giving a period of overcast sky with cloud base at about 1,000 ft. in the assault area later in the day; these cloud conditions will continue overnight Tuesday to Wednesday. Winds will be westerly force 4 on the English coasts and mainly force 3 on the French coasts.

Conditions will probably continue unsettled after Tuesday and it is difficult to time further changes. But it is likely that after another front has passed on Wednesday, when the 10/10 cloud at 1,000 ft. lasting over Tuesday night becomes broken, the cloud base will increase to 2,000–3,000 ft., though the average amount will probably remain at about 7/10. In this period from the passage of Wednesday's front till about Friday, beyond which no useful forecast can be given, there will be intervals of completely overcast sky with cloud base down to 1,000 ft. Considerable fair intervals of broken cloud can reasonably be expected between the overcast intervals. Visibility will be good throughout.

The chart on which the forecast was based (Fig. 2) was an unusual one for the time of year, with a very deep depression off north-west Scotland and another off Labrador, and the situation was difficult from the point of view of extended forecasting. The depression moving along the north Scottish coast was the more westerly one on the Atlantic in Fig. 1, which had absorbed the one further east, and it became still deeper during the night until at 0400 on the 5th pressure fell to 976.8 mb. at Wick. This was the lowest June pressure of this century in the British Isles up till then, though curiously enough there was a lower reading, also at Wick, exactly two years later, on 5th June, 1946, when 975.8 mb. was recorded. Such a deep depression obviously precluded the possibility of a quiet spell, but, in the conditions prevailing, a very vigorous depression was needed to bring the cold front to southward of the coast of Normandy. If there had been a prolongation of the warm south-westerly air stream, as had at one time appeared likely, there would have been more low cloud, especially in the mornings, and weather would have been worse for air operations than it actually was.

On the morning of 6th June, when the first and most important landings were made, the weather was quite good (see Fig. 3). The wind at the beach-head was WNW force 3, becoming 3 to 4. The clouds cleared temporarily over the beach-head at a critical time when our bombers were over in force. The cloud amount during the day was half to three-quarters cover

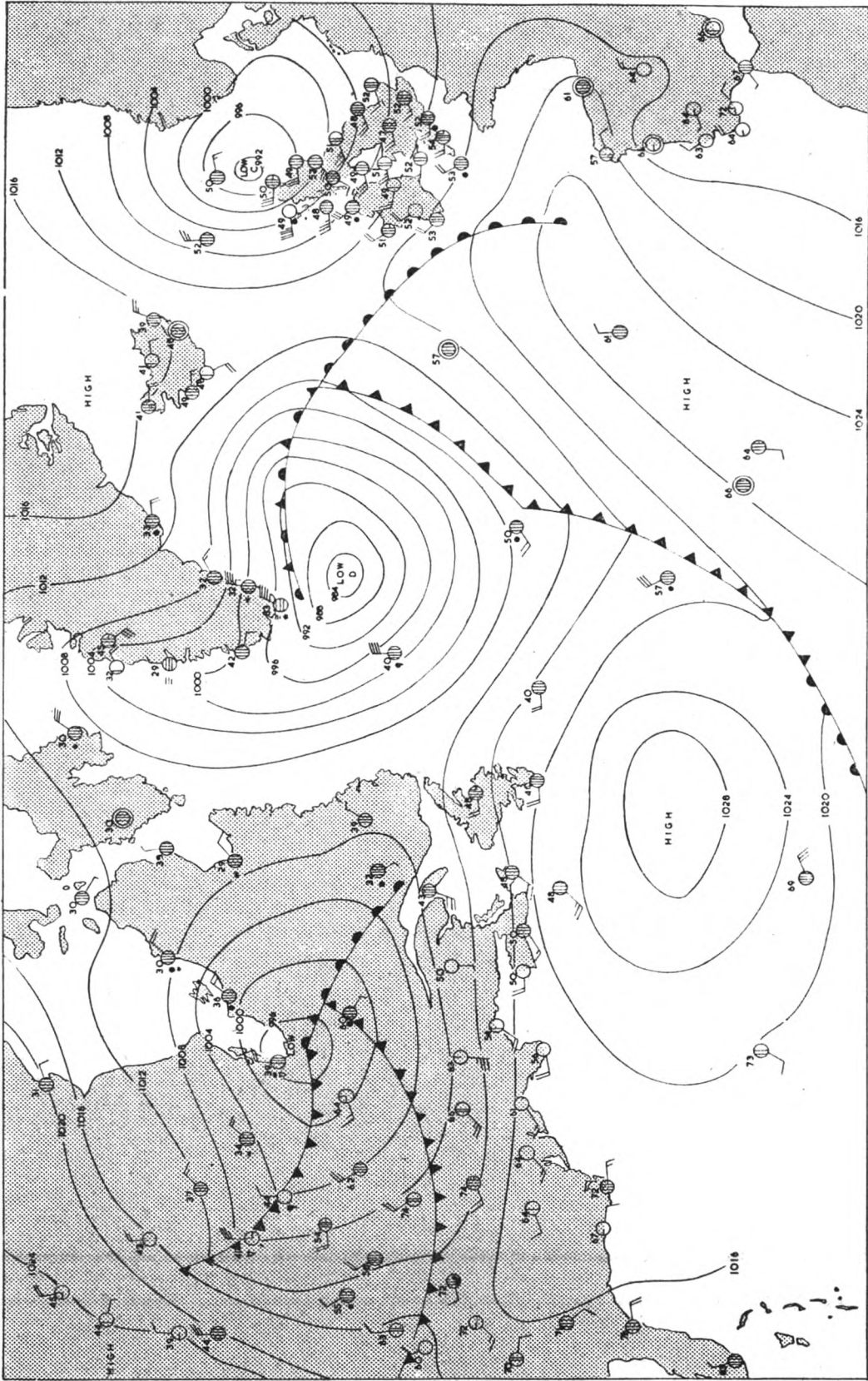
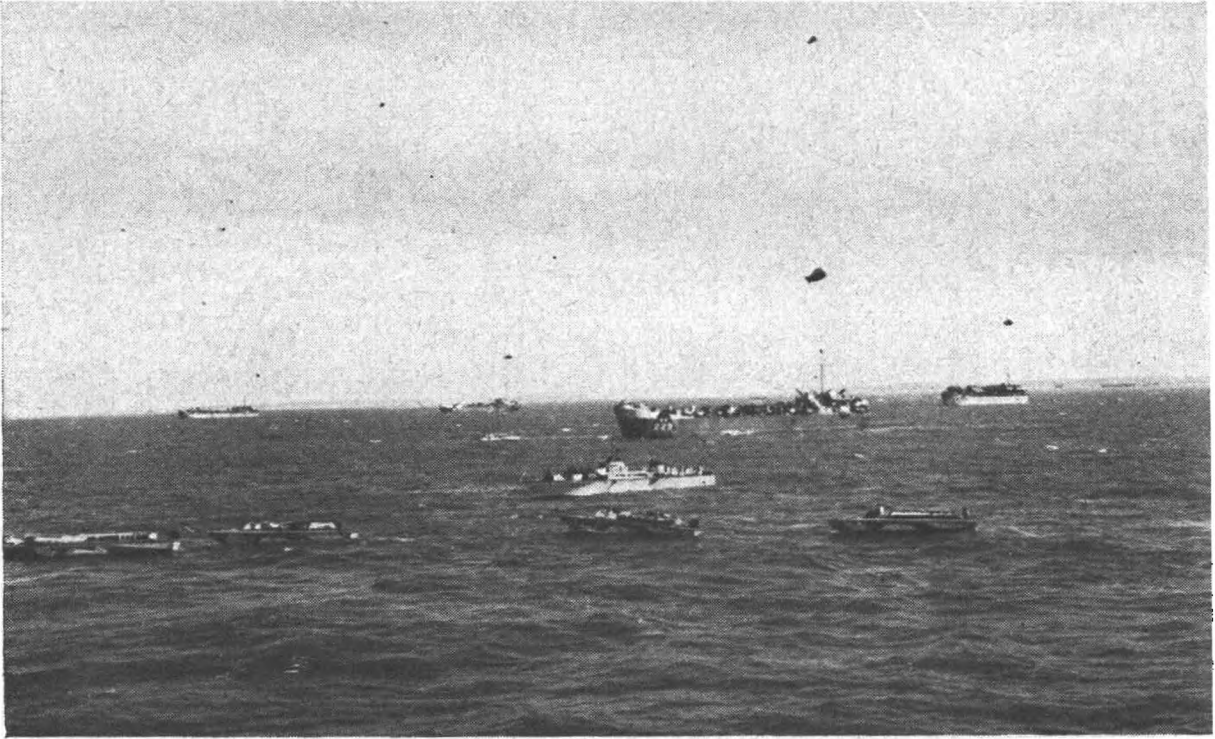


Fig. 3  
Weather Map for 0700 G.M.T., 6th June, 1944. This shows the weather on the morning of the assault.



THE D-DAY LANDINGS

*Crown Copyright Reserved*

General view of part of the invasion armada approaching Asnelles-sur-mer.

between 3,000 and 7,000 ft., and visibility was excellent. The depression off north-east Scotland moved south-eastward during the day, becoming less deep. A small trough of low pressure moved south-east over Great Britain and this increased the wind in the beach-head area, which reached force 5 at times later in the day. The 1800 chart is shown in Fig. 4. This freshening of the wind caused difficulties on the more easterly part of the beach-head which was exposed to a WNW wind, and even the force 4 wind during the morning was too strong. This was an unavoidable trouble, as a landing on that day was essential if at all possible. Additional casualties due to the rough seas were probably more than offset by the advantages of obtaining tactical surprise, which was due largely, if not entirely, to the very unsettled weather. The enemy made regular daily reconnaissance flights to northward of Scotland and to westward of Ireland, and undoubtedly knew about the exceptionally deep depression off north-east Scotland. There is definite evidence that they thought that we could not attack in such weather, and that they were taken completely by surprise. They failed to allow for the technical advances that had been made in landing craft. Another vital factor was the courage of General Eisenhower in going ahead in such dubious weather, with no prospect of the settled fair spell that had been hoped for. The only alternative was a postponement until the tides were again favourable. As we shall see shortly, the weather played one of its unkindest tricks at precisely that time, and in fact there was one of the very few possible summer developments that could have led to disaster. Quite apart from this unknown factor, there were obviously very strong reasons against postponement, which would have been bad for morale and would have involved a serious risk of leakage. But this does not alter the fact that the supreme responsibility for making the decision fell on General Eisenhower, a man to whom the entire civilised world is in debt.

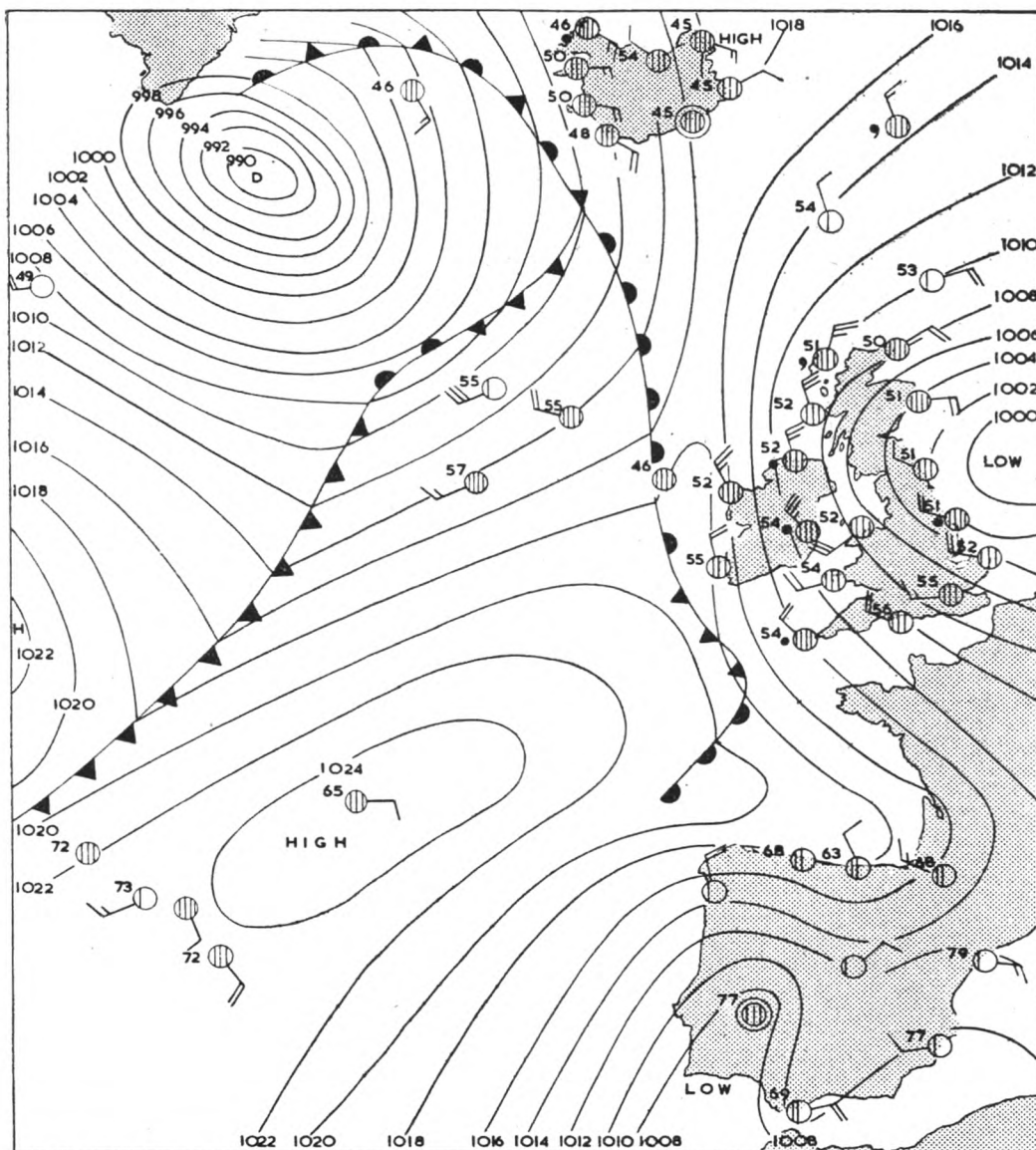


Fig. 4

Weather Map for 1800 G.M.T., 6th June, 1944. After the assault: the weather on the evening of D-Day.

A point of interest in Fig. 4 is the small warm front wave which was moving SSE off the Scilly Isles. This produced some light rain from medium cloud in south-west Ireland and at Scilly, and the medium cloud was seen to westward from aircraft over the beach-head. Behind the small wave the warm front retreated slightly. Though the unexpected south-east movement of the depression freshened the wind in the Channel it also resulted in the advance of the warm front being delayed for 36 hours if not longer. If the Shetlands depression had filled up *in situ* or drifted away north-east or east, there can be no doubt that the warm front would have affected the beach-head area much earlier than it actually did. By 8th June the North Sea depression had partly filled up and moved away eastward and the warm front then advanced, giving a period of moderate rain over the beach-head area in the afternoon. The effect of the south-east movement of the depression was to impede the landings on the eastern beaches on D-day, but it also improved cloud conditions and thus facilitated air operations from the evening



or night of D-day until the afternoon of 8th June. It would require a close knowledge of the military problems to decide which effect was most important, but in view of the fact that the landing difficulties were overcome it is probable that the result was on the whole beneficial.

#### **The weather after the initial landings**

An unsettled westerly type of weather prevailed for 10 days after D-day. There were some fair intervals with very good visibility, but on the whole the weather was worse than is normal in June. Poor weather predominated for the whole summer and autumn, and the only prolonged good weather was in the first half of August. This fair spell was beneficial to the series of operations which culminated in the victory at Falaise.

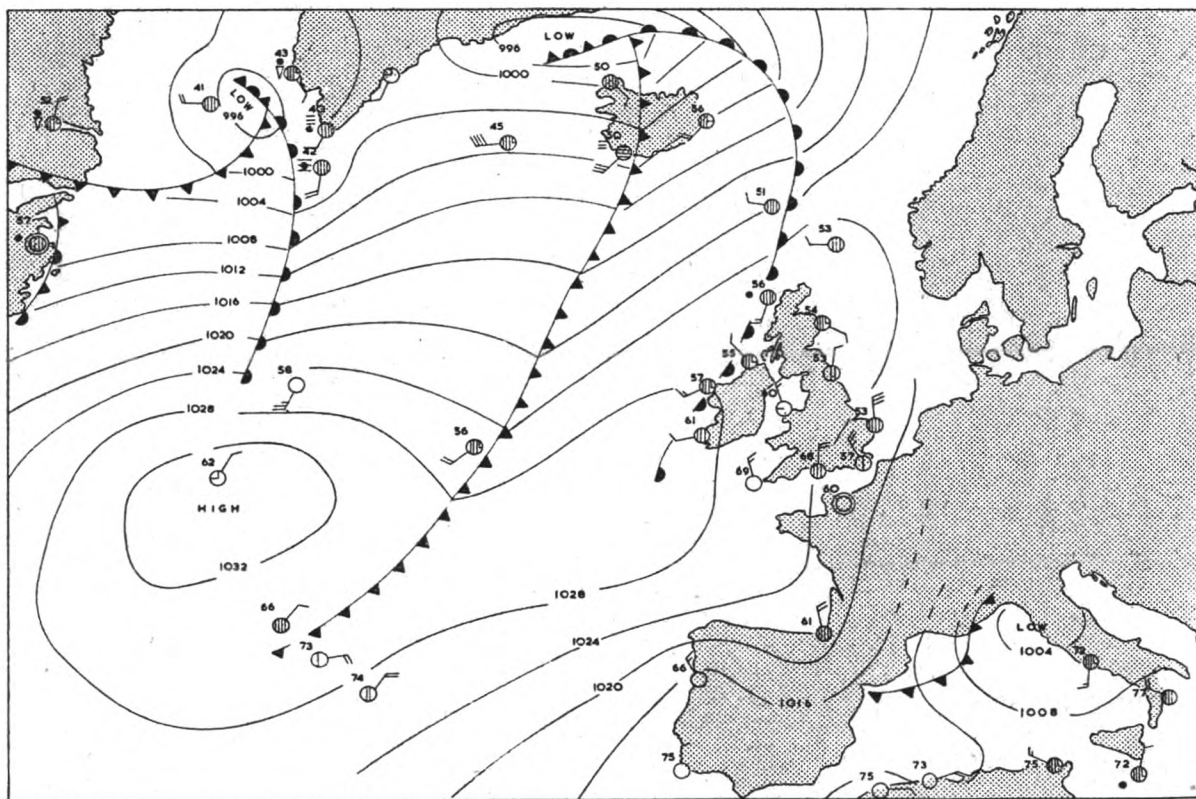


Fig. 5

Weather Map for 1800 G.M.T., 17th June, 1944. If D-Day had been postponed the assault would have been launched soon after this date. This then shows the weather map on which the decision to carry out the operation might have been made.

On 17th June there was a wedge of high pressure moving slowly over Ireland and Scotland, and on the 18th its crest was in the Irish Sea area. The prospect certainly looked better than it had at any time since May, though that is saying very little. If the landings had been postponed from 6th June they would almost certainly have been carried out at this time, probably on the morning of the 18th. Then followed one of those unique and unpredictable developments to which the atmosphere is prone. A cold front which at 0700 on the 17th was at  $29^{\circ}$ W reached our north-west coasts on the evening of the 18th, and behind it a large rise of pressure set in which persisted on the 19th, in spite of the advance of a warm front and then another cold front right into the area of rising pressure. The 1800 G.M.T. charts for the 17th to 19th June are reproduced as Figs. 5-7, and they show this development which had the nature of a north-east movement of an

anticyclone from the area to north-west of the Azores. Meanwhile a depression in the Mediterranean deepened and spread north, and pressure fell in south and south-west Europe. During the 19th a north-east wind of force 6 to 7 developed in the Channel and this continued over the 20th. There was only a slight decrease on the 21st but a large decrease by the 22nd. The wind was only slightly below its geostrophic value and was intensified near the French coast by topographical influence. It caused some loss of life and enormous material damage, including the destruction of the "Mulberry" harbour in the American sector. Fortunately the Americans were able to seize Cherbourg not long afterwards. Even a fortnight after D-day the high winds were a very serious episode, and if they had occurred immediately after D-day the results might well have been catastrophic. Thanks to the courage of General Eisenhower this possible catastrophe was avoided.

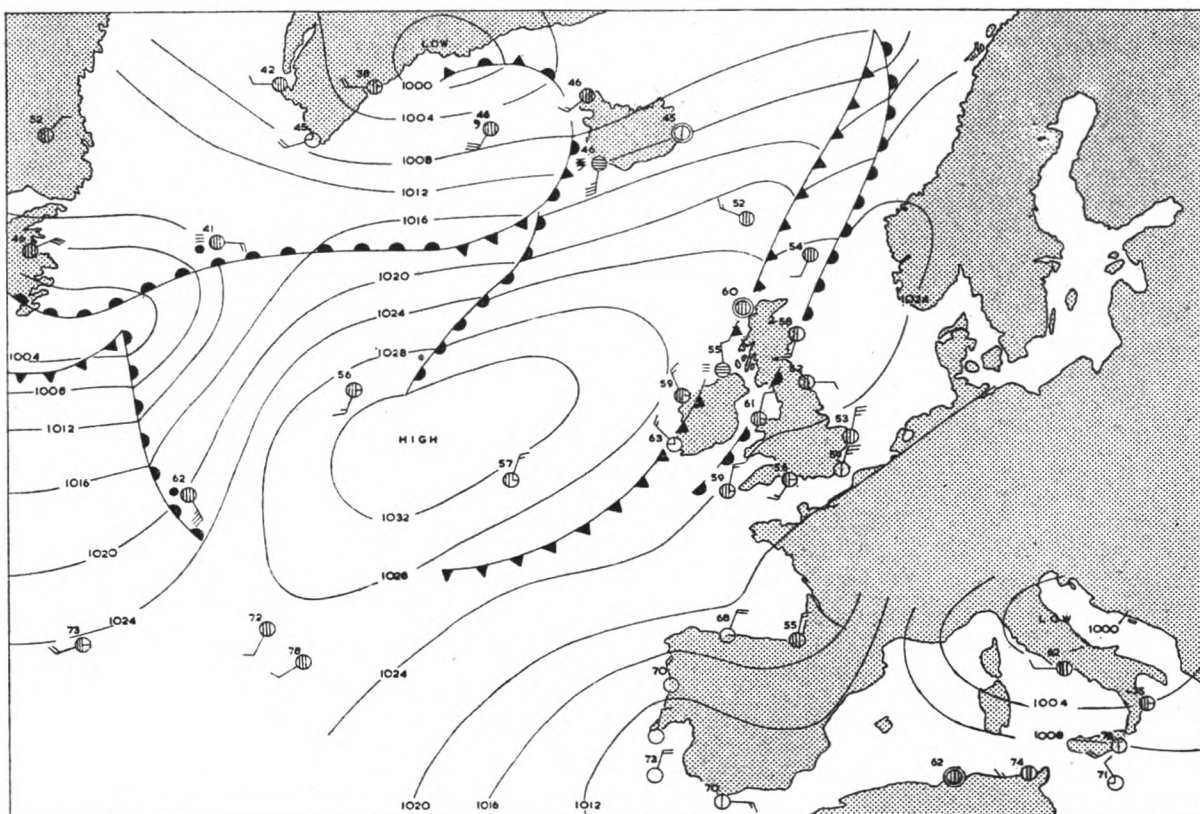


Fig. 6

Weather Map for 1800 G.M.T., 18th June, 1944. This shows the weather that would have been experienced had the assault been postponed until the next period of favourable tides.

Long before D-day attention had been called to the potential danger of strong north-east winds in the Channel, with special reference to the case of 8th May, 1935, when there had been an unexpected development of force 6 to 7 winds, but the development in 1944 was different, and analogies of this kind have almost no forecasting value. The ease with which an east to north-east gale develops in the Channel in winter and spring has long been recognised, but the frequency decreases rapidly as the season advances, and after mid-June prolonged east to north-east winds of force 6 or over are almost unknown. There were strong north-east winds in early June, 1939, but their onset was not sudden and there has been no other such spell in June during the present century. A development which only occurs about

once in a century, and which develops out of a situation which is common in its broad features, is not one which can be predicted on the basis of past experience. The development of 19th to 20th June was not forecast on the 18th, and it is difficult to see in retrospect how it could have been. Still less would it have been possible to foresee it in the early morning of 17th June, when the decision to start the assault would have been made if it had been postponed on the 6th.

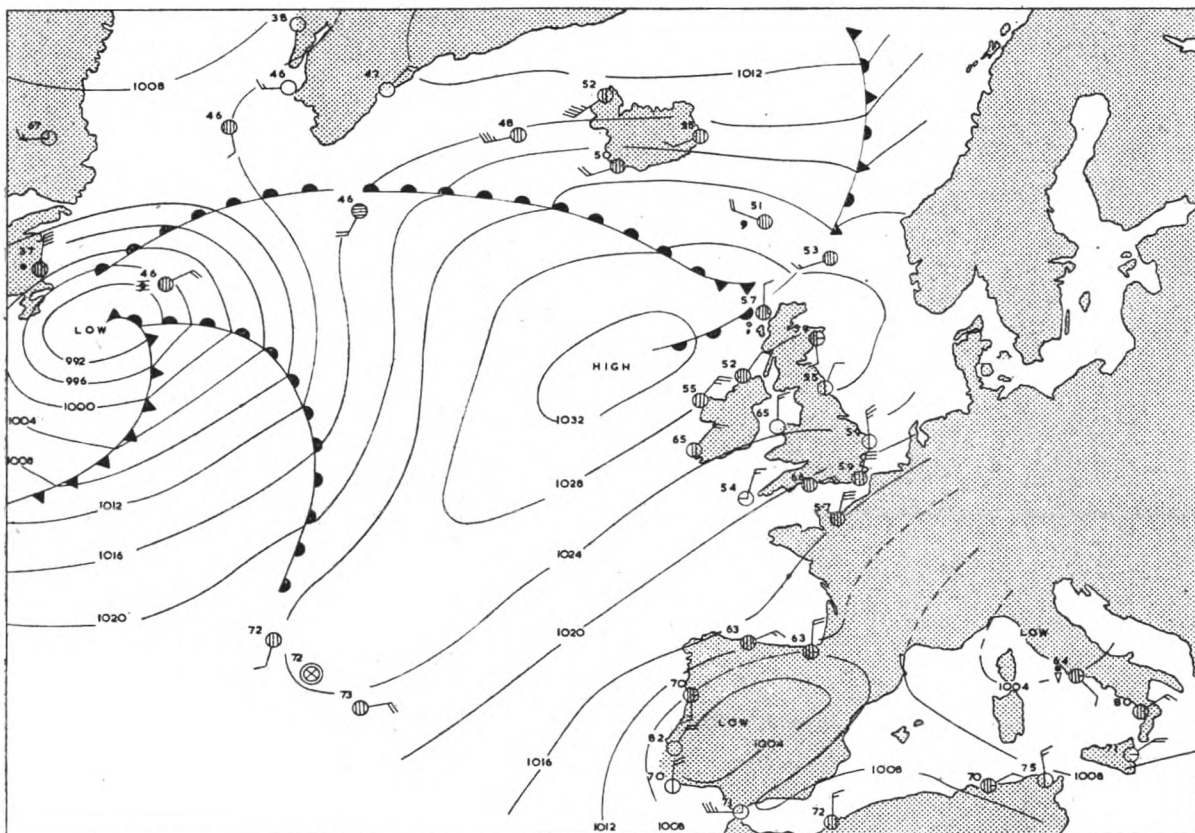


Fig. 7

Weather Map for 1800 G.M.T., 19th June, 1944. This is the situation producing the wind that caused enormous material damage to the Allied landing forces. Had the winds occurred immediately after D-Day the results might well have been catastrophic.

As events actually worked out the result was satisfactory from the point of view of the meteorologist. The time taken for the operation and its restriction to a limited number of possible dates made some degree of weather hazard quite probable, and it was a great relief that everything went so well. The vital forecasts were good for an interval of rather more than 36 hours from the chart on which they were based, and though there were some errors in the outlook beyond that time they were certainly no greater than can normally be expected in a time interval of such length in changeable weather, and were probably less. General Eisenhower expressed his satisfaction with the meteorological advice he received. He sent a personal letter of thanks to the forecasters who took part in the telephone conferences, a remarkable act of courtesy considering the immense burden of work and responsibility which he was carrying. He regarded the meteorological advice received as supplying adequate grounds for going ahead, having regard to all the other factors. If the forecasters had played for safety too much, and introduced a pessimistic bias into their forecasts, the vital decision of the Supreme Commander would have been made more difficult, or even prevented altogether.

# BIRD OBSERVATION ON OCEAN WEATHER SHIPS IN 1950

BY F. R. ALLISON, A. DARLINGTON,  
M. A. BARRAS-SMITH, M. L. R. ROMER

## FOREWORD by M. L. R. ROMER

During the summer and autumn of 1950 the persons named above were permitted to make voyages on Ocean Weather Ships in order to study bird life at the Atlantic stations.

These voyages were in the nature of an experiment which, it is to be hoped, will be repeated, for the advantage to ornithology of a concentrated study of birds at a particular position is very great. Most previous observations of birds at sea have been made from ships sailing from port to port, rather than from those more or less stationary at a given point. Though the cumulative effect of observations made on many voyages aboard merchant ships by ornithologists over a long period of years has been to build up a considerable literature on the subject, there is still an immense amount to be learned.

It was with this in mind that the present observers made their voyages, and it is to stimulate, in the minds of seafarers generally, an interest in birds that this article is written.

The succeeding account is purely factual and no consideration is given to previous theories and observations, nor are any theories advanced and no notes on identification are given.

In this connection it is hoped that some notes on the identification of birds may one day be published in this journal with the object of interesting ships' officers and other readers of *The Marine Observer* in this rather fascinating subject, and to identify and send in reports about the birds they see on the oceans. It is certain that all such reports, if supported by identification remarks, would be of value.

I should like to express, on behalf of my fellow watchers, our gratitude to the Director of the Meteorological Office for affording us the opportunity to make the voyages, to the masters, officers and crews of the weather ships for their forbearance and hospitality, and to the British Trust for Ornithology for making the arrangements for the voyages and the publication of this report.

## THE OBSERVATIONS

The species are listed in the order laid down in H. F. Witherby's *Check-List of British Birds*.

The observations were made by the following observers on the ships during the periods and at the positions stated.

F. R. Allison:

O.W.S. <i>Weather Explorer</i>	July, 1950	$\left\{ \begin{array}{l} 59^{\circ}\text{N}, 19^{\circ}\text{W} \text{ (I)} \\ 61^{\circ}\text{N}, 11^{\circ}52'\text{W} \text{ (I}_1\text{)} \end{array} \right.$
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M. A. Barras-Smith:

O.W.S. <i>Weather Watcher</i>	September	$52^{\circ} 30'\text{N}, 20^{\circ}\text{W} \text{ (J)}$
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A. Darlington:

O.W.S. <i>Weather Explorer</i>	16th August to 12th September	$59^{\circ}\text{N}, 19^{\circ}\text{W} \text{ (I)}$
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M. L. R. Romer:

O.W.S. <i>Weather Observer</i>	September	$\left\{ \begin{array}{l} 59^{\circ}\text{N}, 19^{\circ}\text{W} \text{ (I)} \\ 61^{\circ}\text{N}, 14^{\circ}\text{W} \text{ (I}_2\text{)} \end{array} \right.$
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Where a bird is mentioned as having occurred between, say, Scotland and "Jig", the abbreviation will be s-J, between "Item" and  $I_2$ :  $I-I_2$ , and so on.

### Migrant Perching Birds

BRAMBLING (*Fringilla montifringilla*). One found dead at J on 13th September.

SNOW BUNTING (*Plectrophenax nivalis*). One flying E'ly at J on 13th September and six there on 22nd September, flying s singly and in pairs. One at I on 29th September flying NE and another on 30th September flying SE. Four were seen at J on 29th September, at least one being eaten by the ship's cat.

MEADOW PIPIT (*Anthus pratensis*). A single bird 55 miles w of Islay between 16th and 19th August.

WHITE WAGTAIL (*Motacilla a. alba*). The following birds noted at I and  $I_2$  can only have been of this sub-species, though all were immature. Three were seen between 20th August and 4th September at I, and on 17th September one came aboard at  $I_2$  but died on the 19th of starvation.

WHEATEAR (*Oenanthe oenanthe*). Ten were seen at I between 20th August and 4th September, when a force 10 gale temporarily ended movements of perching and other birds there.

Two came aboard at I on 12th September and nine were seen on board at J next day. Single birds occurred at  $I_2$  on 17th and 19th September and  $I_2-I$  on 23rd September. Two were aboard for 20 minutes at J on 22nd September and a single bird at I on 24th September. Two came on board between I and s and a single one between J and s on 1st October.

SWIFT (*Apus apus*). A single bird flying SE on 6th July, s-I.

KESTREL (*Falco tinnunculus*). One hen or juvenile on 16th September flying SSE and two on 22nd September flying s. All at  $I_2$ .

### Ducks

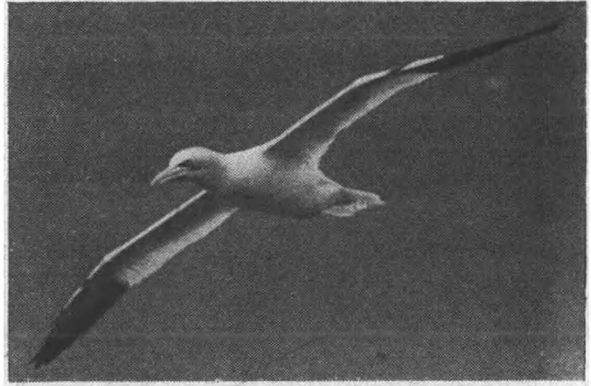
WIGEON (*Anas penelope*). Eight, probably all drakes, flying s on 21st September at J.

### Pelicaniformes

CORMORANT (*Phalacrocorax carbo*). One at I on 30th September almost certainly.

GANNET (*Sula bassana*). Only those gannets seen on station are recorded. During July the following were seen at I: one first-summer bird on the 9th, one adult on the 10th, one adult and one first-

summer on the 16th, one adult on the 17th and single third-summer birds on the 19th and 20th. At  $I_1$  during the same period there were seen on the 21st and 23rd: single second-summer gannets, a third-summer bird on the 24th, two second-summer birds and an adult on the 25th and a first-summer bird on the 27th.



Photograph by J. Barlee  
Gannet

At I between 20th August and 6th September, single adults were seen on eight separate days, pairs of adults on three consecutive days, single immature birds on seven separate days, pairs of immature birds on four days and three immature birds on two days. For the rest of September immature birds outnumbered adults, the majority being second- or third-year birds. Adults were seen singly on only one occasion and a pair was seen once. On five separate days immature gannets occurred and two were seen together once.

At J an adult on 17th September and a second-summer bird on 20th September.

### Shearwaters and Petrels

STORM-PETREL (*Hydrobates pelagicus*). One occurred s-I on 6th and 7th July. One at I on 9th July and two at  $I_1$  on 22nd and 23rd July.

A few were definitely identified at I during a short period after 20th August. These were no longer to be seen immediately before 9th September and none was seen during the rest of September. No storm-petrels were present at J during September, though in off-shore Irish waters two were seen on 8th September and three on 1st October.

LEACH'S FORK-TAILED PETREL (*Oceanodroma leucorhoa*). None seen in July at I, but during the period 20th August to 9th September a strong southward migration was observed there. This apparently ended on 6th September for the bird was not to be seen at I during the rest of September. At J the situation was very different in September, when considerable numbers were present from the 12th to 21st, up to 15 birds being seen on one occasion.

WILSON'S PETREL (*Oceanites oceanicus*). This species was not observed at I until 10th September. From then onwards the bird was a frequent wake-follower, especially during winds of about force 5. The normal number present was two, but on 1st October, 1-s, 11 were following. The noon position then was 57° 38'N, 15° 04'W, and no birds were seen thereafter. On 9th September, S-J, 10 joined the ship at 55°N, 10°W. This number increased to 40 when J was reached, but 20 departed with the ship relieved. Only three were seen during the gale on 16th September. Thereafter the number present rose to 20 on the 26th. None was seen, J-S, after 20 sea miles from J. One bird was ringed on 15th September.

MANX SHEARWATER (*Puffinus puffinus*). None recorded at I during July, but during the early part of the period 20th August to 9th September strong movements were noted. These occurred in such a way as to suggest a passage to

and from feeding grounds each day. The direction taken was towards the SE and ESE in the morning and towards the NW in the evening, there being a lull round noon. On 10th September hundreds were seen flying from Rockall NW towards I. No Manx shearwaters were seen at I on 11th and 12th September, but on 13th two were seen flying S. Next day occasional birds were seen flying before a strong gale from the NE. On 15th September they were more numerous but thereafter very few were seen, averaging less than one a day. None was seen after 27th September. On 20th September one bird followed the ship with fulmars for a considerable time. None seen at J during September, but two off Malin Head on 8th September.

LITTLE SHEARWATER (*Puffinus* (sp.?).). A single bird, species not ascertainable, but distinguished from others of the genus, flying rapidly S at J on 21st September.

GREAT SHEARWATER (*Puffinus gravis*). First seen near Rockall on 7th July, when parties of from three to 30 were observed. From 10th to 27th July nine single birds occurred at I and I<sub>1</sub>. From 20th August to 9th September, occasional birds were seen at I but thereafter only three were seen: one on 10th September, S-I, another on 17th September, I<sub>2</sub>, and the third on 1st October, 1-s. Throughout September, at J, the species was common. Up to 12 were present daily round the ship and parties of from 20 to 250 birds were frequently counted. These parties were generally proceeding S or SE, though three were seen going N and NW.

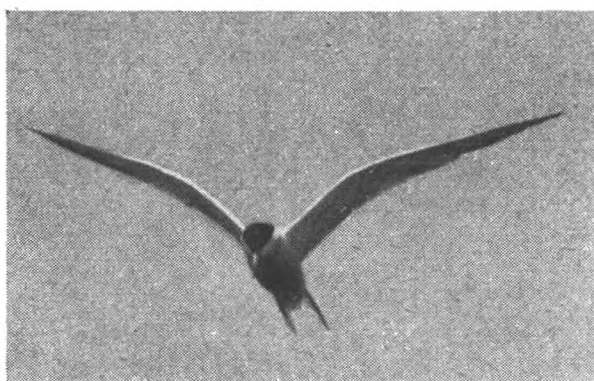
CORY'S SHEARWATER (*Puffinus kuhlii*). Two watched flying S at J on 28th September.

SOOTY SHEARWATER (*Puffinus griseus*). A few were seen near Rockall on 7th July. Four single birds each were seen at I and I<sub>1</sub> between 14th and 27th July. Occasionally seen at I between 20th August and 9th September. Thereafter the following were seen: one on 10th September, S-I; one on 19th September, I<sub>2</sub>; one on 2nd October, 1-s; two on 9th September, S-J; one on 26th September near J.

FULMAR PETREL (*Fulmarus glacialis*). Present at I and I<sub>1</sub> throughout July, some 300 being seen on the outward trip on 7th July. Numbers were present at I from 20th August to 9th September, the proportion of dark-phase birds increasing. During the remainder of September at I the species was about the ship



Photograph by J. Barlee  
Fulmar Petrel



Photograph by J. Barlee

#### Common Tern

continuously, numbers ranging from eight (in calm weather) to 80. Some birds followed the vessel by moonlight, at least up to midnight, on several occasions. The proportion of dark-phase to light was never more than 1 : 20. From 30 to 70+ fulmars were at J during September, a single dark-phase bird occurring on 26th September.

#### Migrant Waders

BAR-TAILED GODWIT (*Limosa lapponica*). A single individual, last seen flying w at J on 10th September.

CURLEW (*Numenius arquata*). One flying s at I on 12th September.

WHIMBREL (*Numenius phaeopus*). Single birds at I on 11th and 12th September flying s.

PHALAROPE (*Phalaropus*). One, identified as RED-NECKED PHALAROPE (*Ph. lobatus*), 40 miles w of Jura on 17th August. Another, identified as GREY PHALAROPE (*Ph. fulicarius*), at I on 1st September. One, I-I<sub>2</sub>, on 23rd September; by its call note probably a grey phalarope. Three occurred at J in September, on 14th, 17th and 25th. One, J-S, on 1st October.

TURNSTONE (*Arenaria interpres*). Between 20th August and 9th September 31 turnstones were seen near Rockall and 29 at I. These usually occurred singly or in couples, though on one occasion eight were seen together. One, S-I, on 10th September. Two, at I<sub>2</sub>, on 21st September.

DUNLIN (*Calidris alpina*). One at I<sub>1</sub> on 21st July. 19 at I between 20th August and 6th September. One, I-I<sub>2</sub>, on 14th September.

PURPLE SANDPIPER (*Calidris maritima*). One on 30th September at I and another, probably, on 2nd October, I-S.

RINGED PLOVER (*Charadrius hiaticula*). Six seen to fly due s at I on 19th July. Between 20th August and 6th September at I 22 were seen, maximum together being seven.

#### Terns, Gulls, Skuas and Auks

SANDWICH TERN (*Sterna sandvicensis*). A single bird seen flying E at I on 19th July.

COMMON TERN (*Sterna hirundo*), ARCTIC TERN (*Sterna macrura*). Observations on these two species are coupled together on account of the great difficulty experienced in satisfactorily differentiating between them while at sea.

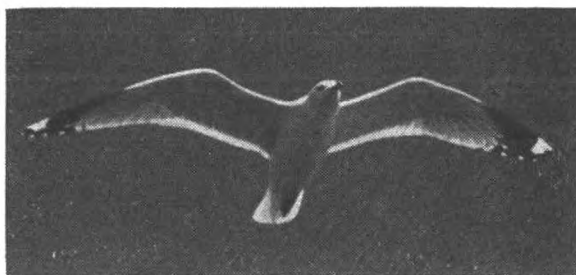
One seen at I<sub>1</sub> on 24th July and two on the following day. All were flying in a N'y direction.

Between s and I, and at I during the period 16th August to 9th September, five birds were caught. Three of these turned out to be commons (one at I) and two to be Arctics. All were carefully measured before being ringed. A strong s'y movement, presumably of both species, was noted during this period.

At I during the rest of September, up to the 29th, single birds and small parties were frequently seen (maximum 10) flying due s. One, identified by its call as an Arctic, flew N on 16th September. At J during the same period a strong migration was noted, 181 birds being counted altogether. The peak was from 11th to 15th September, when 84 were seen. The directions of flight were 142 birds going s and 39 going sw. On no single day were birds observed to be going in any but one direction.

LITTLE TERN (*Sterna albifrons*). Seen at J on three occasions in September. Two on the 15th, single birds on the 22nd and 23rd. The latter two flew off sw after following the ship for a short time.

SABINE'S GULL (*Xema sabini*). A juvenile specimen of this scarce Arctic-breeding species was present at J on 12th September for half an hour and was watched at very close quarters. The forked tail and



Photograph by J. Barlee

#### Common Gull



beautifully patterned wings were among the diagnostic features noted.

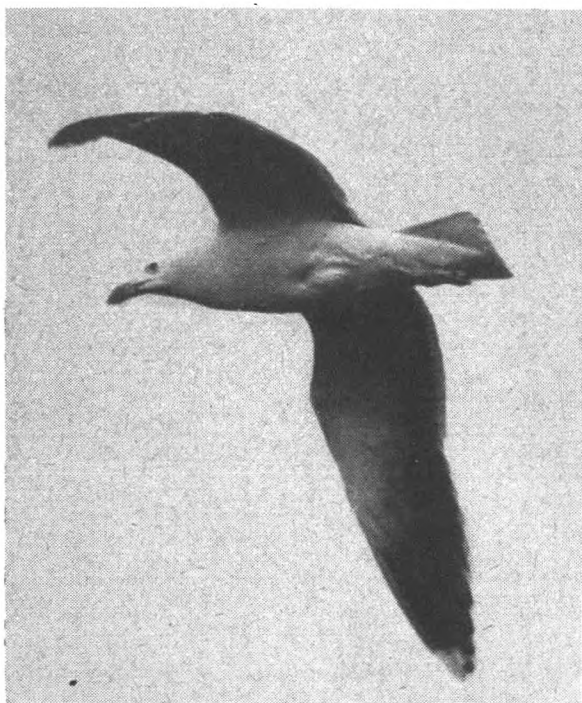
COMMON GULL (*Larus canus*). Three seen at I between 20th August and 9th September.

HERRING GULL (*Larus argentatus*). Only pelagic record is of one immature bird at J on 11th September, flying E.

LESSER BLACK-BACKED GULL (*Larus fuscus*). One at I on 15th July. A marked movement was noted at I between 20th August and 9th September: 37 adults and 33 juveniles were counted. A single immature bird followed at I during afternoon of 12th September and morning of 13th September. The species was not seen again at either I or J.

GREAT BLACK-BACKED GULL (*Larus marinus*). Two adults and four immature birds occurred at I and I<sub>2</sub> between 15th

south at I between 20th August and 9th September. Thereafter two, sometimes seven, birds were to be seen accompanying the ship almost every day. The majority were immature. Small numbers (maximum six) seen at J during September both migrating sw and following the ship. Of the latter class only one juvenile



Photograph by J. Barlee

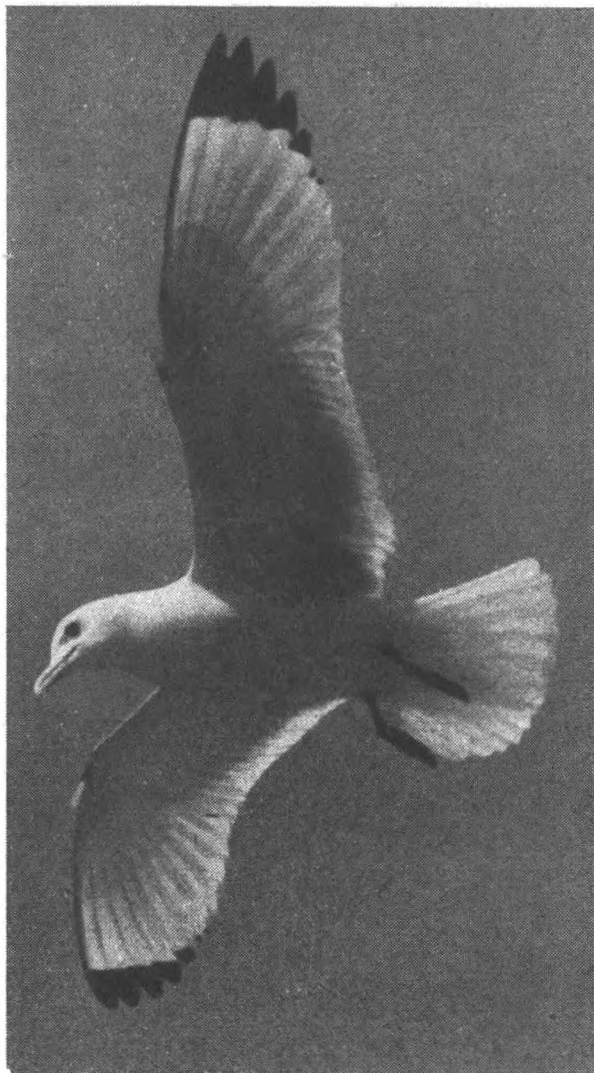
Great Black-backed Gull

and 29th September. At J, during September, two adults and one immature bird were seen on the same day.

GLAUCOUS GULL (*Larus hyperboreus*). An adult clearly identified, flying sw, on 30th September at 53° 20'N, 18° 50'W.

ICELAND GULL (*Larus glaucoides*). A single bird noted at I between 20th August and 9th September.

KITTIWAKE (*Rissa tridactyla*). Single birds seen at I on five days and at I<sub>1</sub> on two days during July. Hundreds passed



Photograph by J. Barlee  
Kittiwake

was seen, though on 1st October (J-S) more than half of 30 sw'ly migrants were immature.

GREAT SKUA (*Stercorarius skua*). One at I on 11th July, three at I<sub>1</sub> on 25th July. Between 20th August and 9th September three were almost continuously present at I. Single birds frequently seen at I and I<sub>2</sub> during the rest of September, with two at I on 25th September. The position was much the same at J during September, where single birds or pairs were frequently seen.



POMATORHINE SKUA (*Stercorarius pomarinus*). First seen at I on 11th September, thereafter southward migrants of both colour phases, adults and juveniles, were fairly frequently seen up to three in number. Two seen at J on 23rd and 25th September, and one flying S on 1st October, J-S.



Photograph by J. Barlee  
Puffin

ARCTIC SKUA (*Stercorarius parasiticus*). At I birds were seen on four days in July, of both colour phases, up to three at once. Small numbers at I, 20th August to 9th September. None seen there later. At J during September 36 birds were counted, including 21 adults, of which eight were light-phase and 13 were dark. Some of the juveniles may have been referable to the next species. All these birds were flying W.

LONG-TAILED SKUA (*Stercorarius longicaudus*). Seen with Arctic skuas at widely separated intervals, up to four at once, at I between 20th August and 9th September.

LITTLE AUK (*Alle alle*). One on 1st October between J-S.

PUFFIN (*Fratercula arctica*). Two at I<sub>1</sub> on 21st July. Single birds were frequently seen at I and I<sub>2</sub> during September, the numbers increasing nearer the continental shelf on the inward run I-S.

## NEW PHONETIC ALPHABET

The International Civil Aviation Organisation introduced on 1st November, 1951, a new phonetic alphabet for communication with civil aircraft. The new alphabet is as follows:

A	Alfa	N	Nectar
B	Bravo	O	Oscar
C	Coca	P	Papa (syllables equal emphasis)
D	Delta	Q	Quebec (Kibbeck)
E	Echo	R	Romeo
F	Foxtrot	S	Sierra (See-erra)
G	Golf	T	Tango
H	Hotel	U	Union (as in English or "Oonion")
I	India	V	Victor
J	Juliett	W	Whiskey
K	Kilo (Keelo)	X	Extra
L	Lima (Leema)	Y	Yankee
M	Metro (as in English or "Maytro")	Z	Zulu

## INTERNATIONAL ICE PATROL, 1951

This began on 3rd March and ended on 17th May, the 1951 ice season being the lightest yet recorded by the Patrol. The average date of ending of the Patrol is about the beginning of July, but in 1938 the date was as late as 22nd July. The dates for the last two years were 1949, 16th June, and 1950, 26th June.

In 1951 only three bergs and a few growlers were seen south of the 47th parallel and these were all recorded in the first half of March, the most easterly being in longitude  $47\frac{1}{2}^{\circ}$ W. No ice was reported south of the 46th parallel.

# COMPARISON OF INTAKE AND BUCKET METHODS FOR MEASURING SEA TEMPERATURE

BY T. H. KIRK AND A. H. GORDON

(T. H. Kirk, B.Sc., served in the Marine Branch of the Meteorological Office until 1949 and is now a forecaster at London Airport. A. H. Gordon, M.S., is a member of the scientific staff of the Marine Branch)

The two reports (A) a comparison, based on Netherlands data, of intake and bucket temperature aboard merchant ships, by T. H. Kirk, and (B) a comparison of intake thermograph and canvas bucket methods of measuring sea temperature aboard British Ocean Weather Ships, by A. H. Gordon, have been prepared in consequence of C.M.M.\* resolution 37, Toronto, 1947, which recommended that the problem of the accurate measurement of sea-surface temperature should be referred to the various meteorological services.

The results of report (A) suggest that the intake temperature is of the order of 1°F higher than the bucket temperature. The results of report (B) suggest that the intake temperature is of the order of 0.2°F higher than the bucket temperature while the ship is under way and 0.4°F higher than the bucket temperature while the ship is on station.

(A) *A comparison based on Netherlands data, of intake and bucket methods of measuring sea temperature aboard merchant ships*

## Introduction

An investigation has already been made into the recorded differences between bucket and intake measurements of sea temperature made in certain British ships during the war years. The results are limited by the fact that no index correction had been applied to the ships' intake thermometers.

Additional material in the form of Hollerith cards has been made available by the courtesy of the Netherlands Meteorological Service. These data include sea temperature measurements by the bucket method and by the intake method, the intake temperatures being corrected for index error. No information is available as to how the intake temperature was measured and whether precautions were taken to avoid engine-room heating.

Data were selected from those Marsden squares having:

- (a) Observations available for each month during the year.
- (b) An appreciable number of observations available.

Data from those squares satisfying these conditions were examined, the number of observations available in each square being shown in Table I.

TABLE I

Squares .. ..	003	004	039	074	075	110	145	146
No. of observations	1182	323	1469	824	742	1556	957	458

The positions of these Marsden squares are shown in Fig. 1.

## Seasonal Variations

Mean values of the quantity "Bucket temperature minus intake temperature" (B-I) were evaluated for each square during each month of the year. The results showed an appreciable amount of scatter, and to reduce this a grouping of the monthly means into seasonal means was made.

The standard deviation of a single observation throughout the year is shown in Table II.

\*Commission of Maritime Meteorology of the International Meteorological Organisation.

TABLE II

Squares .. ..	003,004	039,074 075,110	145,146
Standard Deviations	0.69	0.81	0.92

These results suggest, as might be expected, that the scatter of the differences is a minimum in the equatorial region, where uniform conditions prevail, and increases toward the temperate zone where there is a much greater variety of weather conditions.

A statistical test of the results showed broadly an absence of seasonal change in the equatorial squares (003 and 004), but showed that there was a seasonal variation elsewhere which was a minimum in summer and autumn and a maximum in winter.

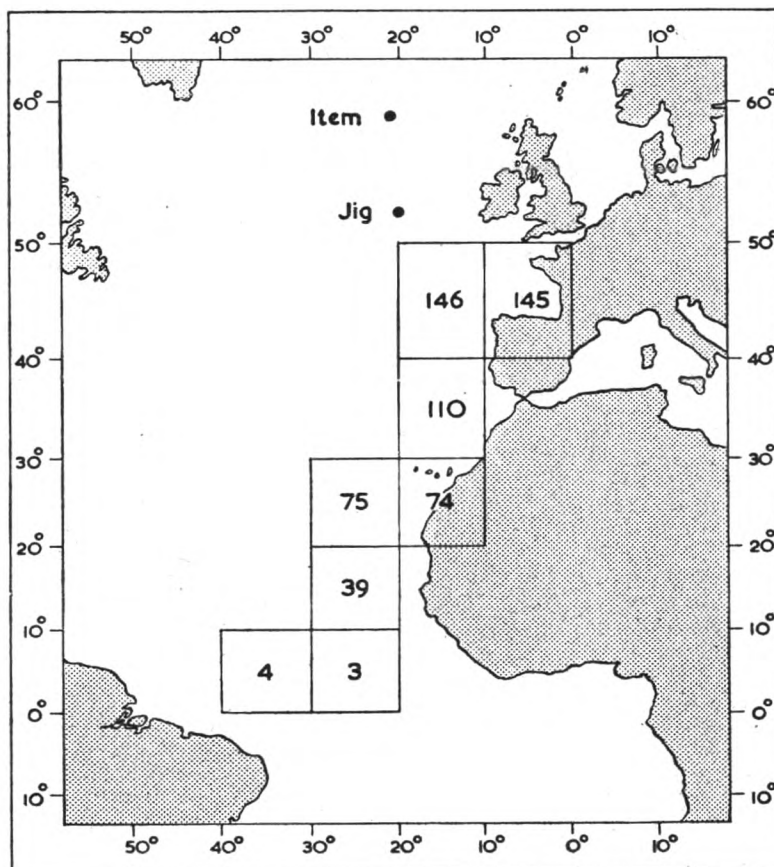


Fig. 1

Map of the North Atlantic Ocean showing the positions of the Marsden squares and Ocean Weather Stations which were used in the investigations.

### Effect of Wind

Within the seasonal classification a further sub-classification was made to show the effect of wind. The classification of wind force into the groups 0-3, 4-6, 7 and over, is hardly satisfactory. The number of occasions of force 7 or over is too small to permit any firm deductions. Another factor which militates against any demonstration of the effect of wind is that any

such effect may be due to the wind's action directly on the content of the bucket, in which case *relative* wind and not absolute wind would be the essential element. Any dependence of the quantity B-I on relative wind may to some extent be masked by the rough classification adopted.

It was found that in squares 003, 004, there is no appreciable variation with wind. On the other hand, the results for the remaining squares suggest a definite relation, higher negative values of the quantity B-I being associated with higher wind force.

#### **Variation with Cloud Amount**

A classification was made in terms of total cloud amount. For this purpose the observations used were those of daylight hours only (taken between the times of civil twilight), it being considered that observations at night lacked the requisite degree of accuracy. The results suggest a general increase in the negative magnitude of the quantity B-I with increase of cloudiness. The values averaged over the whole year show a consistency which could hardly be due to chance.

#### **Effect of Daylight Hours**

New seasonal means were evaluated for the period of daylight hours. The smaller values of these means when compared with those previously given show that the factors which make for differences between the bucket and intake measurements are of minimum effect during the day-time. These figures give evidence of seasonal variation similar to that already afforded by the full data.

#### **Difference between Air and Sea Temperature**

If any part of the observed difference between the bucket and intake measurements be due to heat exchange between bucket and atmosphere, then the difference between air and sea temperatures should be significant. A classification in terms of this difference showed that the largest negative values of B-I are associated with negative values, while small negative values of B-I occur when the difference between air and sea temperature is large and positive.

#### **Variation with Depth**

Mean values of B-I were taken out for different depths of engine intake. Statistical tests showed:

- (a) that in squares 003, 004, the variations of the mean with depth need not necessarily be regarded as real but can be accounted for by the scatter of the observations;
- (b) that for squares 039, 074, 075, 110, and also for squares 145, 146, mean at 3 metres depth is significantly different from the general mean but the variations at greater depths need not necessarily be regarded as significant.

This result in itself does not demonstrate a real variation of temperature with depth. All that can be deduced is that the discrepancy between bucket and intake temperatures is significantly less when the intake water is drawn from a shallow depth (3 metres). This difference may arise from variations in the technique of observation. It may also be due to the fact that in this case both bucket and intake methods are attempting to measure the same thing, this no longer being so with greater depths of intake.



## Conclusion

There are three real factors which might account in some way for the above results. They are:

- (a) Real differences of temperature with depth. There may be some evidence of this in the section headed "Variation with Depth".
- (b) Defects in the "bucket" method of taking sea-surface temperature when using an ordinary canvas bucket, e.g. errors due to loss of heat from the bucket during the process of measurement, this loss of heat being due to the combined effects of heat exchange and evaporation.
- (c) Defects in the intake method of taking sea temperatures, e.g. heating effects in the ship itself during the process of measurement.

The results are most readily interpreted in terms of (b). The difference between air and sea temperature is obviously of great importance in the process of cooling which affects the bucket water after being drawn from the sea. The effect of wind is of importance in the same connection. Factor (c) would presumably be independent of wind, and factor (a) would give a result in the wrong direction, for increased wind would entail increased sea disturbance and hence smaller differences of temperature with depth. Seasonal variations may be due to both factors (a) and (b). Cloud amount is of significance in two ways; first, because absence of cloud implies heating of the bucket by the sun, and secondly, because an increase of cloud amount is usually associated with an increase of wind.

The results support previous opinions that the bucket method is subject to appreciable error due to cooling, unless the bucket itself is suitably insulated. No definite conclusions can be drawn regarding the accuracy of the intake method.

## (B) *A comparison of intake thermograph and canvas bucket readings of sea temperature aboard British Ocean Weather Ships*

### Introduction

In a preliminary report prepared in the Marine Branch in 1946 entitled "Report on Methods of taking Sea Temperature", a large number of differences between observations of sea temperature measured by bucket and intake methods aboard British merchant ships were analysed. Frequency distribution curves suggested that the intake method gave results approximately half a degree Fahrenheit higher than the bucket method. However, it appeared from the wide scatter of the values that errors not necessarily connected with any method of observation were inherent in the observations. It emerged that these errors might occur, firstly, in the method of measuring the intake temperature, exact details of which were often lacking but which clearly varied from ship to ship, and secondly, as a result of cooling of the water in the bucket by evaporation and by conductive transfer of heat when the air was appreciably colder than the sea. (See report (A).)

### The Design of the Experiment

Although it may not be possible to eliminate these errors entirely, the conditions under which the observations have been made aboard the Ocean Weather Ships have been designed to reduce their magnitude so that they no longer hide real physical effects.

These conditions are:

- (a) The new Mark III canvas bucket\* was used. This bucket has been constructed with a double-walled copper vessel inside, the space between the walls being filled with water. The water passes through a spring lid held open by the water pressure into the bucket, through the holes in the bottom of the inner container, back up between the walls and out through the annular space under the lid. With this bucket, the error caused by the temperature of the water in the bucket changing before the reading is taken, owing to the processes of heat exchange and evaporation, is quite small. The error caused by the initial temperature of the bucket being different from that of the sea can be eliminated by towing for about 30 seconds.
- (b) The exact position of the thermograph element in the intake pipe is known (Fig. 2).

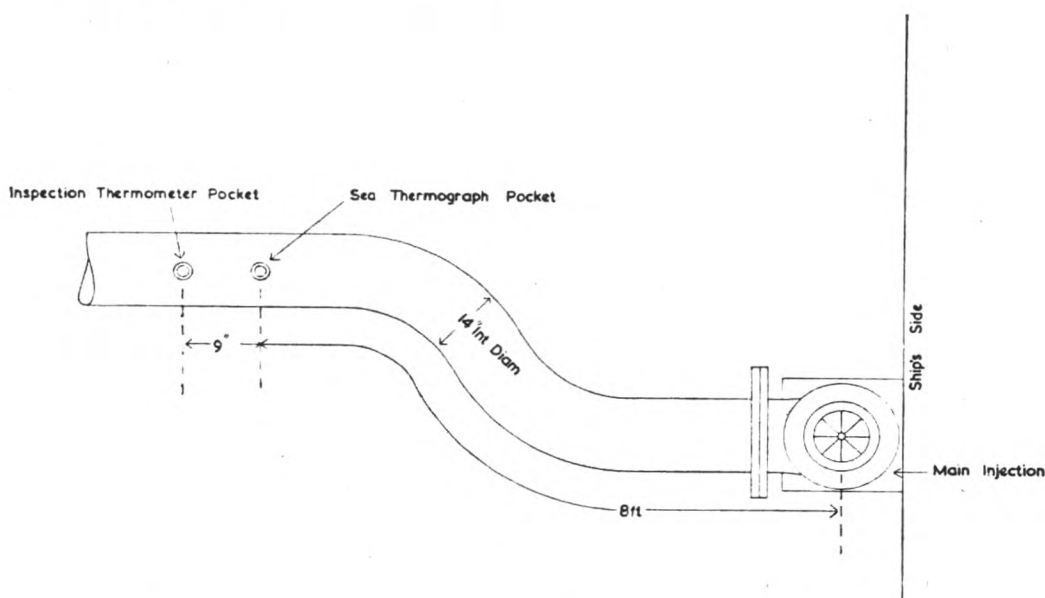


Fig. 2

Diagram showing the position of the thermometer in the engine-room intake pipe.

- (c) The mean depth of the intake where the water enters the ship is 9 ft. below the surface.
- (d) All observations have been corrected for index error and the thermograph has been corrected once every 24 hours by an inspector's thermometer placed in the intake.
- (e) All observations were made by the meteorologists aboard the ships, whose duties are entirely of a meteorological nature.

### Analysis of Observations

The differences between the values of sea temperature recorded by the intake thermograph and Mark III canvas bucket (first haul) were tabulated from the records of three Ocean Weather Ships during the period March-October, 1949.

\**The Marine Observer*, Vol. XIX, No. 144, April, 1949, page 107.

The observations from each ship were analysed separately according to whether they were made while the ship was on station or under way. The canvas bucket values were taken from the first haul, since mean differences between first and second hauls were slight.

Mean differences (first minus second haul) for a large number of cases were:

<i>Weather Watcher</i>	+ 0.04°F
<i>Weather Recorder</i>	+ 0.09°F
<i>Weather Observer</i>	+ 0.05°F
<i>Weather Explorer</i>	0.0

Mean differences between intake thermograph and canvas bucket are shown in Table III for each voyage. All observations were read to the nearest tenth of a degree at the eight synoptic hours.

The mean differences are based on a total of about 170 observations while on station and about 40 observations while under way for each voyage.

Statistical tests applied to the differences in Table III show:

- (a) the mean difference between bucket and intake while on station is significant to the 5 per cent level;
- (b) the mean difference between bucket and intake while under way is not significant.

TABLE III  
Mean Difference between bucket and intake methods of measuring sea temperature

SHIP	VOYAGE		MEAN DIFFERENCE BUCKET MINUS INTAKE (°F)		INTAKE RATE OF FLOW	
			ON STATION	UNDER WAY	ON STATION	UNDER WAY
<i>Weather Recorder</i>	9th March to 14th April	ITEM	+ 0.01	+ 0.30	290 tons/hr.	340 tons/hr.
	2nd to 28th June	ITEM	+ 0.62	+ 0.61	260	340
	14th July to 8th Aug.	JIG	— 0.41	— 0.55	280	360
<i>Weather Watcher</i>	24th Aug. to 20th Sept.	ITEM	— 0.11	+ 0.10	240	360
	2nd to 27th June	JIG	— 0.65	— 0.10	644 g/min.	2000 g/min
	14th July to 8th Aug.	ITEM	— 0.97	— 0.45	644	2000
<i>Weather Explorer</i>	24th Aug. to 19th Sept.	JIG	— 1.00	— 0.50	644	2000
	5th Oct. to 1st Nov.	ITEM	— 1.11	— 1.15	644	2000
	14th to 25th April	ITEM	— 0.41	— 0.45	1300 g min.	1300 g/min.
	12th to 31st May	ITEM	— 0.04	0.00	1300	1300
		Mean	— 0.41	— 0.22		

### Conclusions

The results suggest that the intake method gives readings about half a degree higher than the bucket while on station and about a quarter of a degree higher while under way, although the latter difference is not a significant one.

The former difference may be caused by:

- (a) Transfer of heat from the engine-room to the intake pipe. This explanation is borne out by the fact that the difference is less while under way when the rate of flow of water through the pipe is greater than while on station.
- (b) Cooling of the bucket by evaporation and by transfer of heat on occasions when the air is substantially cooler than the sea. On the average the air is 1°F cooler than the sea at JIG and 2.5° cooler at ITEM during the period covered.

- (c) Stratification of the water. There is a tendency for a vertical circulation to develop so that warm water is moving to the top and cooler water sinking. However, there might be occasions when the temperature of the water underneath the skin surface was warmer either as a result of a vertical or horizontal current or because the surface water is cooled by the air and vertical circulation has not developed sufficiently to equalise the difference.
- (d) Cooling of the surface water directly by evaporation due to the loss of latent heat.

*Editor's Note:*

These investigations seem to show that in a relatively small vessel such as a weather ship, in which the condenser intake is not too deeply immersed, the thermometer is mounted close to the ship's side, and the intake temperatures are read from a distant reading thermograph directly by the officer responsible for making the observations, then the intake readings will, when the vessel is under way, not be appreciably different from the readings taken by the insulated bucket method.

In the case of the observations referred to in Mr. Kirk's paper, a large number of different merchant ships of varying draughts were involved in which the intakes were at varying depths, and in which the temperatures were taken under varying circumstances, and the bucket employed was not of the insulated type. It is difficult therefore to form a real comparison between the two types of readings.

In order to complete the investigation, steps are being taken to analyse some "controlled" observations taken aboard merchant ships in which the position of the thermometer in the intake and its accuracy are known, and an insulated bucket is used for the "bucket" observations. The results of this will be published in due course. In the meantime, aboard British Selected Ships the bucket method should always be used, except in the case of certain large and fast passenger ships proceeding at full speed, in which case the intake method can be used. If an insulated bucket is for any reason not available, a note should be made in the logbook to that effect. If the engine-room intake temperature is recorded at any time this fact should be specifically mentioned, and steps should be taken (preferably in consultation with the Port Meteorological Officer) to check the accuracy of the thermometer in use.

## **WELL DONE, SELECTED SHIP !**

BY J. S. FARQUHARSON, M.A., D.SC.

(Senior Principal Forecaster at the Central Forecasting Office, Dunstable)

Coming home from the Sudan in 1936 in a British ship I shall never forget the horrified look on the Captain's face when I asked to see the weather charts (if any) plotted by his navigating officer. He was under the mistaken impression I wanted a free run of his chart-room! Actually, all I wanted was to see whether meteorology was or could be as useful to the navigator as the observations, made in the ship by the officers, were to the meteorologist at the Central Forecasting Office. I did not find out on that trip.

Bearing my own experience in mind it occurred to me that ships' officers might be equally curious as to the value of their observations when they are received ashore by radio, and the use made of them. I thought they might be encouraged if they were told that the possibly tiresome job of making routine meteorological observations at all hours of the day and night is indeed a real service to the community. A case in point arose at 0600 G.M.T. on 12th September, 1951, when the S.S. *Ruahine*, in position 42°6'N, 27°7'W, made a unique observation which enabled us at the Central Forecasting Office exactly to locate the secondary centre of low pressure shown to the south-west in Fig. 1.



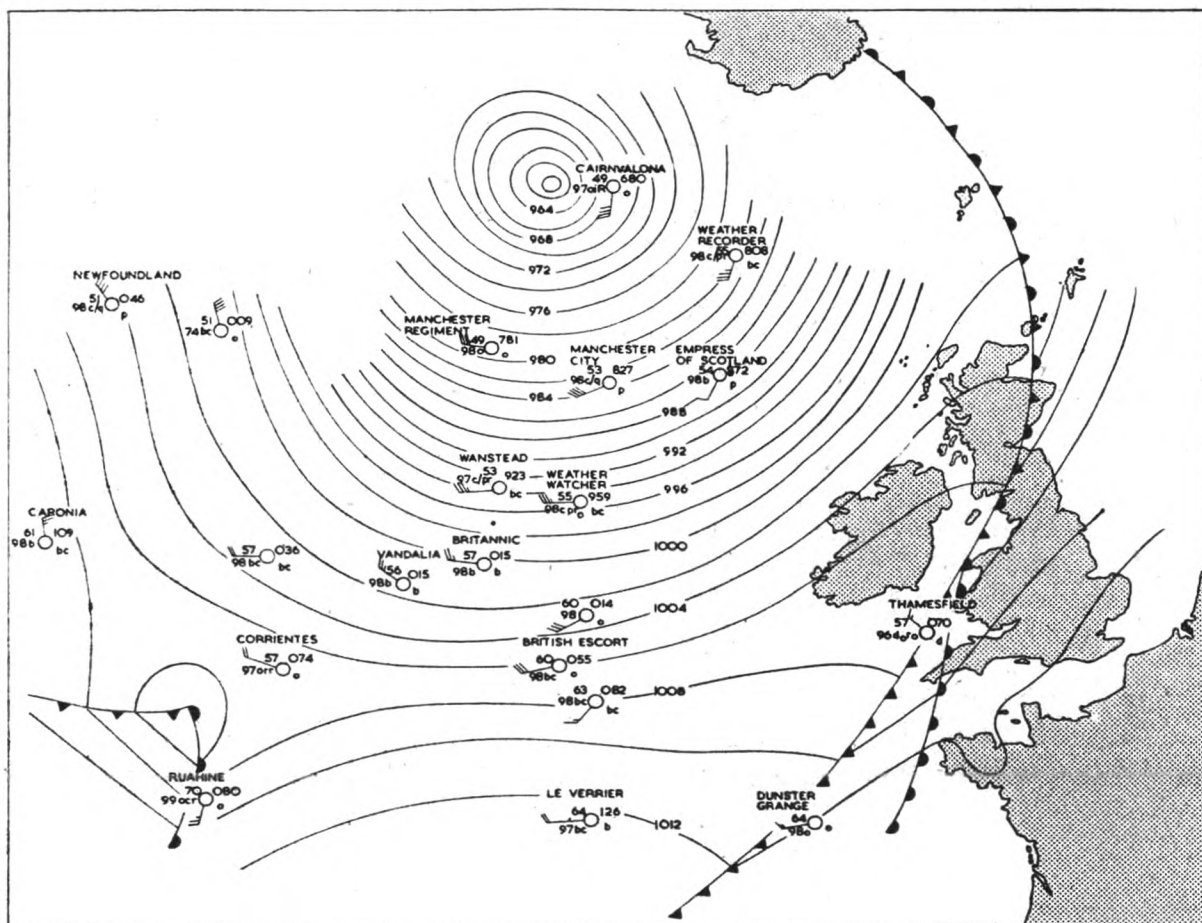


Fig. 1

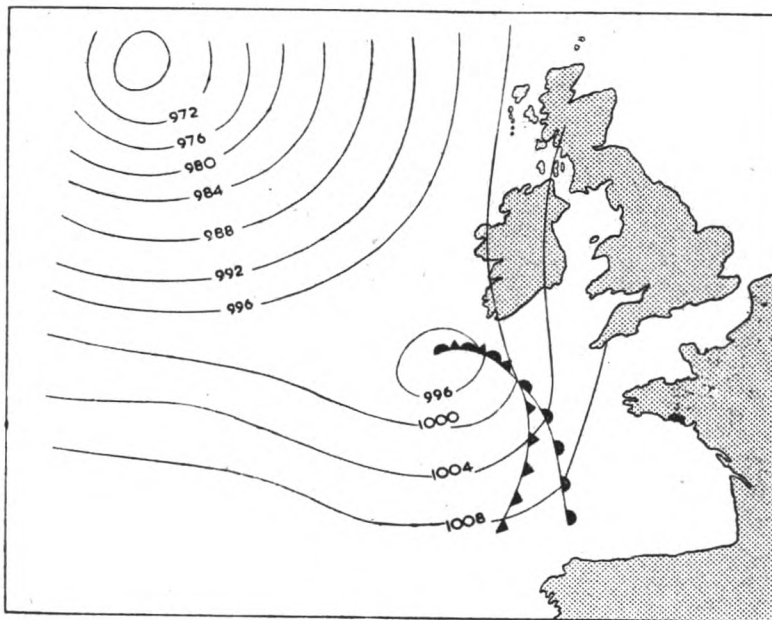
Weather Map for the North Atlantic for 0600 G.M.T., 12th September, 1951

Fig. 1 shows the synoptic situation over the Atlantic at the time and date in question. The forecaster using this observation said: "My whole prebaratic\* turns on that ship's observation. Without it the prebaratic would be quite different—and the weather forecast. . . .". Looking at Fig. 1, try to imagine this chart without the S.S. *Ruahine's* observations, and a different picture would be presented—there would be no secondary centre and it would have been a bold forecaster who forecast the prebaratic shown in Fig. 2. In fact, with the prebaratic as drawn the forecast issued on the mid-day B.B.C. broadcast read as follows: ". . . but further rain will reach some south-west districts from the Atlantic tomorrow morning". The "further outlook" read: ". . . rain spreading from the south-west".

The later chart at 12 noon G.M.T. clearly showed the secondary depression as an important system, but this would have been too late to influence the 0600 G.M.T. prebaratic and the mid-day B.B.C. forecasts, so that the S.S. *Ruahine's* observations were critical so far as this particular set of forecasts was concerned. The actual chart for 0600 G.M.T. is shown in Fig. 3.

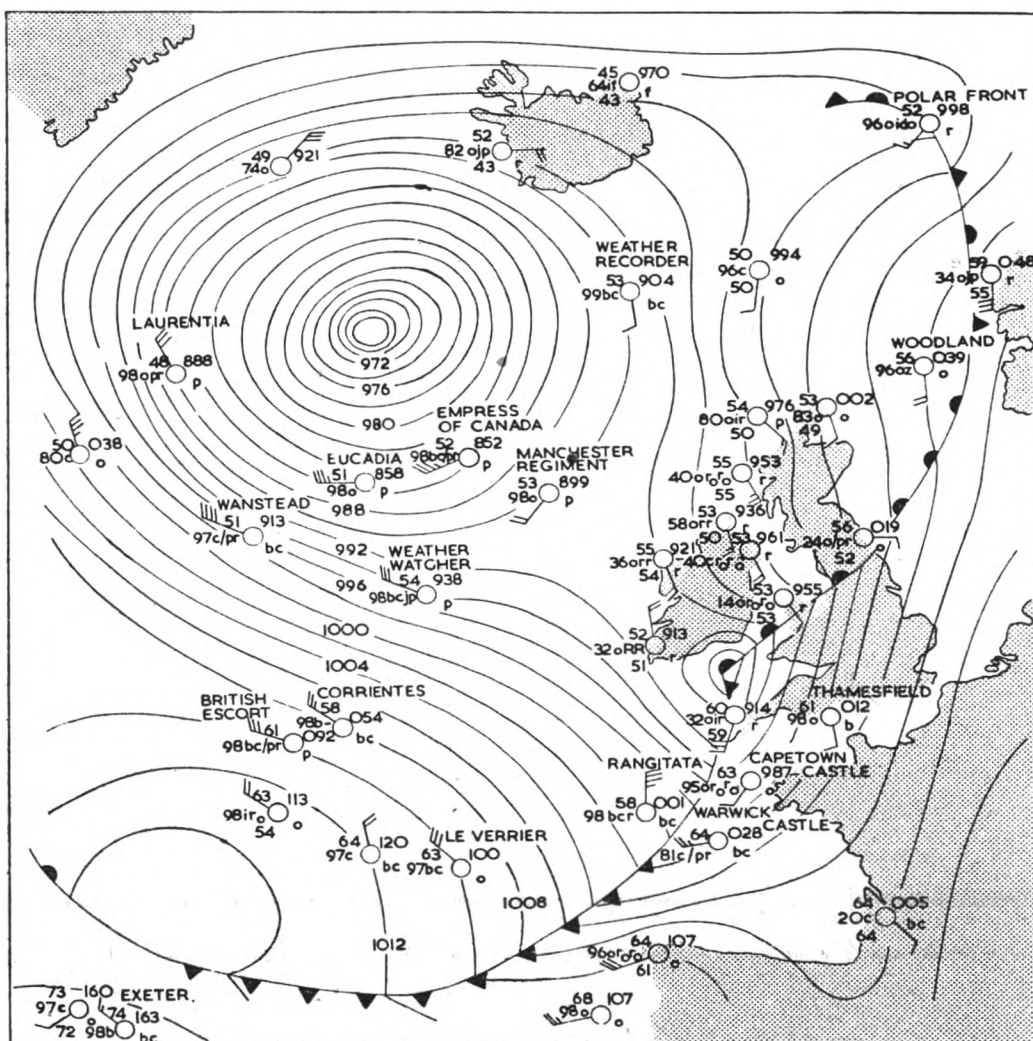
This is a recent striking example of the value of ships' observations to the forecaster, but they occur daily. Even as I write the current weather map has just been changed off south-west Ireland because a ship's report has just come in indicating the presence of a small depression not hitherto located.

\*A forecast map showing the forecaster's views of impending synoptic developments in 24 hours, e.g. Fig. 2.



**Fig. 2**

Prebaratic Chart for the North Atlantic for 0600 G.M.T., 13th September, 1951



**Fig. 3**

Weather Map for the North Atlantic for 0600 G.M.T., 13th September, 1951

Ships' observations are often of greatest value in disturbed situations when intense fast-moving centres of low pressure are crossing the Atlantic. In such situations the forecaster would like to be able to do what we can do occasionally with the Ocean Weather Ships, thanks to the point-to-point radio link which we have with them, namely, send a signal to the effect that we are grateful for most valuable observations made under appalling conditions of wind, weather and sea. It is not practicable to send such a message to the large number of merchant ships which do this voluntary work for us, but if ever you are up our way come and see us, so that we can shake you by the hand and treat you as one of our most important colleagues.



*Crown Copyright Reserved*

A typical scene inside the forecasting room of the Central Forecasting Office, Dunstable. The assistant on the left is decoding the weather reports on the roll of teleprinter paper and plotting them on the synoptic charts. In the centre the forecaster can be seen composing a weather forecast (possibly for the Atlantic Weather Bulletin) under the general guidance of the senior forecaster on the right.

## SOME INTERESTING METEOROLOGICAL MEASUREMENTS AT SEA

BY D. M. HOUGHTON, M.SC., D.I.C.

(Scientific Officer, Marine Branch, Meteorological Office)

Making observations of meteorological elements in or over the free ocean is a task from which many have turned away. The difficulty can be summed up under the word "representative". The scientist demands that the data he is given should be "representative". Over land it is quite easy to take a thermometer, shield it from radiation and ventilate it sufficiently to obtain a representative value of the air temperature for that particular piece of land. With such data he can commence his calculations, the result of which will be valid within the limits of the chosen area. Over the ocean, unfortunately, if we are to make a similar reading of temperature with a thermometer that is well ventilated and sheltered we have to bring in a certain amount of "land" on which to mount the instrument, with the result that our temperature reading is no longer representative of the open ocean but of the "land" which we have imported. This "land" is of course usually a ship. Measurements of most meteorological elements, e.g. wind velocity, temperature, humidity, are never quite the same when made aboard a ship as they would be over the open ocean.

It has long been realised that the transfer of heat between ocean and atmosphere is a problem of fundamental importance, and interest in the subject is increasing as we become more aware of the basic physical processes in meteorology. It appears that, among other functions, this governs the formation of depressions by providing the necessary energy. Calculations of the energy exchange in various parts of the ocean and its daily and seasonal variation can only be accurately based on representative observations. This explains why there is a tendency at present for meteorologists who are working on these problems to ask for special observations made at some distance from the ship in addition to the routine observations on board. Another possible method of obtaining representative observations is to calculate the error which the presence of the ship creates in readings made on board, using either theory, data analysis, special observations or combinations of these methods. The writer has done a certain amount of work in an attempt to estimate air-sea heat exchange, and this will now be described briefly.

An electrical apparatus, which will here be referred to as a gradient thermometer, was floated at a distance of about 30 yards from the British Ocean Weather Ship *Weather Observer* on one or two occasions during August, 1950, and some gradients were recorded using a marine galvanometer secured in the ship's meteorological office. The gradient thermometer consisted of a set of multi-thermocouples mounted at intervals of about a foot in a 12 ft. brass tube. This tube was weighted at the bottom, and supported at the top by two "pellets" such as are used by fishermen for supporting their nets. A watertight cable connected it with the galvanometer. Unfortunately, owing to the great difficulties experienced in floating the instrument in water which was not contaminated by the ship, only two representative profiles were recorded. These were, however, of considerable interest, although no scientific theory can be based on only two observations. The first one was taken under conditions of air temperature less than sea



temperature, very different from the record when the air temperature was greater than the sea temperature. The former are conditions which favour and promote heat exchange by turbulent mixing in the air; this, incidentally, is the primary method of sea-air heat exchange. The latter are "inversion" conditions and hinder heat exchange. This fact was made obvious in the profiles observed, for the first profile showed a negative temperature gradient in the first 4 ft. of sea water (temperature increasing downwards). This must represent an equilibrium gradient established as a result of mixing in the sea surface, cooling by evaporation and sensible heat transfer into the atmosphere. The second profile showed no such reversal in gradient, but a positive gradient which continued right up to the surface and gave a temperature change of  $0.8^{\circ}\text{F}$  in 10 ft. From the magnitudes of these gradients the rate of heat loss to the atmosphere and the rate of heat gain by absorption of radiation in the sea surface may be estimated for any one spot, using certain assumptions which will not be gone into here.

If the sea surface is warmed during the day by solar radiation and cooled at night by outgoing radiation, then it should exhibit a diurnal variation in the bucket temperature readings. Various scientists have analysed observations made by voluntary observers aboard Selected Ships during many years, and the writer has analysed Ocean Weather Ship observations covering a period of three years. Both show an almost negligible diurnal variation. This at first sight appeared to contradict the deductions made from the observed temperature profiles. The answer to this problem was discovered when a more detailed analysis was made and the bucket observations were sorted out into occasions when the air was warmer than the sea surface and when it was colder. The latter outnumbered the former by nearly 10 to 1 and showed no diurnal variation. The former showed a diurnal variation of a magnitude which corresponded very closely to what was calculated from radiation considerations. For sea-surface temperature observations aboard Ocean Weather Ships, an insulated bucket as described in *The Marine Observer* for April, 1949 (Vol. XIX, No. 144), is used.

Finally, an attempt has been made to roughly estimate the radiation error in ships' observations of temperature. This was done indirectly by an analysis, similar to the above, of both air and sea temperature observations and their variation with cloud and wind. On occasions when the air temperature is greater than the sea temperature the diurnal variations of the two temperatures are very similar in shape and magnitude (both about  $2^{\circ}\text{F}$ ). On other occasions there is no diurnal variation of sea temperature and a small one of air temperature (about  $0.4^{\circ}\text{F}$ ). If these latter are further sorted into cloud and wind, (a) cloud  $6/8$  and greater, wind force 6 and greater, and (b) cloud less than  $6/8$ , wind less than force 6, then a diurnal variation of air temperature of about  $1.4^{\circ}\text{F}$  with sea about  $0.4^{\circ}\text{F}$  is seen. After making allowances for the air temperature following the sea temperature and also after subtracting the calculated diurnal variation of air temperature due to absorption and emission of radiation by water vapour in the air, there is a residual diurnal variation of  $0.5^{\circ}\text{F}$ , which can only be explained as radiation error due to the instrument being aboard the ship.

It must be realised that this work is only in its infancy and the above investigations are just a beginning of a more comprehensive attack upon this knotty problem.

## CONGRESS OF MARITIME METEOROLOGY AT GENOA

A Congress of Maritime Meteorology was included in the programme of the Genoa Columbus Celebrations for the year October 1950 to October 1951, and was held in the Palazzo Regio of the University of Genoa from 20th to 22nd September, 1951. Among the delegates to the Congress were meteorologists from France, Germany, Great Britain, Italy and the United States. A total of over 20 papers were read on a variety of subjects in the general field of marine meteorology. The importance of marine meteorology and of ship's observations—without which marine meteorology could not exist—was brought into bold perspective through the holding of such a conference as an integral part of the celebrations to commemorate the 500th anniversary of the birth of the pioneer mariner and navigator, Christopher Columbus.

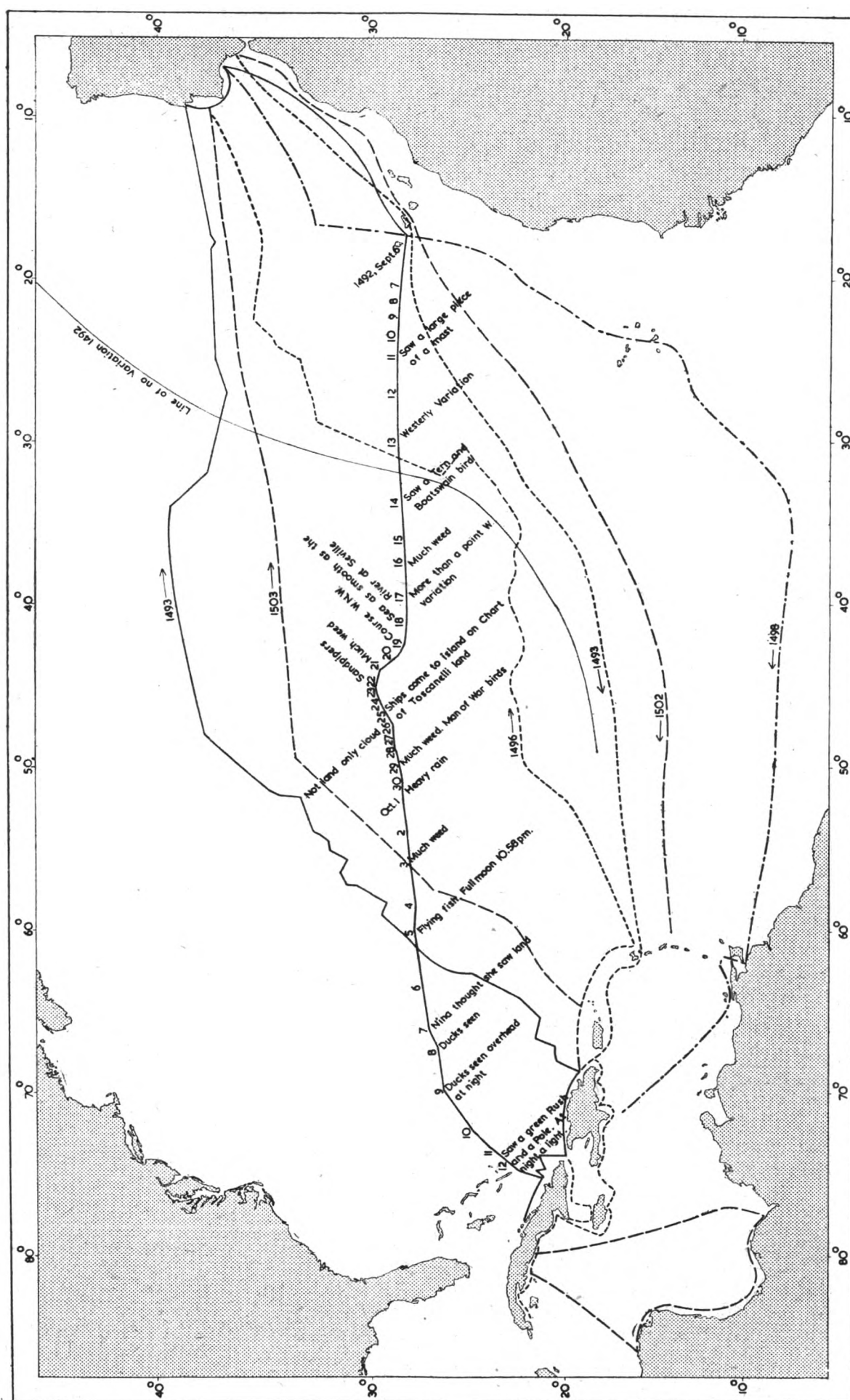
The delegates assembled in the Palazzo Regio at 10 a.m. on 20th September, where an exhibit of meteorological and oceanographical instruments was examined with interest. The Congress was then formally opened by Professor C. Cereti, Rector of the University of Genoa, who emphasised the importance of marine meteorology, our knowledge of which, at present still scarce and insufficient, needed to be enlarged and diffused. Afterwards, Professor M. Bossolasco, Director of the Geophysical Institute of the University and organiser of the Congress, reviewed briefly the history of the science of meteorology since the time of Columbus.

The first paper to be read was by Professor G. Wüst, Director of the Oceanographical Institute of the University of Kiel, on THE HYDROLOGICAL BALANCE OF THE BALTIC AND MEDITERRANEAN SEAS, in which the processes controlling the hydrological balance between ocean and atmosphere were discussed. The importance of an adequate number of reliable marine observations for the solution of problems of this kind was repeatedly stressed.

The afternoon meeting was opened by a paper by Dr. Kuhlbrodt of Hamburg on WINDS ALONG THE MARITIME ROUTE CAPE VERDE—LA PLATA. Dr. Kuhlbrodt discussed in some detail the analysis he had made of surface winds and pilot balloon observations collected from the *Meteor* expedition. Lantern slides depicted the distribution of the wind in a number of ways.

F. Musella of Genoa continued with a paper entitled THE CONTRIBUTION OF SHIPS TO METEOROLOGY IN GENERAL AND MARITIME METEOROLOGY IN PARTICULAR, in which the means of obtaining accurate observations at sea were discussed. At the conclusion of the paper controversial views were expressed by members of the Congress regarding alternative methods of either estimating visually or measuring instrumentally the wind velocity at sea and also regarding the measurement of the sea surface temperature by the bucket or intake methods. Professor Wüst expressed the opinion that it was the temperature of the surface layer of the water that was required rather than that of the depth of the intake. In particular it was necessary to increase the scientific knowledge of the Mediterranean by undertaking voyages to measure depth profiles of temperature and salinity.

The programme on the second day was opened by Dr. Wüst with the reading of a note by A. H. Gordon, of the Marine Branch, Meteorological Office, London, entitled THE RELATION BETWEEN THE MEAN VECTOR WIND AND THE MEAN VECTOR PRESSURE GRADIENT. Pressure and wind data had been treated by Hollerith machines for 5° squares over the oceans, and the



THE VOYAGES OF COLUMBUS

Adapted from "The Truth about Columbus" by Charles Duff

Readers may like to be reminded of the tracks of the four voyages made by Columbus to the New World. On the track of the first voyage are inserted interesting extracts of scientific interest from the ship's log.

mean difference in direction between the mean vector wind and the isobars drawn from the mean vector pressure gradient computed as a function of latitude. Slides were shown illustrating the variation with latitude of the angle of deviation and of the ratio of the actual mean vector surface wind velocity to the theoretical mean vector geostrophic wind velocity. The analysis of data was based on British ships' voluntary observations of wind and pressure over all the oceans of the world back to 1855. A stimulating discussion followed, in which great interest was shown in the ways in which the analysis of marine data by Hollerith methods could contribute to meteorological knowledge of such subjects as the general circulation.

In addition to the papers on the agenda for the morning of 21st September, an officer from the Statistics Bureau in Rome discussed the relation between marine meteorology and statistics. An intense discussion then developed regarding the general unification of all meteorological services in Italy and the best means of developing marine meteorology in a progressive way, using the punched card system of recording and analysing the collected data. In addition there was a need for meteorological education to be propagated. In Italy the weather was normally so good that an interest in meteorology was not stimulated.

Two papers followed by A. D'Arrigo of Catania. The first discussed the influences characterising wave motion in the sea, and the relation between the form of the sea bottom, the fetch, the potential energy of the wave oscillations and the kinetic energy of their breaking. The second dealt with the topography of the sea bottom of the Mediterranean reconstructed from British Admiralty and Italian Hydrographic Institute charts.

The programme of the final session on 22nd September was opened at 9 a.m., with Mr. Gordon in the chair, with the reading of a paper by Dr. H. Roll, *IS THERE A CRITICAL WIND VELOCITY FOR PHYSICAL PROCESSES IN THE LIMITED AIR-SEA BOUNDARY LAYER?* There was evidence that discontinuities appeared at wind velocities of about 7 metre/sec. in the processes governing the behaviour of stress, evaporation, gull soaring and the formation of white caps. A number of wind profiles over the sea as found by various authors were shown on slides.

Dr. Roll was followed by an officer from the Marine Hydrographic Institute of Genoa, who read papers on *THE RELATION BETWEEN WIND VELOCITY AND WAVE MOTION IN THE OPEN SEA AND ALONG THE COAST*, and on *THE ORGANISATION OF METEOROLOGICAL OBSERVATIONS ABOARD ITALIAN MERCANTILE MARINE SHIPS*.

The final session concluded with a discussion of the various resolutions which had been drawn up recommending measures to develop and improve the science of marine meteorology in Italy. In general the resolutions referred to the equipping of a larger number of Italian ships with accurate instruments for measuring meteorological observations at sea, including rainfall, and for the collection and evaluation of the observations by modern punched-card methods. Some slight amendments were made to the resolutions, after which they were approved by the Congress.

The Congress was closed with a few words of appreciation of the hospitality and organisation of the Congress by the chairman on behalf of the foreign visitors present.



The meeting of the Congress was very successful, providing a stimulating atmosphere for the exchange of ideas between workers in maritime meteorology of several nations. It is certainly in the interests of the advancement of science that such international meetings should be arranged from time to time. The availability of foreign scientific literature cannot altogether eliminate a tendency in many cases for individual workers to plan and execute research in watertight compartments. In particular, the meeting proved that the study of weather over the oceans is an inherent part of the science of meteorology and is indispensable to the successful accomplishment of the practical applications of meteorology in the service of humanity.

A. H. G.

### **EASTERN CARIBBEAN HURRICANE SUB-COMMISSION**

In June, 1951, a Sub-Commission of the World Meteorological Organisation held a meeting at Port of Spain, Trinidad, to discuss problems connected with hurricanes in the eastern Caribbean. Various recommendations were made for improving the organisation for collecting information from ships and dissemination of hurricane warnings for shipping and, indeed, for improving the meteorological organisation generally.

Some rather interesting statistics were presented to the meeting by a representative of the U.S. Weather Bureau at San Juan, Puerto Rico. During the 1950 season it appears that there were 12 storms, 11 of which developed full hurricane force; this is the largest number reported for any season since records began. It is true that in 1933 there were 21 storms, but only 10 of these developed hurricane force. Out of the 11 1950 hurricanes, one developed hurricane force twice in its lifetime and might therefore be classed as two hurricanes, bringing the number up to 12 for the 1950 season. Four of the storms entered the United States mainland, with the result that 19 lives were lost, while property and crop damage was over \$35,000,000. Only three of these hurricanes affected areas in the eastern Caribbean. The first hurricane of the 1950 season was observed on 13th August, and this was the first of a family of six which scarcely gave a break until 16th September. After a lull of 14 days another family of six appeared, commencing on 1st October. The whole season lasted from 13th August until 21st October; it thus began relatively late and ended early, but while it lasted it was packed with activity.

From the viewpoint of the meteorologist and the airplane reconnaissance crew, the season presented many difficulties in keeping track of the storms. These tracks show many slow movements, blockings, changes of course and even loops. For example, the hurricane of 1st to 7th September made two small loops in the north-eastern Gulf area and another 180° turn in the vicinity of Florida, which gave four abrupt changes in the course of three days. The erratic behaviour of a hurricane in the Gulf late in October caused needless warnings and anxiety on the west coast of Florida; during the last 12 hours as it approached the coast it decreased in intensity from 100 m.p.h. to a storm of only moderate gale force as it moved inland. Another feature of the season was the simultaneous occurrence of two or more hurricanes on more occasions than one.

During the busy period Miami Hurricane Central issued 270 advisory bulletins. The U.S. Navy despatched 60 reconnaissance flights to investigate hurricanes during this season and the Air Force slightly more.

Bearing in mind the damage and loss of life that can be caused by hurricanes, and particularly the potential danger that they are to shipping, it is gratifying to note that the meteorological authorities in this region deal with the problem of these storms in such a realistic and practical manner. The geographical nature of this area, the number of nationalities involved and the behaviour of the hurricanes that occur there, is such that nothing useful can be accomplished without considerable international co-operation and goodwill.

C. E. N. F.

### INVESTIGATIONS INTO THE DROP SIZE OF SPRAY

A report has been published by the Institut Oceanographique at Monaco\* about some unusual investigations which have been made into the dimension of the drops of which sea spray is composed.

To carry out these investigations a rather ingenious procedure was adopted. A thin piece of copper wire was formed into a framework about 2 cm.  $\times$  2 cm. A small spider—which the author says is easily found in the gardens of Monaco even in mid-winter—is made to walk along the wire. A shake of the wire suffices to shake the spider off the wire, and as he falls he naturally releases his web to save himself. The web can then conveniently be wound round the framework. To obtain a network of even finer webs, the spider is induced to carry out similar acrobatic feats from the web already formed.

This framework of spider webs has been used to collect the spray particles under various conditions of wind and sea. The spray particles, although hygroscopic, will remain on the web and can be kept in an insulated box and examined as necessary. The droplets were examined in an artificial humidity of 95 per cent, in order to have reasonable sized droplets to work with, and the number per litre of air collected under varying wind conditions was analysed. The results seem to show that salt droplets of a greater diameter than 20 microns are relatively rare in the atmosphere, and that, considering the particles large enough to be caught on the spider's web, the mass of salt content per litre of air near the sea surface varies from  $0.4 \times 10^{-11}$  grammes per litre to  $9.5 \times 10^{-11}$  grammes per litre. It seems that these spray particles play no part in the exchange of water vapour between atmosphere and air.

It will be seen that Fournier d'Albe's figures for the salt content of the air are considerably less than those of Jacobs and other investigators. Jacobs, however, estimated the salt content by finding the chlorine content of all particles in the air, whereas Fournier d'Albe probably did not capture particles of the smallest size on his web.

Observations of this nature are interesting in their ingenuity, and they have considerable practical value. Salt particles in the atmosphere are, after all, the chief nuclei on which cloud particles form, and there is no doubt that knowledge about the influence of these droplets upon relative humidity near the sea surface, and indeed upon the general question of exchange of moisture and heat between ocean and atmosphere, is a matter of fundamental importance to anybody interested in meteorology.

C. E. N. F.

\**Sur les Embruns Marins*. By E. M. Fournier d'Albe. *Bulletin de l'Institut Oceanographique*, No. 995. 10 in.  $\times$  6½ in., pp. 8. *Illus.*, Musée Oceanographique, Monaco, 1951.

# SOUTHERN ICE REPORTS

During the year 1951

DATE	POSITION		DESCRIPTION	DATE	POSITION		DESCRIPTION
	LAT.	LONG.			LAT.	LONG.	
JANUARY							
M.V. Biscoe							
17	75 55S	176 30W	Berg 50 miles in length (checked by catcher steaming along its entire length).	1	59 55S	135 30W	2 bergs.
27	65 17S	178 00W	Numerous bergs and growlers.	2	59 55S	129 00W	Few bergs.
28	63 49S	176 45W	Numerous large bergs.		59 55S	119 00W	2 bergs.
	59 50S	168 40W	1 berg.	R.R.S. Discovery II			
	61 45S	171 10W	1 berg.	16	55 42S	91 39E	Medium-sized tabular berg, slightly canted and heavily crevassed.
	61 40S	168 30W	Numerous bergs.	18	Between 58 25S and 60 20S	91 28E and 92 10E	4 large tabular bergs, 9 small pinnacled bergs, 1 small berg, several bergy bits and growlers.
29	61 43S	166 47W	2 bergs.	19	Between 60 42S and 62 49S	92 14E and 90 57E	11 tabular bergs, numerous bergs (some pinnacled), bergy bits and growlers.
	61 43S	164 00W	Several bergs.	20	Between 63 00S and 64 49S	91 00E and 89 56E	20 tabular bergs, 9 bergs (7 pinnacled, numerous bergy bit) and growlers.
30	61 15S	153 20W	Numerous bergs.	21	Between 65 08S and 63 50S	90 00E and 93 18E	10 tabular bergs, 12 bergs and numerous other bergs, growlers and bergy bits within 10 miles of ship. 4 ice islands and considerable loose pack ice. 3 radar bergs.
31	60 30S	145 46W	Numerous bergs.	22	Between 63 45S and 63 05S	93 43E and 98 30E	22 pinnacled bergs, 21 tabular bergs, 34 bergs, 6 radar bergs, numerous bergs and bergy bits. 1 ice island.
	60 20S	143 20W	3 bergs.	23	Between 62 55S and 64 02S	98 40E and 103 20E	11 pinnacled bergs, 13 tabular bergs, 24 bergs, 4 radar bergs, heavy pack running N and S, and 1 ice island.
	60 00S	137 00W	1 berg.	24	Between 63 32S and 62 23S	104 39E and 108 00E	14 bergs, 1 growler and several bergy bits.
S.S. Southern Garden							
2	60 35S	23 00W	Frequent bergs and growlers. Pack ice 10 miles to S.	25	Between 62 22S and 61 05S	108 20E and 112 00E	6 bergs, 1 tabular berg and 3 radar bergs.
3	60 50S	25 00W	Occasional bergs and growlers.	26	59 40S	115 55E	One bergy bit.
6	60 20S	26 30W	Heavy drift, pack ice and hummocked ice extending E-NW 100 miles.		59 30S	116 20E	One bergy bit.
7	59 50S	28 25W	Occasional large tabular bergs, few small bergs.	S.V. John Biscoe			
8	59 51S	30 25W	Numerous tabular bergs and growlers in sight.	13	65 10S	63 45W	Brash and light pack.
11	61 08S	45 07W	3 tabular bergs about 60 ft. high, 400 ft. long.	14	65 15S	64 00W	Numerous bergs, loose pack.
	61 08S	47 19W	5 tabular bergs, 1 growler about 50 ft. high, 200 ft. long.	S.S. Polar Maid			
13	60 43S	46 58W	Numerous tabular bergs and growlers, average 50 ft. high, 300 ft. long.	8	48 45S	35 30W	1 berg and 4 growlers
15	56 22S	37 59W	3 tabular bergs, 4 growlers, 40 ft. high, 300 ft. long.	S.S. Southern Garden			
29	55 14S	32 28W	1 tabular berg, numerous growlers, 50 ft. high, 200 ft. long.	4	62 03S	47 38W	2 tabular bergs and 5 growlers.
30	56 30S	40 30W	No ice sighted for last 12 hours.	8	61 30S	41 00W	Few large bergs.
31	59 11S	47 28W	First berg sighted since 29th.	9	61 07S	43 49W	8 tabular bergs, numerous growlers.
S.S. Southern Harvester							
1	60 37S	21 10W	Several bergs.	10	61 39S	48 40W	2 tabular bergs. Frequent growlers.
2	60 51S	21 48W	Numerous bergs and loose pack ice.	11	61 44S	52 00W	3 large bergs.
	60 43S	22 48W	Occasional bergs and strips of drift ice.				
3	60 43S	25 18W	3 bergs.				
4	60 50S	27 17W	Inside pack. Numerous bergs.				
5	60 44S	27 17W	Inside pack.				
8	60 05S	31 50W	In lee of pack.				
	60 17S	31 46W	2 bergs.				
9	61 01S	33 32W	2 bergs.				
S.S. Struan							
10	50 10S	35 46W	Small berg.				
11	53 17S	36 34W	5 bergs and 3 growlers.				

# SOUTHERN ICE REPORTS (continued)

DATE	POSITION		DESCRIPTION	DATE	POSITION		DESCRIPTION
	LAT.	LONG.			LAT.	LONG.	
	°	'			°	'	
<b>FEBRUARY</b>				<b>S.S. Southern Opal (continued)</b>			
<b>S.S. Southern Garden (continued)</b>				18	61 22S	34 36W	Several bergs and growlers.
13	62 30S	52 30W	Closed pack ice extending SE 60 miles, W 25 miles to SW, with large bergs and open pack.	19	64 08S	35 04W	Bergs and pack ice.
14	60 32S	49 30W	2 tabular bergs, numerous growlers.	20	64 20S	35 59W	Bergs and pack ice.
16	56 11S	37 46W	1 berg.	21	64 30S	36 58W	Bergs and pack ice.
<b>S.S. Southern Opal</b>				22	64 20S	36 50W	Bergs and pack ice.
10	46 46S	35 48W	2 bergs.	23	59 58S	36 02W	Bergs and pack ice.
11	51 08S	35 59W	Several bergs.	<b>MARCH</b>			
12	53 00S	36 00W	Several bergs and growlers.	<b>S.V. John Biscoe</b>			
15	Along N coast, S. Georgia.		Several bergs and growlers.	31	64 24S	62 52W	Tabular bergs, numerous other bergs and brash.
16	55 49S	35 26W	Several bergs and growlers.	<b>S.S. Southern Collins</b>			
17	58 30S	34 54W	Several bergs and growlers.	16	51 29S	36 24½W	Large growlers.
				<b>S.S. Southern Garden</b>			
				15	53 30S	36 30W	1 berg by radar.
				<b>S.S. Struan</b>			
				21	52 56S	36 06W	5 large bergs and several growlers.

Reports of ice for January, February and March previous to 1951 will be found in *The Marine Observer*, Vol. XXI, No. 151, page 62.

## BOOKS RECEIVED FOR REVIEW

*Lloyd's Maritime Atlas*. Compiled and edited by the Shipping Editor at Lloyd's. 9½ in. × 7¼ in. pp. xii + 87 + 16 lithoplates. The Corporation of Lloyd's, London, 1951. Price, 21s.

This atlas is of a very convenient desk size and contains much useful information for anybody concerned with the operation of ships. It should be particularly useful to shipowners, brokers and underwriters. The maps are very attractively set out, and a mass of detail is avoided so that the place names stand out clearly—and yet it seems that the authors have managed to show many minor ports which are not normally shown in atlases. Ports with dry-dock facilities are underlined. The arrangement of the maps follows the method which has been used in Lloyd's publications for over 200 years. There are useful insets giving some detail of canals and approaches to the larger ports. The map showing the bad weather areas of the world and periods during which the bad weather occurs should prove very useful, but it is noted that no reference is made to fog on the North Pacific coast (between San Francisco and Vancouver). At the bottom of this map, local time in various parts of the world at Greenwich noon is illustrated.

It would perhaps have been an improvement if a map had been included showing the ice areas of the world and the season in which ice is liable to be experienced. Although there is a map of the Arctic, there is not one of Antarctica and its environment; the inclusion of such a map might be of considerable interest and value to companies which operate whaling ships.

At the back of the atlas is a useful list of the principal ports, rivers and prominent points of land, arranged geographically and giving latitude and longitude of each place, as well as an alphabetical index.

C. E. N. F.



*The Sea Around Us.* By Rachel L. Carson. 8vo.  $8\frac{3}{4}$  in.  $\times$   $5\frac{1}{2}$  in. pp. viii + 230  
*Illus.* Staples Press Ltd. London, 1951. 12s. 6d.

This delightful book can be confidently recommended to anyone who is even remotely interested in the sea. The author is an American woman who not only loves the sea and all that therein is and knows a lot about it, but who has an elegant literary style. The result is that she brings before the reader an oceanographical panorama in which the main actor is the ocean, and its history, geology, physics and biology is the plot, and she makes it a fascinating and enthralling story. Much research must have gone into its writing, as is shown by the number of oceanographers of various nations whom she consulted.

The reader meets the inhabitants of the deepest ocean and almost feels the enormous pressure and cold and darkness where "with marvellously developed feelers . . . they grope their way like so many blind men with canes"; visits the "diatom meadows and drifting sargassum weed" of the near-surface waters; he sees a volcanic island born and travels back through history to that "primeval ocean growing in bulk as the rain slowly fills its basins". We learn of "the accumulation of sediments . . . that will go on as long as there are seas and continents", of the effects of "wind and sun and the spinning of the earth", and of the tides which "were not always as they are today and as with all that is earthy their days are numbered".

Fog on the Grand Banks is "a small circular room whose walls were soft grey curtains and whose floor had a glassy smoothness", while the "moist breath of the Pacific brings climatic mildness to . . . British Columbia". Meteorological and climatological aspects of the oceans are dealt with in an intelligent and comprehensive manner, and the author rightly reminds us that "day by day and season by season the ocean dominates the world's climate"—a fact which has no little bearing upon the work of a voluntary observer at sea. Mention is made of the pioneer work of Maury in starting the collection of meteorological data aboard merchant ships of all nations. Meteorological research into the behaviour of ocean waves and seismic waves for storm forecasting and other purposes is given considerable attention. Many interesting extracts from Admiralty and United States pilots and remarks about the idiosyncrasies of the ocean around the coasts of Britain receive their due share of attention, and from remarks such as "a hailstorm will knock down a rough sea" one has the impression that the author is a bit of a mariner herself.

There are two small criticisms. Observations made aboard British ships over a large number of years show that within the Sargasso Sea area winds and currents are somewhat more prevalent than the author appears to imply. The suggestion that a man standing on a cliff 1,000 ft. above the sea at St. Helena would be above the trade wind is perhaps open to doubt, as investigations appear to show that the trade winds, although somewhat shallow, normally extend to a greater height than this (*The Marine Observer*, Vol. V, 1928, page 230, and the *Africa Pilot*, Vol. II, page 31).

The final sentence of the book sums it all up: "For all at last return to the sea—to Oceanus, the ocean river, like the ever-flowing stream of time, the beginning and the end".

C. E. N. F. & E. W. B.

*Abridged Nautical Almanac for the Year 1952.* 10½ in. × 7½ in. pp. 410+xxxvi. Supplement, pp. 20. His Majesty's Stationery Office, London, 1951. 8s. 6d.

It is many years since Captain Lecky wrote to a friend in the House of Lords: "I certainly think that the *Nautical Almanac* ought to undertake the star distances, but you will probably find that the United States Hydrographic Office will do it. They have no hesitation in undertaking anything they think worth doing, whereas our people take a few years to think about it".

The few years envisaged by Lecky have proved to be 50 in the case of "our people", while even the United States took something like 30. But the preface to the new *Abridged Nautical Almanac*, 1952, together with *Notice to Mariners No. 20* of 1950, by which it was introduced, show what a lot of careful thought has gone into those 50 years.

The basic requirements of a nautical almanac are that it shall provide the mariner with the means of finding his position with ease, accuracy and confidence. It seems logical then that as the ship's position is required in arc, the nautical almanac elements which are used to find that position should also be in arc. For this reason alone the change to G.H.A. seems worth while.

The system of grouping all the "daylight bodies", viz. the sun, moon, Venus, Mars, Jupiter and Saturn, together with sunrise, sunset, twilight, moonrise and moonset, all on one page is excellent and, we venture to suggest, may serve to remind officers how often a "cross" is obtainable in daylight. We have often referred to this in connection with the computation of ocean currents over short periods.

We have been studying the various articles and letters which have appeared in the nautical press on the new almanac ever since the change was first mooted. These, coming mostly from the men who will be using it, are worthy of close scrutiny. At present opinions range from that of the ship-master who believes that the change is "logical, inevitable and long overdue", to that of the one who will "continue to use dear old 'E', even if it means buying a Greek or Japanese almanac". It remains to be seen how the change will be received. Personally we remember the storm which arose over the introduction of "R" and "E", never dreaming that "E" would become "dear old 'E'" in the short space of 22 years. This storm was as nothing compared with the hurricane which preceded the introduction of the new helm orders in 1933. Yet these have been accepted among seamen, and we confidently expect that when this new almanac has been in use for a few months it too will become part of the ship. If it has a fault we suggest that it is rather bulky and has no stiff cover. The unfortunate junior officer who has to work his sights on a wind-swept bridge while the master and second officer are in the comparative comfort of the chartroom, will be the first to appreciate this.

L. B. P.

*Report on the Snow Survey of Great Britain for the Season 1949-50.* By E. L. Hawke and D. L. Champion. *J. Glaciol.*, London. I, 1951. pp. 516-26.

*Illus.* British Glaciological Society, London. Offprint. Price, 2s. 6d.

From its title one might wonder what connection this little pamphlet, which is reprinted from the *Journal of Glaciology*, has with marine meteorology, or what interests it has for seamen. The body of the report gives the results of voluntary observations made during the year in question by an

efficient and enthusiastic corps of voluntary observers ashore, and gives a word picture, month by month, of the snow conditions all over the British Isles.

The last two pages of the book, however, contain, for the first time in this annual record, details of snowfall at sea in British coastal waters. The observations have been obtained through the courtesy of Trinity House and with the co-operation of the Masters of 26 lightvessels in the North Sea, Channel and Bristol Channel, and thus the foundation has been laid for a series of annual statistics from the sea for comparison with those experienced ashore. Knowledge about snowfall, like that of rainfall, is important, and there is certainly a scientific value in having these statistics. During the year in question the figures showed that in the North Sea snowfall tended to be slightly less than on adjacent coasts. A maximum snowfall of eight days occurred at Barrow Deep and South Goodwin and a minimum of three days at Outer Gabbard, Mid Barrow, Tongue and Royal Sovereign. In the Bristol Channel areas it appears that the amount of snowfall at sea was similar to that on the adjacent coasts.

C. E. N. F.

*Radiolocation.* 4to. 10 in. × 8 in. pp. 16. *Illus.* Marconi International Marine Communication Co. Ltd. 2s. 6d.

This little booklet, issued by the Marconi International Marine Communication Company Limited, condenses in a very readable and graphical manner much useful information, taken from various technical articles and publications, about the use of radar from a navigational viewpoint. One of the references is to Commander Satow's article "Radar, Meteorology and Charts", which appeared in *The Marine Observer*, Vol. XX, No. 149. The booklet gives some excellent drawings, alongside P.P.I. photographs, showing how land and ship targets can be definitely identified, and goes on to explain about the various echoes which can be shown up on the P.P.I. from such meteorological phenomena as cloud and precipitation. The unmistakable picture on the radar screen that the vortex of a hurricane shows is brought out. Warning about the uncertain behaviour of ice as a target is emphasised.

The question of side lobe echoes and false echoes are briefly and clearly described, and the final chapter gives a very condensed and comprehensive picture about the effects of sub-refraction and super-refraction upon radar range.

The pamphlet rightly explains that no matter how efficient the instrument is, it is only by continuous practice that the observer can become really proficient in the use of radar, and that to gain confidence and familiarity practice should be carried out in clear weather, when visual checks can be made on the instrument.

C. E. N. F.

## PERSONALITIES

OBITUARY.—It is with regret that we record the death, at the early age of 53, of CAPTAIN J. B. McREYNOLDS, D.S.C., of the Union-Castle liner *Capetown Castle*. He was landed ill from the ship in Cape Town and died a few days later on the 17th August, 1951.

Educated in the *Conway*, McReynolds went to sea during the first World War and served afloat from 1915 to 1919 in the Royal Navy as a midshipman and later as a Sub-Lieutenant, R.N.R. He then made a few voyages to the East with the British India Steam Navigation Company before joining the Union-Castle Line as a junior officer in 1920, being appointed to his first command in that firm in 1945.

During the recent war he again served in the Royal Navy in command of L.S.T'S and took part in many of the important assault landings in North Africa, Sicily, Anzio and Normandy. He was awarded the D.S.C. for courage during the Italian landings.

A member of the Corps of Voluntary Marine Observers, Captain McReynolds has since 1928 contributed 13 meteorological logs, of which two have been classified "Excellent" and the remainder very good.

The writer of this short note knew him well. He was a good shipmate.

C. H. W.

RETIREMENT.—CAPTAIN W. A. PACE, O.B.E., retired after 41 years with the Union-Castle Line on the arrival of the *Stirling Castle* at Southampton on the 27th July, 1951.

Joining the company as a junior officer in 1910, after passing through the usual grades Captain Pace was appointed to his first command, the *Dundrum Castle*, in 1937. He subsequently commanded the *Llanstephan Castle* and in June, 1940, the *Llandovery Castle*, at that time a hospital ship, on service mainly in the Mediterranean. He spent some considerable time on the Alexandria-Tobruk run and his was the last ship to leave the harbour when Tobruk fell. It was for service during these operations that Captain Pace received his decoration.

Captain Pace's connection with the Marine Branch of the Meteorological Office dates back to the year 1930, when several logbooks were received bearing his name as an observing officer on the *Armada Castle*. As captain or observer he has been responsible for keeping a total of 18 meteorological logbooks, of which three have been assessed as "Excellent" and 14 as "Very Good".

Since May, 1945, Captain Pace has been on the mail service in command of the *Durban Castle*, *Winchester Castle* and since 1947 the *Stirling Castle*.

We wish him health and happiness in his retirement.

J. R. R.

RETIREMENT.—CAPTAIN SIR HENRY R. GORDON, K.B., D.S.C., of the Shaw Savill liner *Dominion Monarch*, retired from the company's service when his ship arrived in London in August, 1951.

H. R. Gordon commenced his sea career in sail at the age of 16 as an apprentice in the full-rigged ship *Fitzjames*, owned by Messrs. W. Montgomery of London, and was later Second Mate of the barque *Rollo*, owners J. I. Jacobs & Co. of London.

He joined the Shaw Savill & Albion Co. Ltd. in 1910 as Fourth Officer, and was promoted through the usual ranks until in 1919 he was appointed to the command of the *Waiwera*. He subsequently commanded a number of the company's vessels and since January, 1943, was in the *Dominion Monarch*.

Captain Gordon's ship the *Wairangi* was sunk in the Malta convoy action of August, 1942, and it was for his conduct on that occasion that he received the Distinguished Service Cross. He was knighted for war services in the New Year's Honours List of January, 1944.

Since 1932 ships under his command have, as Selected Ships, continuously contributed logbooks to the Meteorological Office, except for the war years. Out of a total of 24 logs bearing his name no less than 14 have been assessed as "Excellent", and Captain Gordon was the recipient of Excellent Awards in 1948 and 1950.

We wish him health and happiness in his retirement.

C. H. W.

RETIREMENT.—CAPTAIN W. J. WILLIAMS, of the M.V. *Gothic*, has retired from the service of the Shaw Savill line on attaining the age limit.

He joined the service of the Aberdeen Line as Third Officer of the S.S. *Norseman* in 1911 and later served in the steamers *Themistocles*, *Miltiades* and *Demosthenes*, in which latter vessel he was promoted to command in 1923. In 1925 he was in command of the *Heratius* and was in that ship when the company amalgamated with Shaw Savill & Albion.

A number of vessels under Captain William's command were at times on the list of voluntary observers for the Meteorological Office. Since 1924 a total of 18 logbooks have been received bearing his name, six of which have been assessed as "Excellent".

We wish him a healthy and happy retirement.

C. H. W.

RETIREMENTS.—During 1951 two well-known Marine Superintendents of London shipping companies have retired. They are CAPTAIN R. J. HOWIE, of



Messrs. Andrew Weir & Co. Ltd., and CAPTAIN J. P. THOMSON, of the Eagle Oil & Shipping Co. Ltd.

Captain Howie retired in June after the remarkably long service of 54 years afloat and ashore in the one company. He first went to sea as an apprentice in 1879 in the four-masted barque *Beechbank*, in which ship he completed his "time". He then served in several of the company's steamers and quickly rose to command. In 1914 he was made Marine Superintendent in Durban, and was later in the same post in New York. Then from 1925 to 1951 Captain Howie was the company's Marine Superintendent in London.

Captain Thomson retired in July after 17 years as Marine Superintendent of the Eagle Oil Company. He had joined the company as Third Officer in 1914 and served 20 years afloat, 16 of them in command. In 1917 he was Chief Officer of the *San Lorenzo* when she was torpedoed, but was brought into port under her own steam. As Marine Superintendent he later had much to do with the design and construction of new ships and with planning berthing facilities in out of the way places.

For a good many years a number of vessels of both the companies have appeared regularly in the Meteorological Office lists of voluntary observing ships. Although we have no record of either of these gentlemen having actually observed for the British Meteorological Office, they were always, in their capacities as Marine Superintendents of large companies, most helpful and interested in the work. We wish both of them health and happiness in their retirement.

C. H. W.

### LIGHTHOUSES OF THE BRITISH ISLES



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DUBH ARTACH

Dubh Artach, or St. John's Rock, is the largest of a group of rocks lying in the southern approaches to the Sound of Iona, about 22 miles SE of Skerryvore Lighthouse. These rocks are open to the full fury of the Atlantic, and it is recorded that during the building of the lighthouse, one gale produced waves which carried away 11 stones each weighing 2 tons from a height of 36 ft. on the partially completed structure. Special precautions were taken to make the tower secure, and it is built solid to a height of 64 ft. above sea level. The lighthouse, of grey granite painted with a red band, shows a group flashing light visible for 18 miles and is equipped with an explosive fog signal.

FLEET LIST (Great Britain)  
VOLUNTARY OBSERVING SHIPS

The following is a list of British ships voluntarily co-operating with the Marine Branch of the Meteorological Office. The names of the Captains, Observing Officers and Senior Radio Officers are given as ascertained from the last written returns received. The date of receipt of the last return received is given in the third column.

All returns received from observing ships will be acknowledged, direct to the ship, by the Marine Superintendent.

The Port Meteorological Officers and Merchant Navy Agents at the ports will make personal calls on the Captains and Observing Officers as opportunity offers, or on notification from the ship at any time when their services are desired. (See under Notices to Marine Observers.)

Excellent awards are made at the end of each financial year. The names of the Captains, Principal Observing Officers and Senior Radio Officers gaining these awards are published in a special list in *The Marine Observer*.

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

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

Selected Ships

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Actra</i>	GJSW	3.8.51	A. G. Baptiste	R. E. Liptrout, J. Chaplin	J. Stewart	Elder Dempster Lines, Ltd.
<i>Afghanistan</i>	GNVB	17.4.51	R. Conacher	J. Arthur, S. W. Jones, J. Salter	P. Cymmer	F. C. Strick & Co., Ltd.
<i>African Queen</i>	ZBCY		A. Noble	W. H. Eardley, G. Wood, G. Irons	J. Milton	Colonial Development Corporation
<i>Ajania</i>	GKVV	7.9.51	F. W. Mould	R. Brewster, F. Stenhouse, J. Billings		Trinder, Anderson & Co.
<i>Ajax</i>	GJXM	8.10.51	P. A. Hanney	P. Hopper, S. Barbour, K. Barnett, H. Bowers, D. S. Moreby	A. H. Kirkby	A. Holt & Co.
<i>Akaroa</i>	GMLP	4.4.51	J. W. Hart	P. G. Clifford		Shaw, Savill & Albion Co., Ltd.
<i>Alcantara</i>	GLQR	1.5.50	H. D. Hooper, O.B.E.	P. Sykes, R. L. Hunter, J. Parks	R. E. Hammond	Royal Mail Lines, Ltd.
<i>Alcyone Fortune</i>	MAQC	14.3.51	G. E. Milne	L. J. Paul, J. L. Paine, K. Bouic	T. Hopwood	Alcyone Shipping Finance Co., Ltd.
<i>Alsatia</i>	MABL		F. G. Watts, R.D., R.N.R.	A. Bull, R. Mansan, F. Diggle, D. Rostrom	J. Hinds	Cunard Steamship Co., Ltd.
<i>Amakura</i>	MCPN	17.2.51	S. Armitage	K. Garrett, J. London, J. H. Donaldson	I. R. Davies	Booker Bros., McConnell & Co., Ltd.
<i>Amastra</i>	GYDD	4.4.51	L. E. Clayton	R. Hedley, C. Close, R. J. Bizzey	R. Lacy	Anglo-Saxon Petroleum Co., Ltd.
<i>Amersham</i>	GNTQ	27.2.51	A. Spence	T. Brand, E. T. Ward, J. Frain	A. Bateman	Thompson S.S. Co., Ltd.
<i>Andes</i>	GQCV	25.6.51	G. A. Bannister	W. Wheatley, G. Wright, F. M. Dickenson	W. Smith	Royal Mail Lines, Ltd.
<i>Apapa</i>	MACE	2.6.51	W. Hunt	F. Grayson, D. Thompson, W. M. Crossman		Elder Dempster Lines, Ltd.
<i>Arabia</i>	GLKF	8.7.50	J. Chapman, R.D., R.N.R.	K. D. A. Lamb, K. T. Jones, P. Brush	B. A. Long	Cunard Steamship Co., Ltd.
<i>Arabistan</i>	GCKK	29.5.51	J. E. Cooke	D. Calvert, T. Dumont, A. Norris	P. Hannon	F. C. Strick & Co., Ltd.
<i>Araby</i>	GMZL	24.7.51	F. J. Swallow	C. J. S. Morris, K. Finlison, —, Acaon, M. G. Royd	W. Comming	Royal Mail Lines, Ltd.
<i>Arakaka</i>	GDVN	1.10.51	A. A. Gerrard	H. Adler, A. H. Harley, R. G. C. Roberts	B. Cato	Booker Bros., McConnell & Co., Ltd.
<i>Arava</i>	GSMN		W. G. West	D. M. McLean, B. Hammond, F. E. Sangster, T. S. Hayward		Shaw, Savill & Albion Co., Ltd.
<i>Argentina Star</i>	GTKF	18.5.51	E. R. Pearce, O.B.E.	A. G. Smith, M. J. Slessor, H. Hewson	J. McBride	Blue Star Line, Ltd.
<i>Argyll</i>	GBWB	8.8.51	A. W. Fielding	R. Muir, J. Dodds, L. Lumley	R. Greenhaugh	B. J. Sutherland & Co., Ltd.
<i>Ariguaní</i>	GMBL	8.10.51	G. S. Gracie	R. M. Burns, T. G. Crane, E. G. Whitehouse	A. N. Taylor	Elders & Fyffes, Ltd.

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Armada</i> ..	GMCR	22.3.51	E. J. Ridout	W. L. Babbs, J. Baxter, G. C. Elvidge ..	E. W. Harle ..	Trinder, Anderson & Co.
<i>Arundel Castle</i> ..	GCZL	25.8.51	J. Trayner	R. T. Jacques, G. D. Atwood, H. J. Norman, I. McPherson ..	E. Pitt ..	Union-Castle Mail S.S. Co., Ltd.
<i>Ascania</i> ..	GKNJ	20.3.51	A. MacKellar, R.D., R.N.R.	A. G. Broster, P. J. Mullen, P. Gadsden ..	H. Milligan ..	Cunard Steamship Co., Ltd.
<i>Ashburton</i> ..	GNJN	25.7.51	R. Willcocks	W. Stenhouse, R. Mattingley, H. McGill ..	J. Newlyn ..	Trinder, Anderson & Co.
<i>Asia</i> ..	GLJV	19.6.51	W. B. Tanner, R.D., A.D.C. R.N.R.	P. Miller, A. H. West, T. C. Counsell ..	J. Marshall ..	Cunard Steamship Co., Ltd.
<i>Assyria</i> ..	GGKX	7.9.51	F. Watts, R.D., R.N.R.	L. Portet, J. Dormer, H. Parry-Williams ..	R. Farrell ..	Cunard Steamship Co., Ltd.
<i>Asurias</i> ..	GLQS	16.1.50	B. C. Dodds, O.B.E.	G. B. Paynes, G. S. Bonner, A. V. Keen ..	W. Bradbury ..	Royal Mail Lines, Ltd.
<i>Athelchief</i> ..	GCRG	4.1.50	J. H. Flockhart	R. V. Parkiss, N. Jones, A. Green ..	A. Williams ..	Tankers, Ltd.
<i>Athelregent</i> ..	GQWL	4.1.50	J. A. Russell	R. Nicholson, R. McGregor, W. H. Buckle ..	W. Williams ..	Athel Line, Ltd.
<i>Athenic</i> ..	GBLS	16.8.51	B. Forbes-Moffatt ..	J. K. Mudd, —, Beck, P. N. Harkness, J. Tierney ..	H. Knight ..	Shaw, Savill & Albion Co., Ltd.
<i>Athlone Castle</i> ..	GYTK	10.5.51	C. C. Page ..	J. Pither, F. J. Pigeon, J. Fellow ..	J. H. Summers ..	Union Castle Mail S.S. Co., Ltd.
<i>Auricula</i> ..	GKPV	9.10.51	A. Thompson	R. L. Wood, M. L. De Lacroix, N. Courmow ..	H. D. Bray ..	Anglo-Saxon Petroleum Co., Ltd.
<i>Atlantis</i> ..	GLTM	28.7.51	S. J. G. Hill	M. Mortimer, J. Baxter, J. Kavanagh, N. Lawson ..	H. Matthews ..	Royal Mail Lines, Ltd.
<i>Australia Star</i> ..	GYCS	25.9.51	R. White ..	J. Harris, H. Windle, J. Hutton ..	N. Aldersley ..	Blue Star Line, Ltd.
<i>Australind</i> ..	GJKF	20.7.51	S. Payne ..	S. Leggate, D. Giles, H. Smith ..	R. Brown ..	Trinder, Anderson & Co.
<i>Avistone</i> ..	GBSV	9.8.51	A. D. Niblett	J. Logie, A. Armour, W. K. Kent ..	L. R. Bradley ..	Purvis Shipping Co., Ltd.
<i>Avondene</i> ..	MAWG	8.9.51	F. Moorcroft	W. T. Williams, D. G. Powell, C. D. Arthur ..	D. Gillow ..	Dene Shipping Co., Ltd.
<i>Balaena</i> ..	GLDG		P. Virik ..	—, Christoffersen, —, Bentzen, A. Andersen ..		United Whalers, Ltd.
<i>Balanita</i> ..	GBNM	30.6.51	H. Davies ..	W. A. Tresidder, C. C. Cowley, J. H. Evans ..	K. G. Arthur ..	Royal Mail Lines, Ltd.
<i>Baron Elphinstone</i> ..	GCCD	20.4.51	T. Scott ..	W. H. White, J. S. Heptinstall, J. Rennie ..	C. Clifford ..	H. Hogarth & Sons
<i>Baron Fairlie</i> ..	GLCY		T. R. Reid ..	J. E. Gordon, T. H. Macdonald, R. A. Hughes, R. E. Forrester ..	J. Browne ..	H. Hogarth & Sons
<i>Baron Maclay</i> ..	GKXW	12.9.51	R. Gibson ..	J. S. Cameron, E. Molder ..	L. McGivern ..	H. Hogarth & Sons
<i>Bassano</i> ..	GNXK	28.12.50	C. H. Tutty	J. T. Trezise, A. Robinson, A. B. Jackson ..	D. Withers ..	Ellerman's Wilson Line, Ltd.
<i>Beaverburn</i> ..	MAGB	28.7.51	R. A. Leicester, O.B.E.	G. W. R. Graves, S. Fieldhouse, J. A. Edwards, R. J. Stewart ..	J. B. Smith ..	Canadian Pacific S.S., Ltd.
<i>Beavercove</i> ..	GNLX	22.2.51	C. L. de H. Bell, D.S.C., R.D., R.N.R.	T. E. Morris, R. Jones, F. Surtees, —, Bateman ..	A. R. Porter ..	Canadian Pacific S.S., Ltd.
<i>Beaverdell</i> ..	GBBS	2.6.51	D. Parsons, R.D., Cdr., R.N.R.	W. E. Williams, R. Savage, R. M. Stewart, A. Peace ..	L. Norton ..	Canadian Pacific S.S., Ltd.
<i>Beaverford</i> ..	MQJG	8.7.50	L. C. Barry ..	J. Gallagher, J. A. Edwards, D. Wallace ..	T. Ainsworth ..	Canadian Pacific S.S., Ltd.
<i>Beavergleng</i> ..	GBCP	1.3.51	W. R. Thorburn ..	—, Walgate, R. Savage, J. P. Jones, P. Ainsworth ..	S. Caughey ..	Canadian Pacific S.S., Ltd.
<i>Beaverlake</i> ..	GBCQ	10.8.51	J. Soame ..	T. Sargent, J. Waling, J. P. Jones, J. Richardson ..	A. E. S. Thompson ..	Canadian Pacific S.S., Ltd.
<i>Benarty</i> ..	GCZZ	8.10.51	T. Sutherland	A. King, B. Stark, L. Chandler, J. Peyton-Bruhl ..	R. Dixon ..	W. Thomson & Co.
<i>Bendoran</i> ..	GCJN	28.11.50	H. F. Mason	A. Addison, W. Watson, J. Wisden ..	J. E. Kemp ..	W. Thomson & Co.

<i>Bennthor</i>	..	GDVV	8.10.51	J. P. Robertson	..	H. C. Chafer, G. R. Bannerman, B. B. Erskine	P. V. Richmond	W. Thomson & Co.
<i>Bennevis</i>	..	MAGG	5.7.51	T. McL. Blaikie	..	J. Forbes, A. Hall, M. Mathie	A. Pagan	W. Thomson & Co.
<i>Benvianno S.</i>	..	GCDZ	21.6.51	A. M. Robertson	..	N. J. Mackie, R. G. Faulkner, J. Ritchie, J. Brown	E. Carruthers	W. Thomson & Co.
<i>Benurackie</i>	..	GBTZ	11.7.51	J. C. Allen	..	A. J. King, I. Welsh, S. Roger	J. L. Wells	W. Thomson & Co.
<i>Benayvis</i>	..	MYPW	25.9.51	K. Hardie	..	W. W. Creber, M. Mathie, — Syme	D. Milne	W. Thomson & Co.
<i>Blacoe</i>	..	GDCW	26.9.51	W. Orrell	..	C. G. Stiff, O. McCurdy, A. Wilkinson, J. Beal	J. Harrison	Hector Tankers, Ltd.
<i>Boyn-ton Wyke</i>	..	GBZV	15.11.50	G. Glixby	..	R. G. Taylor, B. Macphail, T. Ripley, J. B. Hall	T. Murdock	West Dock Steam Fishing Co., Ltd.
<i>Brasil Star</i>	..	GTLF	14.11.50	G. C. Barnard	..	F. Barnes, H. Jardine, R. Martin	R. Newton	Blue Star Line, Ltd.
<i>Bravo</i>	..	GLDZ	18.7.51	F. Mason	..	J. M. Cree, M. J. Glover, D. N. Murray, J. Coultas	R. G. Thomson	Ellerman's Wilson Line, Ltd.
<i>Brisbane Star</i>	..	GZCJ	..	S. Foulkes	..	C. Lofthouse, D. M. Wilton, E. R. Ashbury	J. Sheppard	Blue Star Line, Ltd.
<i>Bristol City</i>	..	GUAY	..	A. L. Webb, O.B.E.	..	E. Diggle, R. Hunt, M. Dodds	J. R. S. Kidson	Charles Hill & Sons.
<i>Britannic</i>	..	GDXF	1.1.51	R. Sell, R.D., R.N.R.	..	L. Ashburn, T. Skuse, J. McMillien	C. R. Currier	Cunard Steamship Co., Ltd.
<i>British Colonel</i>	..	GFDB	7.3.51	W. F. Beddison	..	D. S. Buckley, P. N. Dawson	D. McDiarmid	British Tanker Co., Ltd.
<i>British Endeavour</i>	..	GFCN	10.8.51	H. J. Were	..	J. Candlish, I. Colville, E. Powell	A. E. Adams	British Tanker Co., Ltd.
<i>British Endurance</i>	..	MLZM	20.9.51	R. T. C. Wright	..	R. G. Dunn, D. McFarlane, R. W. Clarke, K. D. Curtis	C. Henry	British Tanker Co., Ltd.
<i>British Escort</i>	..	GCRB	1.3.51	H. H. Burke	..	W. Mills, C. Byrne, E. Glover	J. Kennedy	British Tanker Co., Ltd.
<i>British Lancer</i>	..	MAGS	13.4.51	A. Fielding	..	R. D. Tinson, J. Clarke, N. Rutherford	A. G. Martin	British Tanker Co., Ltd.
<i>British Marquis</i>	..	GWVL	7.8.51	W. C. Wall	..	L. W. Twemlow	J. Martin	British Tanker Co., Ltd.
<i>British Pattence</i>	..	GUFF	2.6.50	W. Jackson	..	J. Picken, N. P. Elliott, M. H. Baker	O. Brunjes	British Tanker Co., Ltd.
<i>British Piper</i>	..	GDNN	24.7.51	T. P. Brown	..	A. Fraser, P. F. Mason, E. C. Ford	F. G. Rimmington	British Tanker Co., Ltd.
<i>British Power</i>	..	GZGG	15.10.48	K. M. Mitchell	..	I. O'Kane, G. M. McLeod, D. Ritchie	P. E. Rowe	British Tanker Co., Ltd.
<i>British Resource</i>	..	GFGD	16.8.51	F. W. Walton	..	C. Symons, C. Hindes	A. V. Cowser	British Tanker Co., Ltd.
<i>British Statesman</i>	..	GNJR	16.8.51	E. Hornby	..	C. D. Brown, A. G. Tantram, E. R. Ryan	R. M. McWhirter	British Tanker Co., Ltd.
<i>British Swordfish</i>	..	GQVQ	13.4.51	L. G. Tanner	..	C. D. Ratcliff, J. T. Bland, B. A. Wood	P. Mahoney	Royal Mail Lines, Ltd.
<i>Brittany</i>	..	GMZS	14.11.50	G. M. Fletcher	..	J. K. Venus, W. Pattison, J. R. Jenkins	J. Pryor	Walter Runciman & Co., Ltd.
<i>Brockley-moor</i>	..	GDWP	29.5.51	D. J. Jones	..	M. F. Fair, D. Hazall, T. Flack	W. P. Greaves	Lampport & Holt Line, Ltd.
<i>Byron</i>	..	GNFL	26.7.50	J. Byrne	..	C. Sutherland, G. H. Percy, S. R. Bell	E. Johnston	Cairns, Noble & Co.
<i>Cairnavon</i>	..	GPIN	24.5.51	J. W. Scott	..	J. Hogg, W. Gordon, A. Farley	T. W. Lawson	Cairns, Noble & Co.
<i>Cairnesk</i>	..	GMIK	25.4.51	I. G. Foster	..	N. E. Forth, J. Labban, R. R. Campbell, D. Prudham	S. J. D. Taylor	Anchor Line, Ltd.
<i>Cairnvalona</i>	..	GQKM	5.9.50	G. R. Norvell	..	T. L. Langlands, N. McFarlane, W. S. Thompson, O.B.E., J. Dunnipace	D. Thompson	P. & O. Steam Navigation Co.
<i>Caledonia</i>	..	GCKR	30.8.51	E. J. Stormont, M.B.E.	..	H. McLean, G. Moncrief, H. Jones, P. B. Young	P. Macarthy	West African Fisheries Research Institute
<i>Cameronia</i>	..	GDXS	9.8.51	A. C. Johnston	..	M. M. O'Connell, H. L. Fisher, A. K. Langley	J. Gilbart	Lyle Shipping Co., Ltd.
<i>Canton</i>	..	GDDT	6.9.51	G. Stable	..	R. Davison, R. Couth, S. Liddle	S. J. Pepler	Union Castle Mail S.S. Co., Ltd.
<i>Cape St. Mary</i>	..	..	..	J. A. Robson	..	G. W. John, J. V. B. Buckland, A. A. McCaule	W. Brown	R. Chapman & Son
<i>Cape York</i>	..	GCZS	27.1.51	J. S. Binne	..	W. K. Tanewski, — Benson, — Quinn	G. Parsons	Union Castle Mail S.S. Co., Ltd.
<i>Capetown Castle</i>	..	GKGM	1.8.51	H. A. Deller	..	T. B. Schmidt, P. Muir	W. H. Chick	Cunard Steamship Co., Ltd.
<i>Carlton</i>	..	GIFE	2.8.51	T. H. Main	..	I. Brice, N. McAllister, C. Nicholson	C. Cornish	Peninsular & Oriental Steam Nav. Co.
<i>Carnarvon Castle</i>	..	GJSL	17.1.51	J. F. Oakley	..	D. Parsons, T. Smith, B. B. Jones	..	Runciman (London), Ltd.
<i>Canoria</i>	..	GYSL	18.5.51	C. L. Thomson	..	P. Robinson, J. I. Aitken, F. J. Hamilton	..	..
<i>Carthage</i>	..	GRNX	12.8.50	E. R. Bodley	..	..	..	..
<i>Caston</i>	..	MCJR	6.3.51	J. M. Cherry	..	..	..	..

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Cavina</i> ..	GKRV	4.9.51	T. H. Bull	W. Young, J. H. Payne, N. Abbot, A. E. T. Hunter ..	E. A. Loft ..	Elders & Fyffes, Ltd.
<i>Caxton</i> ..	GCDX	13.4.51	R. J. Longley	B. Bromfield, —, Thompson ..	A. Austin ..	Runciman (London), Ltd.
<i>Ceramic</i> ..	GFLM	1.10.51	A. V. Richardson	D. E. Hamerton, R. Frisdy, T. de M. Ogier, G. Perry ..	H. V. Littlecott ..	Shaw, Savill & Albion Co., Ltd.
<i>Cerintus</i> ..	GCRM	4.9.51	J. F. Auld ..	C. J. Welch, M. Hart, —, Denyer, —, Foot ..	—, Patterson ..	Houlder Bros. & Co., Ltd.
<i>Cheshire</i> ..	GLXV	1.10.51	P. H. Potter	A. E. Young, J. R. Longrigg, H. Traynor ..	J. L. Banks ..	Bibby Bros. & Co.
<i>Chinatown</i> ..	GFRT	28.8.51	B. A. Rogers, D.S.C., R.D.	F. Bell, B. Brooking, H. N. Severs, —, Wells ..	R. C. Law ..	British Indian Steam Nav. Co., Ltd.
<i>Chitral</i> ..	GLKN	6.2.51	G. C. Forrest, R.D., Cmde., R.N.R. ..	—, Adv., —, Beaumont, —, Crone ..	L. D. Waterhouse ..	P. & O. Steam Navigation Co.
<i>Cilicia</i> ..	GDGL	24.7.51	J. L. Gibson	D. Lamont, G. Ramage, J. Barclay ..	F. Alcock ..	Anchor Line, Ltd.
<i>Cingalese Prince</i> ..	GFRC	31.7.51	J. D. Fraser	R. Murphy, R. A. Coombes, H. E. Jennings, K. Slapp, J. W. Baston ..	S. A. Rawlinson ..	Prince Line, Ltd.
<i>City of Barcelona</i> ..	GTKR	8.12.50	N. Groundwater ..	W. E. James, R. Fields, R. E. Greenwood, A. Bember ..	—, Cowan ..	Ellerman Lines, Ltd.
<i>City of Bristol</i> ..	GCPN	7.9.50	T. F. Labey	W. Paton, O. Henderson, J. D. Baillie ..	T. Gaffney ..	Ellerman Lines, Ltd.
<i>City of Calcutta</i> ..	GLYX	13.4.51	M. L. Herman, M.B.E.	D. Wardlaw, D. L. Kinley, —, Ramage ..	D. Cross ..	Ellerman Lines, Ltd.
<i>City of Cape Town</i> ..	GBBQ	7.7.51	W. R. Pinchbeck	W. J. Lee, M. B. Perry, D. R. Townson ..	A. L. Pews ..	Ellerman Lines, Ltd.
<i>City of Carlisle</i> ..	GBJK	29.5.51	W. A. Hannah, O.B.E.	R. A. Jones, J. Terres, D. A. Williams, W. McMillan ..	F. Dobbie ..	Ellerman & Bucknall S.S. Co., Ltd.
<i>City of Chester</i> ..	MAHN	13.7.51	E. M. Robertson ..	A. A. Ramsden, R. F. Moon, N. Paskin ..	A. R. Childe ..	Ellerman Lines, Ltd.
<i>City of Delhi</i> ..	GLBW	12.9.51	D. C. Hamilton	J. P. Mason-Price, N. A. C. Smith, R. A. Reid ..	M. F. Page ..	Ellerman Lines, Ltd.
<i>City of Derby</i> ..	GFWC	13.6.51	G. J. Law, O.B.E.	P. Turner, —, Clark, G. W. White ..	—, Dean ..	Ellerman Lines, Ltd.
<i>City of Dieppe</i> ..	GSVQ	20.2.51	E. G. Chapman	J. F. Thompson, E. G. A. Smith, B. Ramage, R. I. Thulson ..	R. C. Lowen ..	Ellerman Lines, Ltd.
<i>City of Durham</i> ..	GBJM	9.7.51	H. G. Williams, O.B.E.	N. F. Ayers, D. S. Taylor, A. I. Crossland, J. Cowper ..	H. Wilson ..	Ellerman Lines, Ltd.
<i>City of Evansville</i> ..	GJNF	13.7.51	A. M. Westlake	C. T. Heywood, K. Jones, W. F. Cannell ..	B. Kennedy ..	Ellerman Lines, Ltd.
<i>City of Johannesburg</i> ..	GBKW	1.1.51	W. H. Matheson, O.B.E.	R. B. May, J. A. Irvine, J. I. Owen ..	A. R. Henderson ..	Ellerman Lines, Ltd.
<i>City of Khartoum</i> ..	GBZC	14.6.50	J. A. Kinley	B. Walker, I. McDermid, T. R. Phinn, D. W. Asquith ..	J. Lord ..	Ellerman Lines, Ltd.
<i>City of Lille</i> ..	GSLN	25.9.51	W. A. Owen	R. H. Bellhouse, W. H. Holden, J. A. Buchanan ..	C. Pickles ..	Ellerman Lines, Ltd.
<i>City of Lyons</i> ..	GMCN	3.8.51	C. G. Griffith	P. R. Skelton, B. Jones, R. G. Lewis ..	W. Thompson ..	Ellerman Lines, Ltd.
<i>City of New York</i> ..	GLYQ	25.7.51	S. L. Houre, O.B.E.	J. L. Blanch, —, Chapman, V. W. Pennington, W. Tooley, J. R. Lowe, R. C. Thomas ..	R. Douglas ..	Hall Line, Ltd.
<i>City of Paris</i> ..	GFQM	1.5.51	H. Percival, O.B.E.	W. Dick, I. S. McGregor, —, Faulkner, —, McTigue ..	B. J. Holyoake ..	Ellerman Lines, Ltd.
<i>City of Pretoria</i> ..	GBLN	18.6.51	A. G. Freeman	J. R. Marking, I. McBeth, A. G. Smith, D. Lightly ..	J. Booth ..	Ellerman & Bucknall S.S. Co., Ltd.
<i>City of Swansea</i> ..	GBZT	25.9.51	F. J. H. T. Vizer	F. C. O'Neil, C. J. Appleton, A. K. Earl, D. Matthias ..	L. D. Beatty ..	Ellerman Lines, Ltd.
<i>City of Sydney</i> ..	GSEM	24.8.49	H. Johnson	B. Walker, J. Blanch, E. E. Cooper ..	H. D. Smythe ..	Ellerman Lines, Ltd.
<i>City of Windsor</i> ..	GIYR	10.5.51	T. L. Vaughan	H. Lewis, E. R. Crossley, T. Keer ..	W. C. Huyton ..	Ellerman & Bucknall S.S. Co., Ltd.
<i>Clem Brodie</i> ..	GKPD	28.3.50	B. Vernon-Browne	J. L. Jones, I. A. Williamson, W. D. B. Davidson ..	F. P. F. Lawton ..	Cayzer, Irvine Co., Ltd.



Clan Buchanan	..	GKNM	28. 7. 51	J. Forster ..	B. Edwards, E. Cox, J. Beacock ..	W. Harper ..	Cayzer, Irvine Co., Ltd.
Clan Campbell	..	GDZK	20. 2. 51	J. McCrone ..	J. Stormont, W. L. Muir, W. H. J. Dilks ..	R. F. Cole ..	Cayzer, Irvine Co., Ltd.
Clan Chattan	..	GFBX	7. 7. 51	A. G. McPherson ..	E. Cox, G. A. Berry, A. P. Sweeney ..	E. Shillabeer ..	Cayzer, Irvine Co., Ltd.
Clan Chisholm	..	GFBY	13. 8. 51	R. B. Linsley ..	C. A. Thomas, D. R. Godfrey, S. J. Bedford ..	H. G. P. Macnamara ..	Cayzer, Irvine Co., Ltd.
Clan Davidson	..	MAWU	3. 10. 50	T. A. Watkinson ..	D. S. Williams, J. Molyneux, D. Richards ..	J. E. Appleton ..	Cayzer, Irvine Co., Ltd.
Clan Forbes	..	GPGB	9. 8. 51	W. R. Woodtriffe ..	R. D. Helme, J. S. Cumming, J. S. Catteral, G. M. Spiers ..	W. G. Peddie ..	Cayzer, Irvine Co., Ltd.
Clan Macaulay	..	GZCS	12. 7. 49	A. G. Storkey ..	S. K. Young, J. Arnott, G. Gann ..	J. Ormerod ..	Cayzer, Irvine Co., Ltd.
Clan Mac Donald	..	GCPG	5. 7. 51	H. Cater ..	J. Walker, T. Hunter, A. M. Vaughan ..	G. Martyn ..	Cayzer, Irvine Co., Ltd.
Clan Mac Dougall	..	GFBQ	11. 8. 51	P. MacMillan ..	A. Elston, G. R. Thomas ..	C. E. C. Crew ..	Cayzer, Irvine Co., Ltd.
Clan Mackinnon	..	GK LX	17. 8. 51	S. S. Davidson ..	M. J. Skillington, R. A. Green ..	J. D. Brosman ..	Cayzer, Irvine Co., Ltd.
Clan Mac Laren	..	GSSC	3. 10. 51	A. Redford, Capt., R.N.R.	A. L. Pitts, A. T. Campbell, A. S. W. Grant ..	R. W. Moore ..	Cayzer, Irvine Co., Ltd.
Clan Mac Nair	..	GFNK	6. 7. 51	J. P. Dumphy ..	— Chittock, E. Coutts ..	— Brooks ..	Cayzer, Irvine Co., Ltd.
Clan Mac Neill	..	GFWP	13. 6. 51	J. West ..	G. Rowland, B. Edwards, J. Halton ..	T. Hunter ..	Cayzer, Irvine Co., Ltd.
Clan Macrae	..	MAHP	13. 4. 51	E. Coulthart ..	M. Lewis, T. Atchison, D. S. M. Tosh ..	R. D. Pringle ..	Cayzer, Irvine Co., Ltd.
Clan Mac Tavish	..	GUBB	14. 11. 50	A. MacIntyre ..	P. L. Plateau, C. B. Owen, T. L. Easton, E. M. Phelps ..	W. A. Ellmers ..	Cayzer, Irvine Co., Ltd.
Clan Shaw	..	GBYW	25. 6. 51	R. P. Galer ..	A. J. R. Tyrrell, A. M. Kennedy, W. Siles, J. Adair ..	G. H. Hudd ..	Cayzer, Irvine Co., Ltd.
Clan Sutherland	..	GFWZ		H. J. Anchor, O.B.E., A.D.C., R.D., R.N.R. ..	L. W. Gibbins, N. F. Wray-Cook, S. M. Grant ..		Cayzer, Irvine Co., Ltd.
Clan Urquhart	..	GFBK	31. 5. 51	T. W. Inman, O.B.E. ..	W. Graham, J. M. Shearer, P. Leslie ..	A. F. McIntyre ..	Cayzer, Irvine Co., Ltd.
Clearpool	..	MAHQ	16. 4. 51	J. Whamond ..	G. Raccliffe, J. Forrest, D. Parker ..	E. Wrighton ..	Sir R. Ropner & Co., Ltd.
Clydebank	..	GKLM	3. 7. 51	J. E. Allen ..	M. Pender, H. K. Stevens, C. V. Sawyer ..	G. Murphy ..	Andrew Weir & Co., Ltd.
Columbia Star	..	GOGT	28. 8. 51	M. B. M. Tallach, O.B.E. ..	L. Graham, M. K. Drummond, H. Dyer ..	A. Evans ..	Blue Star Line, Ltd.
Comitibank	..	GK LJ	6. 2. 51	J. Townsley ..	J. Donald, W. Ellarby, J. P. Edmiston ..	R. Bodeman ..	Andrew Weir & Co., Ltd.
Condasa	..	MAHU	6. 6. 51	H. Heal ..	R. Tinnmouth, G. Boothly, E. White ..	T. McNamara ..	Furness-Houlder Argentine Lines, Ltd.
Consuelo	..	GCGQ	12. 9. 51	H. Greenhill ..	D. J. C. Martin, R. Ball, P. Ramsay, J. Weatherston ..	T. Goodman ..	Ellerman Wilson Line, Ltd.
Corfu	..	GRNW	14. 8. 51	E. F. Ferraby ..	D. Johnstone, D. I. Parsons, D. J. Knight, J. B. Newman ..	J. T. Macdonald ..	P. & O. Steam Navigation Co.
Corinthic	..	GZYL	29. 8. 51	G. M. Robertson, D.S.C. ..	L. M. Howells, F. Packman, B. Cavendish ..	J. W. Soulsby ..	Shaw, Savill & Albion Co., Ltd.
Corrales	..	GSJL		W. J. Dodd ..	D. C. Jones, C. Abbott, J. Hallinan, K. J. Leslie ..		Elders & Fyffes, Ltd.
Corrientes	..	GPPT	8. 10. 51	W. Anderson ..	R. S. Aitken, H. Leitch, Q. K. Paul, J. H. Stark ..	W. S. Vaughan ..	Donaldson Bros. & Black, Ltd.
Coulgorm	..	MAHZ	21. 3. 51	G. Robison ..	C. Hardy, A. Jones, J. Buchanan ..	J. Crowley ..	Lambert Bros., Ltd.
Craftsman	..	GPZT	7. 9. 51	W. F. O'Neill ..	W. E. Williams, W. C. Stoddart, F. L. Steele ..	P. Goulden ..	T. & J. Harrison
Cumberland	..	GPPY	13. 4. 51	J. S. Oxhard ..	— Fulcher, G. Wotton, — Hughes, A. Sewell ..		Federal Steam Navigation Co., Ltd.
Cuthbert	..	GFNW	23. 6. 49	A. Good, D.S.C. ..	J. P. Evans, H. Nish, J. L. Lynch ..	T. Laing ..	Booth S.S. Co., Ltd.
Cusco	..	GKPF	1. 10. 51	R. D. S. Eckford ..	A. Festico, W. Johnston, G. Pattison ..	D. Swindon ..	Pacific Steam Navigation Co.
Daleby	..	MFBV	13. 6. 51	J. Kenny ..	E. A. Snaith, E. J. Middleton, N. A. H. Oates ..	F. Murrant ..	Ropner Shipping Co., Ltd.
Dallas City	..	GCLS	11. 10. 51	C. E. Exton ..	E. Thomas, R. Vinton, P. Bartlett ..	M. Carney ..	Sir William Reardon Smith & Sons, Ltd.
Darro	..	MAID	8. 8. 51	T. Powell ..	W. Kennedy, J. Holt, W. Jones ..	D. J. Barnes ..	Royal Mail Lines, Ltd.
Debrett	..	GRPR	18. 10. 50	W. J. M. Ankers ..	W. A. Ansdell, R. J. Garcia, R. M. Dunning ..	H. Heenay ..	Lampport & Holt Line, Ltd.
Deebank	..	GTDB	20. 2. 51	B. Rivett ..	H. J. Allan, C. B. Loads, P. Grimanes ..	W. Miller ..	Andrew Weir & Co., Ltd.
Deerpool	..	GKDY	11. 10. 51	C. H. Churchill ..	T. C. Jagger, J. W. Tinnmouth, R. A. Vans ..	E. T. Williams ..	Sir R. Ropner & Co., Ltd.

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Defoe</i>	GNWF	20.8.51	W. C. Blake	D. Cordova, H. Smith, J. G. Roberts	W. Dowds	Lampert & Holt Line, Ltd.
<i>Delane</i>	MMNW	24.5.51	H. Pratt	L. M. Metcalfe, A. J. M. Cox, C. T. Skrastin	J. Brown	Lampert & Holt Line, Ltd.
<i>Delilian</i>	GJSQ	23.4.51	J. S. Macmillan	A. C. Henderson, S. P. Ewing, J. Jackson	W. J. Read	Donaldson Bros. & Black, Ltd.
<i>Delius</i>	GZSY	6.2.51	A. W. Mitchell	J. Spooner, D. S. Sapp, T. Owen	—, Powell	Lampert & Holt Line, Ltd.
<i>Denbighshire</i>	GOGW	19.9.51	J. Simpson	J. Jackson, T. Ireland	E. W. Divers	Glen Line, Ltd.
<i>Derryclare</i>	GCKN	14.3.51	N. Bellwood	D. S. Kingsland, A. Monaghan	A. Hudson	McCowen & Gross, Ltd.
<i>Derryhean</i>	MAIF	29.5.51	J. Robinson	T. Moodie, F. Saunders, E. S. Neave,	I. S. Humphrey	McCowen & Gross, Ltd.
<i>Desado</i>	MAIH	13.6.51	P. Burrell	E. J. O'Keefe, R. Morgan, S. Parsons, M. S. Jones	—, Prior	Royal Mail Lines, Ltd.
<i>Devis</i>	GPKT	27.9.51	W. Gillespie	R. H. Baldwin, F. E. Crebbin, C. T. Skrastin	J. Tomlinson	Lampert & Holt Line, Ltd.
<i>Devon</i>	GDRF	27.9.51	A. Hocken	J. Weston, W. Martin, J. Crewdson	G. Talbot	Federal Steam Navigation Co., Ltd.
<i>Devonshire</i>	GTTV	17.1.51	A. Beharrel	J. W. MacKinlay, P. S. Lovegrove, —, Crossley	S. J. Taylor	Bibby Bros. & Co.
<i>Dilaara</i>	GYQV	10.7.51	F. L. Sampson, D.S.C.	H. B. Cray, E. C. Ploverman, R. B. Coates	—, J. B. Totten	British India Steam Nav. Co., Ltd.
<i>Discovery II</i>	GWVM	24.5.51	J. F. Blackburn, D.S.O., Cdr., R.N. (Retd.)	B. Q. Dunham, G. H. Selby-Smith, P. A. Masters	J. A. McAskill	National Institute of Oceanography.
<i>Dominion Monarch</i>	GRGG	22.8.51	D. Aitchison	G. H. Riding, A. Baber, S. H. Wilde	T. W. Moody	Shaw, Savill & Albion Co., Ltd.
<i>Dorsetian</i>	GJTL	14.3.51	D. MacQueen	W. H. Squair, A. J. Dougall, J. Baillie	D. J. Charters	Donaldson Bros. & Black, Ltd.
<i>Dorset</i>	GZFQ	1.10.51	A. E. Williams	E. J. Newing, J. Hollier, M. Smith, W. Laidlaw	A. J. Humphries	Federal Steam Navigation Co., Ltd.
<i>Drina</i>	MAIL	15.11.50	D. R. Miller	J. Fox, J. G. Street, A. Nottage	R. H. Heard	Royal Mail Lines, Ltd.
<i>Dromore</i>	GDSF	11.10.51	J. R. Moreby	J. McCool, R. Hughes, W. Clure	P. Thompson	Furness, Withy & Co., Ltd.
<i>Dryden</i>	MOFT	30.1.51	D. C. Roberts	K. Quirk, D. S. Leicester, I. Pritchard	E. J. O'Connor	Lampert & Holt Line, Ltd.
<i>Duke of Athens</i>	GMYS	15.9.51	J. G. Lomas, A.I.N.A.	T. Owen, N. Beattie, T. Walton	R. B. Read	Trent Maritime Co., Ltd.
<i>Dunedin Star</i>	GKKT	7.9.51	J. Davis	G. Stanley, J. Edwards	A. McCartney	Blue Star Line, Ltd.
<i>Dunera</i>	GBBR	20.3.50	A. A. Kay	F. Hills, C. R. S. Monk, L. D. Conway	G. Delahoy	British India Steam Nav. Co., Ltd.
<i>Dunster Beacon</i>	GUFS	10.9.51	A. C. E. Green	A. Tatchell, J. Twite, D. Bervick	T. D. Sullivan	Phs. Van Ommeren (London), Ltd.
<i>Dunster Grange</i>	GCSD	29.5.51	R. S. Grigg, O.B.E.	P. J. Walper, —, Wills, D. M. Smith, V. J. Owen	H. Davies	Houlder Bros. & Co., Ltd.
<i>Durango</i>	MAIM	18.8.51	H. Wright	G. W. Meldrum, B. Y. Harrison, J. Connell, R. Foulkes	—, Backhouse, C. Loraine, D. S. Clubb,	Royal Mail Lines, Ltd.
<i>Durham Castle</i>	GPGP	29.8.51	R. A. D. Cambridge, D.S.C., R.D., R.N.R.	R. J. Taylor, D. P. Beckett	H. A. Liggins	Union Castle Mail S.S. Co., Ltd.
<i>Durenda</i>	GFSL	21.11.50	A. H. Usher	H. R. Smith, D. A. C. Windle, G. A. Hankins	T. Welsh	British India Steam Nav. Co., Ltd.
<i>Durham</i>	GWWK	8.8.51	H. C. R. Dell	C. Keyse	C. Robinson	Federal Steam Navigation Co., Ltd.
<i>Edinburgh Castle</i>	GOHN	7.9.51	T. W. McAllen	D. Evans, K. Williams, —, O'Connor	D. Hoyle	Union Castle Mail S.S. Co., Ltd.
<i>Egidia</i>	GJZD	17.9.51	R. S. Paron	W. B. Sawyer, W. Hallum, R. Watt, R. M. Sinclair	H. R. Sullivan	Anchor Line, Ltd.
<i>El Gallo</i>	MAIP	16.4.51	S. J. Watts	R. K. Hanrahan, W. P. Hanrahan, J. A. Hogg	W. Hier	P. & O. Steam Navigation Co.
<i>Elysia</i>	GJZK	12.1.51	E. Barclay	J. McLarry, J. T. Donald, M. Keenan, W. Spowart	P. Maloney	
<i>Empire Fowey</i>	GMFW	30.3.51	D. G. Bailey	P. Hewett, D. W. Lightbody, J. Howe, J. Houghton		

<i>Empire Halladale</i>	GPVQ	8. 8. 51	R. Blake	H. A. Cameron, W. Marshall, J. W. Blair	J. N. Cragg	Anchor Line, Ltd.
<i>Empire Oruell</i>	GRCB	21. 2. 51	A. C. G. Hawker, R.D., R.N.R.	J. W. Charlesworth, J. Hughe, D. Hayes	A. C. Shippam	Orient Steam Navigation Co., Ltd.
<i>Empire Patrai</i>	GDKL	18. 9. 51	R. J. Young	S. O. Nazar, A. Honnor	C. J. Higginson	Fenton S.S. Co., Ltd.
<i>Empire Pride</i>	MAJB	30. 8. 51	G. Dobson	R. Hammond, R. M. Bessant, J. Beckett	D. Alcock	Bibby Bros. & Co.
<i>Empire Star</i>	GCDP	13. 8. 51	F. N. Johnson	— Bayley, — Munroe, J. Maidment	W. Hackworthy	Blue Star Line, Ltd.
<i>Empire Viceroy</i>	MAJN	6. 4. 51	J. B. S. Bland	A. M. Brockwell, C. D. Mason, J. W. Abbott	W. Clarke	Pandelis Shipping Co., Ltd.
<i>Empress of Australia</i>	GFSB	3. 8. 51	C. L. de Hauteville Bell, D.S.C., R.D., R.N.R.	H. Long, P. Litherland	T. C. Mann	Canadian Pacific S.S., Ltd.
<i>Empress of Canada</i>	GSVR	23. 2. 51	J. P. Dobeon, D.S.C., R.D., R.N.R.	H. Towers, I. Murray, P. Beerling	J. M. Butterworth	Canadian Pacific S.S., Ltd.
<i>Empress of France</i>	GNTV	9. 6. 51	B. B. Grant, R.D., R.N.R.	L. E. McDowell, F. Granger, P. Ainsworth	E. Murphy	Canadian Pacific S.S., Ltd.
<i>Empress of Scotland</i>	GMLV	6. 6. 51	E. A. Shergold	J. Mackay, P. Hargreaves, J. Walker	J. Campbell	Canadian Pacific S.S., Ltd.
<i>Erodona</i>	GZLQ	24. 2. 51	J. E. Gill	W. A. G. Curphey, J. Albert, J. Owles, J. G. Evans	J. Martin	Anglo-Saxon Petroleum Co., Ltd.
<i>Eros</i>	GYSB	23. 4. 51	R. C. Vigurs	S. Lunn, C. P. Turguand, J. A. Mills	P. McEwan	Steamship Eros, Ltd., Elders & Fyffes, Ltd.
<i>Esperance Bay</i>	GSMP	3. 10. 51	T. V. Roberts, R.D., R.N.R.	J. K. Wyles, R. Mossopp, G. S. Sheldron	H. H. Lyon	Shaw, Savill & Albion Co., Ltd.
<i>Essex Trader</i>	GCMS	24. 7. 51	D. G. Evans	D. A. Owen, S. Jones, E. Whislay	R. Jones	Trader Navigation Co., Ltd.
<i>Esso Glasgow</i>	GTXC	21. 7. 51	M. Rutherford	R. J. Allen, R. J. Robson, W. L. L. Edward	G. M. Baker	Esso Transportation Co., Ltd.
<i>Esso Plymouth</i>	GYRX	4. 8. 51	E. Orr	J. Doyle, P. Mattocks, H. Johnson	D. O'Brien	Esso Transportation Co., Ltd.
<i>Eucadia</i>	GJZL		D. Morrison, O.B.E.	R. Crawford, D. McLeod, R. L. Richard, C. Boyle		
<i>Explorer</i>	GYJX	21. 6. 51	J. L. Curle	W. Jackson, R. J. Abbott, D. O. Lindsay	D. Sproat	Anchor Line, Ltd.
<i>Fanad Head</i>	GNQQ	25. 9. 51	W. A. Haddock, O.B.E.	A. Fee, J. Kane, R. W. Crawford	B. N. Walker	T. & J. Harrison
<i>Flanenco</i>	GCBV		P. L. Hockey	A. B. Powell, A. W. Lewis, R. Spalton	H. Haskayne	G. Heyn & Sons, Ltd.
<i>Fordsdale</i>	GSMW	18. 9. 51	T. H. Davies	J. L. Harrison, R. J. Ryding, P. W. Banbridge		Pacific Steam Navigation Co.
<i>Franconia</i>	GBRQ	1. 7. 50	D. M. Maclean	J. S. Rowe, P. S. Taylor, R. D. Hammond	J. J. Nolan	Shaw, Savill & Albion Co., Ltd.
<i>Fresno City</i>	GBYD	28. 12. 50	W. V. Doughty	T. W. D. John, G. Groves, J. Robiliard	J. L. Blanchard	Cunard Steamship Co., Ltd.
<i>Fylingdale</i>	GKSR	24. 8. 51	R. Coultas	W. W. Gatenby, T. E. Ellerby, A. Booth	J. W. Ellis	Headlam & Son.
<i>Geologist</i>	GJMR	18. 9. 51	A. E. Jackson	D. V. Jones, W. G. Biddulph, A. K. Jones	M. H. Whitehead	T. & J. Harrison
<i>Georgic</i>	GRLJ	20. 2. 51	W. M. Stuart, O.B.E.	A. C. Caird, H. Carmichael, F. Watts, A. Leyland	N. Ryan	Cunard Steamship Co., Ltd.
<i>Glaucus</i>	GDYZ	28. 11. 50	C. F. Lock	E. M. Groves, J. R. Jones, P. H. Benson, D. Robinson	F. Devlin	A. Holt & Co.
<i>Glenartney</i>	GBLG	15. 6. 51	J. M. Anderson	V. Moore, A. W. Spivey, P. Nicolson, R. G. Spence	J. F. Wilson	Glen Line, Ltd.
<i>Glenbank</i>	GKLC	28. 6. 51	J. B. Mitchell	L. O. Moody, C. A. Brown, M. W. Filton	H. S. Roberts	Andrew Weir & Co., Ltd.
<i>Glenorchy</i>	GBLL	9. 10. 51	P. Cross	J. D. Miller, P. Wilks, L. Kenyon, K. Jones	R. A. Knight	Glen Line, Ltd.
<i>Gloucester</i>	MANK	7. 8. 51	J. Taylor	G. Pegler, R. Webster, A. Bennett, R. Stokes	L. Savers	Federal Steam Navigation Co., Ltd.
<i>Golfito</i>	GBYL	1. 9. 51	S. A. Sapsworth	R. A. Laycock, R. L. Leech, P. N. Mace	R. W. Smith	Elders & Fyffes, Ltd.
<i>Gracia</i>	MANN	14. 9. 50	J. McInnes	J. Macfarlane, H. F. Tomson, J. Stewart	G. Crighton	Donaldson Bros. & Black, Ltd.
<i>Granford</i>	MQGC	27. 9. 51	E. C. J. Morgan	A. MacDonald, J. Brown, J. Laird		Gouldandris Bros., Ltd.
<i>Haparangi</i>	GJYX	14. 3. 51	R. G. Rees	J. R. Ramsay, C. E. Burrill, —, Stocum, —, Salwood	L. Raynor	New Zealand Shipping Co., Ltd.
<i>Harmatris</i>	GTWP	18. 6. 51	A. R. Phelps	R. A. Brock, A. H. Barber, J. R. Woodfield, W. R. Moore	R. Read	J. & C. Harrison, Ltd.
<i>Helicina</i>	GKBC	17. 1. 51	J. B. Richie	I. Morrison, B. L. Oliver, J. B. Walker	— Flood	Anglo-Saxon Petroleum Co., Ltd.
<i>Herdsmen</i>	GPZX	1. 11. 50	W. A. Short, O.B.E.	H. Lawton, H. Jones, C. Arden	G. Whittier	T. & J. Harrison
<i>Herefordshire</i>	GOFG	23. 7. 51	H. Kerbyson	B. Pennington, T. G. Hughes, A. P. Moore, —, Ashcroft	A. G. Johnson	Bibby Bros. & Co.

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Highland Brigade</i> ..	GJKN	6.7.51	A. N. Anderson	D. V. Buckle, J. L. Perkins, J. Holt	J. Desborough	Royal Mail Lines, Ltd.
<i>Highland Chieftain</i> ..	GCTY	27.7.51	W. H. Grinshaw, O.B.E.	J. Egan, A. Acaon, C. Markham	W. Rollason	Royal Mail Lines, Ltd.
<i>Highland Monarch</i> ..	GMZF	16.9.50	H. G. Whittle, O.B.E.	E. Card, K. Kistler, J. Rutter, J. R. Manley	F. Dunk	Royal Mail Lines, Ltd.
<i>Highland Princess</i> ..	GFMN	24.5.51	W. H. Roberts	C. Wightman, C. J. Gulliford, R. Williams, R. E. Fairley	F. G. Goodall	Royal Mail Lines, Ltd.
<i>Hilary</i> ..	GQVM	29.5.51	J. W. Binns, O.B.E.	T. W. McMullan, L. W. Crump, O. Cox	T. Tyman	Booth S.S. Co., Ltd.
<i>Himalaya</i> ..	MCDY	29.5.51	S. W. S. Dickson	G. M. McClean, G. C. Barrett, D. H. F. Armstrong, J. P. Crichton, R. E. J. Fox, W. G. Constantine, C. I. H. Greaves	F. E. Ash	P. & O. Steam Navigation Co.
<i>Hinakura</i> ..	GDVS	7.7.51	E. A. J. Williams	R. S. Hales, S. Robinson, P. A. Ogden, J. M. Stephens	J. Delvin	New Zealand Shipping Co., Ltd.
<i>Hororata</i> ..	MANZ	28.12.50	E. H. Hopkins	F. Taylor, P. Davison, E. Cooper, D. Newman	D. E. Hodding	New Zealand Shipping Co., Ltd.
<i>Huntingdon</i> ..	GFCT	1.10.51	P. S. Calcutt	D. A. G. Dickens, K. J. Field, D. Jones, A. C. Robinson	A. Wallace	Federal Steam Navigation Co., Ltd.
<i>Hurunui</i> ..	GIZF	17.1.51	H. E. Reilly, R.D., R.N.R.	F. Taylor, T. Rowland, J. Milner	C. Braithwaite	New Zealand Shipping Co., Ltd.
<i>Hyrcania</i> ..	MADE		E. W. V. Garrett	D. M. Hannah, D. McKinnon, T. Maloney	C. O'Boyle	Baltic Trading Co., Ltd.
<i>Imperial Star</i> ..	GIAC		G. C. Goudie	G. A. Hunt, M. T. Slessor, J. Nolan	W. H. Jones	Blue Star Line, Ltd.
<i>Imishoven Head</i> ..	MAOC	7.5.51	R. A. Ferguson	W. H. Campbell, E. McIntosh, P. Percival	M. P. Ward	G. Heyn & Sons, Ltd.
<i>Interpreter</i> ..	GPZY		H. Coates	K. Cobb, J. Adams, H. Harvey		T. J. Harrison
<i>Inverbank</i> ..	GKML	14.3.51	L. W. Thorne	R. S. Mortimer, R. D. Williams, G. T. Brown	P. C. Kelly	Andrew Weir & Co., Ltd.
<i>Jamaica Producer</i> ..	VPLM	14.9.51	G. E. M. Jenkins	B. Noble, J. A. Whitehouse, C. P. Grady, A. L. Gwynne-Harrison	P. Graham	Kaye, Son & Co., Ltd.
<i>Jersey City</i> ..	GIGA	24.7.51	D. W. Butcher	D. B. Thomas, J. Vaughan, T. Turner	H. Christianson	Sir Wm. Reardon Smith & Son, Ltd.
<i>Jessmore</i> ..	MAOF	28.7.51	C. G. Killick	J. Sims, R. B. Douglas, —, Ware	R. Deakin	Furness, Withy & Co., Ltd.
<i>John Biscoe</i> ..	VPNE	1.8.51	W. Johnston	R. M. Kane, J. Park, A. de St. Jorre	W. Bonner	Falkland Islands Government
<i>John Holt</i> ..	GNFD	31.10.50	J. Shaw	W. R. Atkinson, A. Furel, W. Turton	G. W. Burke	John Holt Line, Ltd.
<i>Kaikoura</i> ..	GZPZ	11.6.51	N. Fraser	G. S. Gunn, S. Beer, J. Watson	L. Laval	Trinder, Anderson & Co.
<i>Kaipaki</i> ..	GQGI	24.4.50	T. M. Fenwick	J. Farnell, J. B. Ricketts, F. Le Messurier	A. Leeder	Trinder, Anderson & Co.
<i>Kaipara</i> ..	GZPY	23.10.51	J. F. Wood	H. O. T. Fuller, J. Sey, M. Foster	E. Carver	Trinder, Anderson & Co.
<i>Kaituna</i> ..	GQGG	7.12.50	S. Clampitt	T. G. Wilson, G. B. Charleson, P. Johnson, J. Jackson	A. Clegg	Trinder, Anderson & Co.
<i>Kenilworth Castle</i> ..	MQLP	1.1.51	L. H. Farrow	R. Dugdale, J. C. Edwards, P. A. Sharp	G. G. Kneath	Union Castle Mail S.S. Co., Ltd.
<i>Kent</i> ..	GPDC	18.7.50	J. Moncrieff	S. Lambbrick, J. Collins, D. Moran, J. North	R. Heath	Federal Steam Navigation Co., Ltd.
<i>Kenuta</i> ..	GCBW	3.10.51	J. D. Richards	P. A. A. James, F. J. Leicester, P. Whelbourn	J. J. Davis	Pacific Steam Navigation Co.
<i>King Robert</i> ..	MAON	21.3.51	G. Craze	G. Dando, P. W. Kidd, A. D. Terras	C. Cowen	King Line, Ltd.
<i>King William</i> ..	GNVF	14.7.51	A. B. Drever	J. C. Davies, T. Fairclough, J. F. Campbell	W. Ferguson	King Line, Ltd.
<i>Kingston Onyx</i> ..	MLFP	17.1.51	A. R. Cornish	G. H. Byrne, C. O. Jones, A. Woodward	D. Chapman	Kingston Steam Trawling Co., Ltd.
<i>Kolistan</i> ..	GSFZ	8.8.51	A. N. Henderson	P. Staples	G. Morris	F. C. Strick & Co., Ltd.
<i>Laguna</i> ..	GKIC	7.9.51	P. H. Ray	A. D. Rumble, G. H. Marshall, R. Davies	G. J. Ingram	Pacific Steam Navigation Co.
<i>Lancashire</i> ..	GCTC	15.5.50	A. R. Cossar	R. R. Hagley, D. C. Monteith, W. O. Thomas	A. Jones	Turnbull, Martin Co., Ltd.
<i>Lancashire</i> ..	GLZC		N. F. Fitch	A. Edgar, K. C. Horne, A. J. Starkey	R. T. Milford	Hibby Bros. & Co.
<i>Lassell</i> ..	GFND	10.5.51	J. King			Lampport & Holt Line, Ltd.

<i>Latia</i>	..	GLCF	10.9.51	A. E. Bleasdale	C. S. Owston, E. R. Jenkins, —, Dyson-Cope	J. Brownlee	Anglo-Saxon Petroleum Co., Ltd.
<i>Laurentia</i>	..	GNDY		A. Bankier ..	N. Forth, A. McCallum, R. Durling, J. A. Douglas	A. W. J. Levack	Donaldson Bros. & Black, Ltd.
<i>Levernbank</i>	..	GLPZ	17.10.51	T. Robertson	F. G. Howard, A. Dorkins, D. Moore	J. Simpson	Andrew Weir & Co., Ltd.
<i>Linguit</i>	..	GQBC	10.8.51	W. Weatherall	C. H. Boam, A. Hancock, —, Cheek	W. Bennett	T. & J. Harrison
<i>Livorno</i>	..	GPWF	14.11.50	E. S. Greene	F. Methan, A. Bayley, G. Forward	P. Morris	Ellerman's Wilson Line, Ltd.
<i>Lloydcrest</i>	..	MAOY	25.6.51	L. Barwell ..	H. W. Campbell, E. Waiter	F. Thornborrow	Crest Shipping Co., Ltd.
<i>Lobos</i>	..	GDXL	28.11.50	A. G. Litherland	H. Walmsley, J. Williamson, K. Eastwood	F. Rogers	Pacific Steam Navigation Co.
<i>Lock Avon</i>	..	GMZT	12.7.51	C. E. Mason	M. Dean, R. G. Stapleton, M. Fletcher	M. R. Littlejohn	Royal Mail Lines, Ltd.
<i>Lock Garth</i>	..	GMZY	30.3.51	J. Smith, R.D., Cdr., R.N.R.	M. J. Evans, J. Phillips	D. J. W. Morgan	Royal Mail Lines, Ltd.
<i>Lock Ryan</i>	..	MAOZ	3.3.51	R. N. Fletcher	T. A. Evans, A. N. Brook, A. W. Dewers, D. Hargreaves	J. F. G. Thomas	Royal Mail Lines, Ltd.
<i>Lord Gladstone</i>	..	MAPA		—, Brien ..	C. A. Brown, —, Grayson, —, Benson	T. E. Stronge	Ships Finance and Management Co., Ltd.
<i>Losada</i>	..	GDXM	24.5.51	D. W. Hutchinson	G. E. Turner, G. Webster, J. Rourke	E. O'Neill	Pacific Steam Navigation Co.
<i>Macharda</i>	..	GKXF	1.6.51	R. A. Penston	G. A. Jackson, H. S. Prestwood, L. J. Saxty	J. Caddy	T. & J. Brocklebank, Ltd.
<i>Magdapur</i>	..	GBJX	21.6.51	A. Hill, O.B.E.	J. Watson-Ross, P. A. Gunson, A. Wood, J. M. Pearson	J. Smith	T. & J. Brocklebank, Ltd.
<i>Mahanada</i>	..	GOFM	3.5.51	C. W. C. Parry	P. Brand, D. S. Carter, P. Briscoe	T. Williams	T. & J. Brocklebank, Ltd.
<i>Mahia</i>	..	GNZV	3.8.51	G. Heywood	A. R. Stevenson, R. Munro, I. Magill, W. A. Siddall	H. G. Sorenson	T. & J. Brocklebank, Ltd.
<i>Mahout</i>	..	GDZN	22.5.50	J. Richardson	D. L. Campbell, E. G. Anderson, H. L. Burn		Shaw, Savill & Albion Co., Ltd.
<i>Mahseer</i>	..	GZSV	5.6.50	L. T. Owen, O.B.E.	D. Carter, M. H. Taylor, A. Halcrow	C. W. Jacobs	T. & J. Brocklebank, Ltd.
<i>Mahud</i>	..	GSCP	27.4.51	L. F. Dodson	B. L. des Landes, B. Dey, G. H. Hunter	R. Burton	T. & J. Brocklebank, Ltd.
<i>Makalla</i>	..	GOFN	29.8.51	T. Eddy ..	R. E. Roberts, M. Emberton, H. L. Burn	B. J. Guy	T. & J. Brocklebank, Ltd.
<i>Malanca</i>	..	GZRD	18.5.51	S. Broughton	P. Penbridge, J. Bonny, J. K. Cooper	A. Halstead	T. & J. Brocklebank, Ltd.
<i>Malansbury</i>	..	MAQE	16.7.51	R. Ross ..	W. P. Russell, J. Hands, F. Ferguson	A. Orham	T. & J. Brocklebank, Ltd.
<i>Maloja</i>	..	GFBF	10.5.51	E. J. Parry ..	R. M. Sinclair, F. N. Eagle, W. C. Rimmer, R. Thew	A. Hill	Houlder Bros. & Co., Ltd.
<i>Manchester City</i>	..	GBBP	11.6.51	H. Hancock	A. W. Swan, A. Cookson, —, Le Mesurier	W. Dawson	P. & O. Steam Navigation Co.
<i>Manchester Commerce</i>	..	GKMY	29.8.50	W. Hine, R.D., Cdr., R.N.R.	D. C. Woodall, J. E. Askew, F. Jones	M. Doran	Manchester Liners, Ltd.
<i>Manchester Division</i>	..	GBYR	7.5.51	M. E. Bewley	J. McCarron, D. S. Millard	F. M. Berry	Manchester Liners, Ltd.
<i>Manchester Merchant</i>	..	MGZQ		F. D. Struss, O.B.E., D.S.C.	D. S. Mullard, R. Wadsworth, T. Hancock	F. M. Berry	Manchester Liners, Ltd.
<i>Manchester Port</i>	..	GYNF	10.1.50	F. Downing	J. E. Jones, T. W. Field, R. O. White	P. B. McNab	Manchester Liners, Ltd.
<i>Manchester Progress</i>	..	GPGD	12.10.50	E. W. Espley	G. R. Thompson, L. C. Taylor, —, Garner	W. H. Critchley	Manchester Liners, Ltd.
<i>Manchester Regiment</i>	..	GBRD	19.10.49	E. W. Raper	W. Oliver, G. S. Garner, J. Parish	A. Reid	Manchester Liners, Ltd.
<i>Manchester Shipper</i>	..	MAPC	4.10.51	F. L. Osborne	F. Lewis, J. Illingworth, T. H. Lynn	E. Ambler	Manchester Liners, Ltd.
<i>Manchester Trader</i>	..	GMWG	8.2.51	W. H. Downing	W. Quirk, D. G. Thomas, —, Woolven	F. J. Fitzgerald	Manchester Liners, Ltd.
<i>Mandasor</i>	..	GBNY	8.11.49	R. Humble	C. Grey, G. W. Sinclair, P. Manson	G. W. Hazel	T. & J. Brocklebank, Ltd.
<i>Manitola</i>	..	GDMY		R. Stone			British India Steam Navigation Co., Ltd.
<i>Marengo</i>	..	GLFW	13.4.51	F. Ellison	H. Edwards, H. Riley, B. Tong	G. Camm	Ellerman's Wilson Line, Ltd.
<i>Margay</i>	..	GFYQ	13.6.51	E. A. Prentice	M. W. Tipple, B. S. Kenn, J. Jones	E. Leigh	Kaye, Son & Co., Ltd.
<i>Maribor</i>	..	GTFZ	8.12.50	J. B. Newman	I. A. McLaren, J. C. Farmer, D. A. M. O'Byrne	G. Stone	T. & J. Brocklebank, Ltd.
<i>Marna</i>	..	MLPK	14.6.50	A. Goodlad	G. Wilson		Chr. Salvesen & Co.
<i>Marsdale</i>	..	GBKB	18.10.50	M. Ferguson	C. Webster, J. Bennett, D. Hamilton	D. Chuster	Kaye, Son & Co., Ltd.
<i>Martina</i>	..	GTGG	18.10.50	T. Fox-Lloyd	R. Watkins, J. Robertson	D. H. Butterworth	T. & J. Brocklebank, Ltd.
<i>Maritima</i>	..	GNQT	10.8.51	H. Burn ..	F. T. Mudd, T. McDonald, A. Gillespie	G. J. Greenfield	Kaye, Son & Co., Ltd.
<i>Mataroa</i>	..	GCSV	23.8.51	R. G. James, R.D., Capt. R.N.R.	J. A. Williams, W. J. Denly, T. J. Whiston, V. H. Vizer	L. Boyce	Shaw, Savill & Albion Co., Ltd.
<i>Matheran</i>	..	GOFQ	8.3.51	H. E. McGregor	—, Griffiths	G. W. Hazel	T. & J. Brocklebank, Ltd.



NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Matina</i> ..	GSZX	28.8.50	H. Roberts, O.B.E.	T. C. Crane, P. Everitt, H. G. Cresswell ..	A. C. Knight ..	Elders & Fyffes, Ltd.
<i>Mauretania</i> ..	GTIM	9.1.51	D. W. Sorrell ..	M. B. Cox, —, Joyner, J. P. Ward, G. R. Carter ..	F. Clarke ..	Cunard Steamship Co., Ltd.
<i>Media</i> ..	GSRW	17.4.51	G. H. Morris ..	R. G. Hunt, G. W. Edwards, J. G. Parry ..	E. P. Bishop ..	Cunard Steamship Co., Ltd.
<i>Melbourne Star</i> ..	GDFZ	6.2.51	F. N. Riley, D.S.O.	H. Tompsett, S. C. Buchanan, B. B. Gaffany, D. Maycock ..	J. Clarke ..	Blue Star Line, Ltd.
<i>Millais</i> ..	MAPH	13.4.51	A. R. Bibby, O.B.E.	B. Salisbury, J. L. Roberts, D. S. Sapp ..	V. Slevin ..	Lanport & Holt Line, Ltd.
<i>Mirror</i> ..	GDFL	25.4.51	J. G. West ..	J. S. Deane, A. Miller ..	N. R. Iden ..	Cable & Wireless, Ltd.
<i>Monarch</i> ..	GBDF	5.4.51	J. P. F. Betson ..	O. R. Bates, J. A. Hall, G. Chisholm ..	T. Tilley ..	H.M. Postmaster General
<i>Mooltan</i> ..	GFBC	8.6.51	J. M. Peter ..	D. Aikman, L. H. Kellett, M. Penney, —, Simmonds ..	J. Ormiston ..	P. & O. Steam Navigation Co.
<i>Moveria</i> ..	GKYW	7.12.50	J. Jack ..	G. E. Waddell, C. Sheppard, J. McCormick ..	S. Sheridan ..	Donaldson Bros. & Black, Ltd.
<i>Mulbera</i> ..	GFTM	12.1.51	F. G. Baines ..	P. Middleton ..	—, Phillips ..	British India Steam Nav. Co., Ltd.,
<i>Myrtlebank</i> ..	GLQB	27.2.51	R. J. Owen ..	C. T. Lewis, A. Tavendale, A. Szimczak ..	F. McGuinness ..	Andrew Weir & Co., Ltd.
<i>Napier Star</i> ..	MAPN	30.3.51	M. B. M. Tallack ..	E. Harvey, C. G. Sneaton, D. G. Mallinger ..	G. Evans ..	Blue Star Line, Ltd.
<i>Naticina</i> ..	GIGH	29.11.50	F. Mansfield ..	J. D. Dyson, A. Douglas, B. Bagler, J. Thompson, A. Batey ..	J. W. Starrs ..	Anglo-Saxon Petroleum Co., Ltd.
<i>Neaera</i> ..	MQTG	28.8.51	R. G. Green ..	J. Boadle, D. M. Smith, —, Booth, D. H. Moreby ..	G. Leach ..	Anglo-Saxon Petroleum Co., Ltd.
<i>New Australia</i> ..	GZKD	1.8.51	K. D. G. Fisher ..	W. Newport, J. Johnstone, B. Mahy, C. H. Saddington, R. J. McVittie ..	W. Chick ..	Shaw, Savill & Albion Co., Ltd.
<i>New York City</i> ..	MATR	4.10.51	F. P. Neil ..	J. W. Owen, A. V. Watt, J. B. Hall ..	A. V. Ewart ..	Charles Hill & Sons, Ltd.
<i>New Zealand Star</i> ..	GYCR	17.1.51	E. N. Rhodes ..	J. B. Stewart, J. T. Sheffield, E. W. Foxworthy ..	T. Cahill ..	Blue Star Line, Ltd.
<i>Newfoundland</i> ..	GNMC	17.1.51	C. H. Kenyon ..	P. Edwards, R. N. P. Johnston, C. Partington ..	J. E. Whitworth ..	Furness, Withy & Co., Ltd.
<i>Nordic</i> ..	GDJC	25.9.51	B. R. Simons ..	M. J. Heron, A. P. Harrington, J. R. Wichell ..	J. D. Turnham ..	Prince Line, Ltd.
<i>Norfolk</i> ..	GJLV	25.9.51	B. Evans ..	D. Nicolson, J. Short ..	W. Hammer ..	Federal Steam Navigation Co., Ltd.
<i>Norwegian</i> ..	GDMC	25.9.51	A. L. Hunter ..	R. Burton, R. Hood ..	J. Heath ..	Donaldson Bros. & Black, Ltd.
<i>Nottingham</i> ..	GCNC	25.9.51	H. D. Horwood, R.D., Cdr., R.N.R.	J. D. P. Williamson, J. Williams, D. Fuller ..	W. C. Brock ..	Federal Steam Navigation Co., Ltd.
<i>Nova Scotia</i> ..	GNNK	21.7.51	J. E. Wilson, O.B.E.	W. L. Ashton, I. G. Macauley, J. C. Court ..	D. Berry ..	Furness, Withy & Co., Ltd.
<i>Novelist</i> ..	GMLG	3.3.51	T. E. Steel ..	J. Marshall, J. Guyler, T. W. Dunsford ..	C. Robinson ..	T. & J. Harrison
<i>Novari</i> ..	GJKX	26.7.51	S. W. Andrews ..	J. D. Birch, D.S.C., R.D., R.N.R., E. V. Harris, R.D., Lt. Cdr. R.N.R., R. F. Underwood, R. Fletcher, F. B. Woolley, E. H. Kidd, P. Watts ..		New Zealand Shipping Co., Ltd.
<i>Orcades</i> ..	MABA	4.7.51	I. E. G. Goldsworthy, R.D., R.N.R.	M. R. Wilmshurst, P. Leighton, D. P. Blois ..		
<i>Orion</i> ..	GYKL	15.5.50	N. A. Winfield ..	R. D. Cookman, A. Bensley, A. J. Field ..	F. W. Miller ..	Orient Steam Navigation Co., Ltd.
<i>Ormonde</i> ..	GYLC	6.6.51	C. K. Blake, O.B.E.	R. W. Roberts, D.S.C., O.B.E., J. C. Stratford, A. M. Murray, L. A. Finch, J. English, W. H. Benjamin, O. F. W. Pitts ..	T. H. Shannon ..	Orient Steam Navigation Co., Ltd.
<i>Oronsay</i> ..	GCNB		T. L. Shurrock, O.B.E.		N. A. Boon ..	Orient Steam Navigation Co., Ltd.

<i>Orontes</i>	..	GBXM	3.8.50	S. S. Bernand, O.B.E.	G. Grandage, D.S.C., R.D., Cdr., R.N.R., W. B. Thomson, D. F. Hayes, L. Kingswood, Lt., R.N.R., J. Hughes, A. Harris .. .. .	F. Murphy .. ..	Orient Steam Navigation Co., Ltd.
<i>Otranto</i>	..	GFKV	26.9.51	R. J. Galpin, R.D., Cdr., R.N.R. .. ..	R. Riddelsdell, J. Terry, M. McGowan, J. K. Thornton, J. Bensley, M. Champneys .. ..	C. J. Seaton .. ..	Orient Steam Navigation Co., Ltd.
<i>Pacific Fortune</i>	..	GBFM	15.10.51	F. H. Perry .. ..	P. J. Williamson, G. K. Whitby, R. G. G. Bonney, A. C. Farrar-Hare .. ..	I. R. M. Thomas .. ..	Furness, Withy & Co., Ltd.
<i>Pacific Importer</i>	..	GDKV	18.8.50	B. M. Collard .. ..	G. Cook, A. H. Linden, E. H. Gregson .. ..	W. Britton .. ..	Furness, Withy & Co., Ltd.
<i>Pacific Liberty</i>	..	GDFQ	7.2.51	W. F. Swann .. ..	R. Coyle, N. R. Land, C. G. Stiff .. ..	A. Adamson .. ..	Furness, Withy & Co., Ltd.
<i>Pacific Nomad</i>	..	GCRZ	1.8.50	W. Hutchinson .. ..	J. Tye, J. T. Cameron, P. Cable .. ..	E. Graham .. ..	Furness, Withy & Co., Ltd.
<i>Pacific Stronghold</i>	..	GNSQ	28.6.51	A. Cooke .. ..	E. Hall, J. Cockburn, P. Frodsham, K. Macalister .. ..	A. E. Trim .. ..	Furness, Withy & Co., Ltd.
<i>Pacific Unity</i>	..	GUAN	14.11.50	E. A. Kemp .. ..	A. Pearson, A. A. Drake, W. E. Thomas, M. Kirk .. ..	H. Olding .. ..	P. & O. Steam Navigation Co.
<i>Palana</i>	..	MMBF	6.3.50	F. R. Spurr .. ..	— Savage, — Trower, G. E. Harris .. ..	M. F. Conroy .. ..	MacAndrews & Co., Ltd.
<i>Palomares</i>	..	GJGN	15.11.50	D. J. Thomas, M.B.E.	H. Johnson, R. Lidgate, J. Lewis .. ..	J. P. Deagan .. ..	Royal Mail Lines, Ltd.
<i>Pampas</i>	..	GCDL	24.5.51	R. C. S. Woolley, R.D., R.N.R. .. ..	J. A. Martin, R. J. Turner .. ..	W. Mate .. ..	New Zealand Shipping Co., Ltd.
<i>Papanui</i>	..	GDJW	25.7.51	K. Barnett .. ..	C. Single, T. Walton, D. V. Gaskell .. ..	B. Morgan .. ..	New Zealand Shipping Co., Ltd.
<i>Paparoa</i>	..	GBCZ	30.8.51	N. A. Thomas .. ..	J. D. Cubitt, G. Munson, C. F. Smith, J. D. Fulle .. ..	P. Goulden .. ..	Royal Mail Lines, Ltd.
<i>Paraguay</i>	..	MAQS	31.1.50	H. V. Todd, R.D., Cdr., R.N.R. .. ..	N. J. Oliver, J. Frankish, N. Deighoun .. ..	D. W. Cross .. ..	Royal Mail Lines, Ltd.
<i>Pardo</i>	..	GMNZ	24.5.51	T. W. Stevens, R.D., Capt., R.N.R. .. ..	M. V. Wingate, L. W. Black, R. Collins .. ..	D. Powell .. ..	Royal Mail Lines, Ltd.
<i>Parina</i>	..	GCLQ	3.8.51	H. E. Sang .. ..	P. Driver, T. Jones, A. H. Whittle .. ..	G. Soanes .. ..	P. & O. Steam Navigation Co.
<i>Paritiga</i>	..	MMBD	29.8.51	H. P. Mallet .. ..	M. Rooker, A. R. Howard, D. E. Shipp, W. Waghorn .. ..	A. O'Sullivan .. ..	Cunard Steamship Co., Ltd.
<i>Parthia</i>	..	GSWQ	4.9.51	J. W. Caunce, R.D., R.N.R.	R. Jones, J. A. Davies, G. H. Griffiths .. ..	F. Groves .. ..	P. & O. Steam Navigation Co.
<i>Perim</i>	..	GCGB	16.7.51	R. J. F. Paice .. ..	— Nowell, — Healey, — Lower, — Hancock .. ..	F. J. C. Bray .. ..	Turnbull, Martin & Co., Ltd.
<i>Pertshire</i>	..	GYWK	30.6.51	A. J. Hogg .. ..	A. Young, M. P. R. Turner, G. W. Sharp, G. Wilson .. ..	W. C. Doyle .. ..	T. & J. Harrison
<i>Philosopher</i>	..	MAQV	13.10.50	T. Winstanley .. ..	J. W. Kent, J. Nash, R. A. Patmore .. ..	A. Oakes .. ..	Royal Mail Lines, Ltd.
<i>Pilcomayo</i>	..	GBZX	15.5.50	F. A. C. Thacker .. ..	L. W. Green, J. M. Ashworth, G. D. Phillippe .. ..	D. Compton-James .. ..	New Zealand Shipping Co., Ltd.
<i>Pipiriki</i>	..	GDRQ	7.7.51	H. R. M. Smith .. ..	I. C. Davidson, R. G. Blakey, J. Marshall .. ..	— Gagny .. ..	Chr. Salvesen & Co.
<i>Planter</i>	..	GZSS	23.2.49	H. T. Wells .. ..	G. W. Sigsworth, G. G. Robins .. ..	J. MacKinnon .. ..	Port Line, Ltd.
<i>Polar Maid</i>	..	MAQX	18.5.51	J. W. Ross .. ..	J. W. Mundy .. ..	I. S. Skinner .. ..	Port Line, Ltd.
<i>Port Adelaide</i>	..	MCGG	.. ..	C. R. Townshend .. ..	— Dingle, J. A. Ashburner, L. G. Garnham, T. G. Clarke .. ..	E. G. Gunner .. ..	Port Line, Ltd.
<i>Port Auckland</i>	..	GWRB	8.6.51	J. G. Lewis, O.B.E.	W. M. Clough, R. A. Holmes, V. A. Hunt, K. Jayne .. ..	— Brook .. ..	Port Line, Ltd.
<i>Port Brisbane</i>	..	GWRC	8.8.50	H. Steele, O.B.E.	F. Gorman, P. Smith .. ..	R. C. Crompton .. ..	Port Line, Ltd.
<i>Port Chalmers</i>	..	GWQR	10.10.51	P. H. Pedrick .. ..	M. E. Field, E. R. Jenkins, W. E. Bell .. ..	P. J. McKeon .. ..	Port Line, Ltd.
<i>Port Hobart</i>	..	GKGC	18.8.51	L. Copeland .. ..	H. Thompson, G. Wardell .. ..	R. Robertson .. ..	Port Line, Ltd.
<i>Port Jackson</i>	..	GZKR	29.5.51	F. S. Ball .. ..	W. L. Robson, D. J. Batterbee, M. McKeith .. ..	T. Hargrave .. ..	Port Line, Ltd.
<i>Port Lincoln</i>	..	GFZK	18.8.51	G. C. Langford .. ..	J. Pritchard, V. G. K. Webster, R. Barton .. ..	.. ..	.. ..
<i>Port Macquarie</i>	..	MAQY	4.4.51	L. J. Skates .. ..	B. St. J. Smith, W. V. Lusted, J. Sharp .. ..	.. ..	.. ..
<i>Port Napier</i>	..	GPKD	22.10.51	G. W. Hazlewood .. ..	D. J. A. Pritchard, R. V. McKee, M. L. Coombs, D. J. Cloke .. ..	.. ..	.. ..

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
Port Phillip ..	MAQZ	3.10.51	D. G. Bradley ..	E. Willis, T. G. Ward, A. W. Kensett, N. B. Hutton ..	B. McGovern ..	Port Line, Ltd.
Port Pirie ..	GLVQ	3.5.51	F. W. Bailey, M.B.E.	T. Fairbairn, H. R. Long, —, Lancaster ..	W. Miller ..	Port Line, Ltd.
Port Vindex ..	MAUW	29.5.51	H. H. Smith, O.B.E.	L. W. Cady, D. N. Robinson, G. Ballinger, J. R. King ..	F. Sharman ..	Port Line, Ltd.
Port Wyndham ..	GYCW	25.6.51	E. E. Roswell ..	C. M. Walkins, B. B. Skrimshire, J. F. Lester ..	J. N. Courts ..	Port Line, Ltd.
Potaro ..	GNLJ	24.5.51	E. N. Giller ..	G. Rogers, J. F. Agderson, E. D. Long ..	J. O'Callaghan ..	Royal Mail Lines, Ltd.
Powell ..	GKIL	2.10.51	D. Cornwell ..	R. Cardno, J. W. Stewart ..	E. Murphy ..	United Whalers, Ltd.
Pretoria Castle ..	GOAE	2.5.50	R. Wren, D.S.O. ..	J. Ross, P. Walker, P. Rousseau ..	H. Oliver, M.B.E.	Union-Castle Mail S.S. Co., Ltd.
Radley ..	GZZG	2.5.50	C. J. Forster ..	H. G. Strickland, D. A. Barfoot, J. D. Todd ..	P. Probert ..	Stephens, Sutton, Ltd.
Rakaia ..	GFGW	28.11.50	C. J. Codran, R.N.R.	C. S. Keay, F. Allen, A. B. Moss, R. E. Cooke ..	R. Saunders ..	New Zealand Shipping Co., Ltd.
Ramore Head ..	MAXX	18.8.50	E. W. Black ..	E. G. Davey, I. A. Piggott, D. Lawson ..	B. P. Lewis ..	Heyn & Sons, Ltd.
Rancho ..	GLKW	28.8.51	C. E. Halliday ..	—, Woodroge, R. Lowther, P. Saunders, E. C. Jones, D. J. Masson ..	R. V. Gregory ..	P. & O. Steam Navigation Co.
Rangitane ..	GDBV	2.8.51	T. L. Maltby ..	F. S. Angus, J. Marshall, D. Crabtree, F. Williamson ..	C. Lambe ..	New Zealand Shipping Co., Ltd.
Rangitata ..	GSXN	23.8.51	G. Kinnell, O.B.E.	D. Brittain, A. Elliott, T. Wadie, J. Hannah ..	J. Grant ..	New Zealand Shipping Co., Ltd.
Rangitiki ..	GSXW	16.10.51	A. E. Lettington, O.B.E., D.F.C.	I. Christall, G. Simpson, I. Batley ..	J. Poyner ..	New Zealand Shipping Co., Ltd.
Rangitoto ..	GLMV	20.7.51	C. R. Pilcher, O.B.E.	F. Bevis, A. Holley, A. Jenkins, D. Hellings, P. Mather ..	E. R. Saunders ..	New Zealand Shipping Co., Ltd.
Regent Hawk ..	GMND	6.6.51	G. H. Hobson ..	S. Henningway, Z. Wojewodzki, L. S. Ziembicki ..	R. W. Jones ..	Regent Petroleum Tankship Co., Ltd.
Reina Del Pacifico ..	GMPS	18.9.51	J. Whitehouse ..	P. Whitaker, A. Greenwood, J. Peters ..	J. Butler ..	Pacific Steam Navigation Co.
Repton ..	GPFL	29.5.51	D. Cowrie ..	T. Moncrieff, A. Nuttall, B. A. Large ..	H. Mooney ..	Galbraith, Pembroke & Co., Ltd.
Rhodesia Star ..	GUAX	21.11.50	G. L. Evans, O.B.E.	E. W. Jenkins, R. Bayley, R. B. Escrout ..	C. I. Roe ..	Blue Star Line, Ltd.
Rialto ..	GBLV	14.3.51	E. Tyler ..	N. Cook, T. Fugill, G. T. Lawson, H. K. Thompson ..	G. Shilson ..	Ellerman's Wilson Line, Ltd.
Richmond Castle ..	GCSP	19.6.51	J. P. Aplin ..	I. C. McPherson, J. M. Cairns, D. Lamb ..	W. A. Plater ..	Union-Castle Mail S.S. Co., Ltd.
Ripplingham Grange ..	GIGP	1.7.50	R. Owen, O.B.E. ..	R. Brooks, J. H. Taylor, —, Zabel ..	R. G. J. Alton ..	Houlder Bros. & Co., Ltd.
Rochester Castle ..	GZQF	30.7.51	H. L. Holland ..	J. Taylor, R. G. Patterson, C. R. Kelso ..	P. Master ..	Union-Castle Mail S.S. Co., Ltd.
Roslin Castle ..	GYJZ	25.7.50	A. C. M. Black, O.B.E.	J. C. Edwards, S. Hagan, H. Lawton ..	J. Burnett ..	Union-Castle Mail S.S. Co., Ltd.
Rowallan Castle ..	GDFT	10.5.51	A. E. F. Payne ..	R. H. Hudson, J. M. Shelgar, D. Witty ..	H. Dunning ..	Union-Castle Mail S.S. Co., Ltd.
Roxburgh Castle ..	GBGS	8.3.51	E. G. Bidwell ..	J. Kerr, F. J. Pye, M.B.E., E. Hall ..	J. Power ..	Union-Castle Mail S.S. Co., Ltd.
Royal Star ..	MARJ	15.6.51	G. Aldridge ..	H. C. T. Wood, B. G. Knight, M. R. Bremberg, J. W. Poole ..	C. L. Carpenter ..	Blue Star Line, Ltd.
Ruahine ..	GKSY	19.9.51	A. I. Robertson, R.D., A.D.C., Capt., R.N.R.	R. C. Kinloch, B. Crust, J. Newing ..	J. Heath ..	New Zealand Shipping Co., Ltd.
Sacramento ..	GKCN	4.9.51	G. Mussared ..	T. P. Hebden, J. A. Etches, J. A. Pettinger ..	G. Camm ..	Ellerman's Wilson Line, Ltd.
St. Zeno ..	MQMJ	24.5.51	L. Abbey ..	I. L. Downie, G. B. Manson, W. McKean ..	W. Docherty ..	T. Hamling & Co., Ltd.
Salacia ..	GZRN	7.12.50	T. S. Graham ..	R. B. Bryant, J. Bruce, E. Swan ..	A. Hill ..	Donaldson Bros. & Black, Ltd.
Salamanca ..	GSLG	11.1.50	A. Lyall ..	W. P. Duguid, J. Galstone, E. Gowland ..	J. Slater ..	Pacific Steam Navigation Co.
Salaverry ..	GBLQ		J. E. Evans, R.D., R.N.R.			

<i>Salinas</i>	..	GLLK	29.5.51	T. J. Naylor	..	K. Thomas, W. Washington, W. R. Holmes	P. Lyons	..	Pacific Steam Navigation Co.
<i>Salween</i>	..	GFFN	28.8.51	S. S. Duncan	..	A. McDonald, J. Whitehead, J. Coogans, J. Ready	J. Brown	..	P. Henderson & Co.
<i>Samanco</i>	..	MARQ	20.4.49	G. H. Rice	..	H. Allenby, G. A. Holeyman, K. F. Artell	J. Brown	..	Pacific Steam Navigation Co.
<i>Samaria</i>	..	GICF	31.10.50	C. B. Osborne, R.D., R.N.R.	..	W. L. Deslandes, P. King, P. Jackson	J. H. Loetschert	..	Cunard Steamship Co., Ltd.
<i>San Adolfo</i>	..	GYKK	21.11.50	—, McLeod	..	A. Walker, D. P. Carroll, D. Frazer	H. Hughes	..	Eagle Oil & Shipping Co., Ltd.
<i>San Cirilo</i>	..	GZMR	24.5.51	T. L. Pearson	..	E. N. Givens, B. J. Hamilton, W. Hodgson	J. A. Carolan	..	Eagle Oil & Shipping Co., Ltd.
<i>San Felix</i>	..	GFIZ	3.7.51	C. Summers	..	W. W. Gibb, K. D. Harrison, P. Hodges	D. J. Locke	..	Eagle Oil & Shipping Co., Ltd.
<i>San Velino</i>	..	GCNY	8.8.51	K. E. Spencer	..	W. Thompson, W. Povey, H. Bailey	J. Greene	..	Eagle Oil & Shipping Co., Ltd.
<i>San Veronica</i>	..	MASQ	6.3.51	A. E. Gumbleton	..	H. W. Fortnam, J. B. Hunter, N. G. Burton	H. G. Burton	..	Eagle Oil & Shipping Co., Ltd.
<i>San Vulfrano</i>	..	MASR	7.8.51	M. A. Connell, M.B.E.	..	T. Bowlerwell, R. Trim, G. W. Shakespeare	J. Murdoch	..	Eagle Oil & Shipping Co., Ltd.
<i>Sansu</i>	..	GOQN	..	O. Owens, O.B.E.	..	D. I. Jones, O. A. Baker, —, Donaldson	R. Haines	..	Elder Dempster Lines, Ltd.
<i>Santander</i>	..	GBNR	8.8.51	E. C. Hicks	..	F. Nuttall, E. Pepper, P. B. Potts	N. Roberts	..	Pacific Steam Navigation Co.
<i>Sarmiento</i>	..	MARW	1.6.51	J. Williams	..	I. King, R. Middleton, W. Davidson	R. Deakin	..	Blue Star Line, Ltd.
<i>Saxon Star</i>	..	MARX	20.8.51	R. J. C. McDonald	..	R. M. Harrison	G. Gill	..	T. & J. Harrison
<i>Scholar</i>	..	GDCC	7.3.51	D. Wolstenholme	..	R. W. G. Brown, N. Gale, G. Ballard	P. M. Evans	..	Furness, Withy & Co., Ltd.
<i>Scottish Prince</i>	..	GDSK	3.10.50	—, Wiles	..	P. S. Taylor, T. Grimrod, G. B. O. Bowyer	L. Varmin	..	Cunard Steamship Co., Ltd.
<i>Scythia</i>	..	GDYP	14.3.51	J. V. Locke, R.D., R.N.R.	..	W. Tinker, W. Owens, O. T. Jones, R. M. Harrison	W. Robson	..	T. & J. Harrison
<i>Selector</i>	..	MARZ	17.7.51	W. H. Slaughter	..	J. Bean, C. E. Bramhall, W. B. McGuffin, J. S. Bobbin	T. & J. Harrison	..	T. & J. Harrison
<i>Seitler</i>	..	G'FTX	10.5.51	R. F. Phillips	..	F. Gardner, W. P. Russell, M. F. Wakeling	P. J. Townsend	..	Galbraith, Pembroke & Co., Ltd.
<i>Sherborne</i>	..	MFDS	..	H. F. McInnes, O.B.E.	..	N. Halliday, C. H. Drummond, B. E. Watson	W. C. Arscott	..	Andrew Weir & Co., Ltd.
<i>Shelbank</i>	..	GDPZ	17.4.51	C. S. Holbrook	..	A. N. Cockroft, D. Lamont, M. A. Gretton-Doidge	J. A. Wickens	..	Silver Line, Ltd.
<i>Silverbriar</i>	..	GDWM	28.8.51	J. H. Leask	..	D. L. O. Smith, F. Hewett, J. S. Bowman, —, Sellers	W. O'Meara	..	Silver Line, Ltd.
<i>Silverguava</i>	..	GMVR	6.6.51	J. Duncan, O.B.E.	..	J. McK. Batchelor, T. Martyn, E. A. Hansen, I. F. Robertson	D. Redwood	..	Silver Line, Ltd.
<i>Silveroak</i>	..	GCQR	20.4.51	T. S. Morgan, O.B.E.	..	G. F. Lightfoot, A. M. Kirkby, D. Goddard	P. Killen	..	Silver Line, Ltd.
<i>Silverstrand</i>	..	GSFQ	12.1.51	G. F. Chivers	..	L. W. Rothwell, C. H. Goddard, D. M. Bailey	S. D. Cox	..	Silver Line, Ltd.
<i>Silversteak</i>	..	GSFR	22.3.51	E. L. Tilmouth	..	J. Meadows, M. Bingham, D. A. B. Walker	A. Wake	..	Headlam & Son
<i>Silverwalnut</i>	..	GSFT	29.8.51	C. J. Metcalf	..	E. Wilson, M. Turtand, W. Atkinson	S. Heslop	..	P. & O. Steam Navigation Co.
<i>Sneaton</i>	..	GDBS	28.11.50	W. Armstrong	..	J. L. Dunkley, J. R. Turner, B. Tice, A. W. H. Dallas	H. F. Camp	..	Federal Steam Navigation Co., Ltd.
<i>Socotra</i>	..	MASC	27.7.51	J. C. W. Last, O.B.E., Cdr., R.N.R.	..	C. S. Masson, C. A. Miller, C. S. Keay	P. Broome	..	Blue Star Line, Ltd.
<i>Somerset</i>	..	GIMN	15.8.51	P. S. Calcutt	..	G. E. Marsh, L. J. Thompson, T. Ballatyne	J. Cunningham	..	Chr. Salvesen & Co.
<i>South Africa Star</i>	..	GUAU	20.8.51	R. M. T. Jones	..	A. D. Petrie, T. Storey	P. Curzon	..	Chr. Salvesen & Co.
<i>Southern Atlantic</i>	..	GBLY	30.8.51	J. O. Bowie	..	D. Scott, J. Flucker, K. T. Austin	G. R. Campbell	..	Chr. Salvesen & Co.
<i>Southern Collins</i>	..	MASE	13.6.51	J. Bowie	..	—, Anderson, —, Magnus, H. Solburg, D. Smith, G. Vaughan	A. Turnbull	..	Chr. Salvesen & Co.
<i>Southern Garden</i>	..	MASF	23.4.51	W. J. Swanson	..	I. Maclean, J. Maclean, C. Pole	T. Jonstone	..	Chr. Salvesen & Co.
<i>Southern Harvester</i>	..	GFZJ	13.4.51	T. Strandskog	..	J. Holtan, A. Harkness, K. Snorkhestad	J. Hawick	..	Chr. Salvesen & Co.
<i>Southern Opal</i>	..	MASG	27.7.51	A. F. Baikie	..			..	
<i>Southern Raven</i>	..	MAJG	..	J. McNaughton	..			..	
<i>Southern Venturer</i>	..	GNNM	20.4.51	H. Myhre	..			..	

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Sovac</i>	GDDV	30.1.51	A. McCausland	W. Lyall, H. G. Moon, D. Gleadow	K. C. Morris	Vacuum Oil Co., Ltd.
<i>Speaker</i>	GCGT	13.1.51	E. T. Dunn	R. E. Hines, J. M. Doran, T. Pennant	J. Clarke	T. & J. Harrison
<i>Specialist</i>	GCTF	27.7.51	L. Holden	W. S. Turnbull	T. Daly	T. & J. Harrison
<i>Springford</i>	GQKQ	18.1.49	T. R. Mackie	J. Reid	A. Guy	Springwell Shipping Co., Ltd.
<i>Stancourt</i>	GKCP	21.12.50	— MacAlpine	R. Smith, A. Bilsen	M. K. Kavanagh	J. A. Biffmeir & Co., Ltd.
<i>Stirling Castle</i>	GYPX	5.9.50	G. Mayhew	W. Gray, L. Haslett	P. P. Williams	Union-Castle Mail S.S. Co., Ltd.
<i>Stirlingshire</i>	GCQD	20.4.51	E. W. Jenkins	T. R. Halliday, J. Caley, G. M. Silvers	N. J. Braddon	Turnbull, Martin & Co., Ltd.
<i>Strathaird</i>	GRSX	2.8.51	H. S. Allan, R.D., Cdr., R.N.R.	P. A. Wiseman, I. J. Shaw	W. N. Freeman	P. & O. Steam Navigation Co.
<i>Stratheden</i>	GDGT	8.9.50	G. C. Forrest	A. C. Williams, N. R. Lewis	H. S. Horn	P. & O. Steam Navigation Co.
<i>Strathmore</i>	GYMS	1.3.51	C. E. Pollitt	I. M. Sinclair, J. P. McArthur, B. D. H. Thompson, S. Mordant, C. B. Thompson, D. A. Hansing	J. P. Carey	P. & O. Steam Navigation Co.
<i>Strathnaver</i>	GRPZ	25.4.51	J. C. Mellonie	D. T. Bolas, E. Aikman, D. Fanthorpe	A. Miller	Chr. Salvesen & Co. Ltd.
<i>Struan</i>	MASJ	24.5.51	M. Polson	G. Reid, S. Sutherland, A. H. Davies	W. Hayes	Crest Shipping Co., Ltd.
<i>Suncrest</i>	GNWW	11.6.51	L. J. Hunter	A. Oakeshott, N. Munce, — Vernoeaux	— Nicholson	Clunies Shipping Co., Ltd.
<i>Sunrover</i>	MSLB		A. Macvicar	T. Horne, A. Nuttal, R. Caldwell	H. Reynolds	Federal Steam Navigation Co., Ltd.
<i>Sussex</i>	MAEF		F. Loughheed			
<i>Sutherland</i>	GBYG	3.5.51	R. W. Nicolson	J. N. Garrett, G. Balloway, R. B. Hudson, J. C. Cussy	S. Morgan	B. J. Sutherland & Co., Ltd.
<i>Swainby</i>	GPFS	25.4.51	R. D. Sparling	P. Henderson, T. Hastings, P. Dyer	S. R. Johns	Sir R. Ropner & Co., Ltd.
<i>Sydney Star</i>	MKSM	20.7.51	T. F. McDonald, O.B.E.	G. C. Jones, E. Dyer, D. A. Hume, C. G. Lee	J. D. Eastwood	Blue Star Line, Ltd.
<i>Tamaroa</i>	GFWX	13.6.51	G. P. McCraith	J. G. Beck, D. G. Ede, J. Carroll, J. F. Mason, D. MacAskill	D. MacRae	Shaw, Savill & Albion Co., Ltd.
<i>Tanele</i>	GCBF	6.6.51	W. Munt	J. Smith, — Garbot, W. Craig, M. A. McClory	F. Broomfield	Elder Dempster Lines, Ltd.
<i>Tarkua</i>	MASU	8.8.51	G. D. Simpson	J. H. Edmundson, A. R. Jones, R. Martin	G. I. Gilling	Elder Dempster Lines, Ltd.
<i>Tasmania Star</i>	GKPC		G. Owen, O.B.E., R.D., Cdt., R.N.R.			Blue Star Line, Ltd.
<i>Tasso</i>	GLMR	4.9.51	F. Mason	A. Teale, E. J. Beaumont, A. T. Jardine	D. Withers	Ellerman & Wilson Line, Ltd.
<i>Tectus</i>	GBMJ	26.7.51	K. J. Morris	A. S. L. Ayres, I. Higgins, A. Pringle	J. M. Murphy	Anglo-Saxon Petroleum Co., Ltd.
<i>Tekoa</i>	GJFQ	13.12.51	J. D. Bennett	J. Sutherland, W. F. Dan, G. Risley	T. O. M. Jones	New Zealand Shipping Co., Ltd.
<i>Telenachus</i>	GHLB	3.8.51	A. Harrison	J. Dunlop, R. Brett, A. M. Blackburn	— Chapman	A. Holt & Co.
<i>Teviot</i>	MASX	15.6.51	L. T. Peterson	V. Gordon, N. J. Oliver, R. Byles	D. A. Evans	Royal Mail Lines, Ltd.
<i>Thamesfield</i>	GDGK	10.9.51	J. Newbold	J. F. Blakie, S. G. Medhurst, W. B. Simpson	R. Dolley	Hunting & Son, Ltd.
<i>Theliconus</i>	GBMT	13.9.51	W. R. Maine	D. J. E. Marshall, R. A. Moorhouse	P. J. Cottrill	Anglo-Saxon Petroleum Co., Ltd.
<i>Timaru Star</i>	GKKM		R. T. Hales	J. Calabrese, A. H. White, F. A. Ball, G. J. Miles	J. M. Mathias	Blue Star Line, Ltd.
<i>Tinto</i>	GBYT	13.4.51	S. H. Bennett, M.B.E.	C. Everingham, J. Spandler	A. A. Harrison	Ellerman's Wilson Line, Ltd.
<i>Tongariro</i>	GLFZ	18.6.51	T. J. Alderman	R. Merry, N. Collett, J. Bone	R. Heath	New Zealand Shipping Co., Ltd.
<i>Tort Head</i>	GZPW	13.10.50	M. Kennedy	T. Templeton, J. McCormick, F. Sadlier	G. Penketh	G. Heyn & Sons, Ltd.
<i>Tregema</i>	GBPM	13.6.51	C. Lloyd Collings, O.B.E.	N. Berry, D. W. Carror, A. Downs	C. Kelly	Hain S.S. Co., Ltd.
<i>Treleuan</i>	GBPQ	13.7.51	S. K. Hawken	J. E. Maiden, W. O. Boon, B. R. Welbury	I. W. Hart	Hain S.S. Co., Ltd.
<i>Trelyn</i>	GBPP	25.9.51	F. J. Cornish, M.B.E.	J. Downard, H. Gravel, — Tissman	T. H. Murrin	Hain S.S. Co., Ltd.
<i>Tresilian</i>	GCKP	28.12.50	G. Joslin	J. Williams, B. Martin, — Lacey	J. Jenkinson	P. & O. Steam Navigation Co.
<i>Trevaylor</i>	GCKG	22.8.50	A. G. Williams, O.B.E.	T. J. Smith, D. Fife, T. Youdan	— Tyrer	Hain S.S. Co., Ltd.
<i>Tribeman</i>	GBNZ	28.12.50	W. Baker	D. Sims, S. Richardson	S. Pepper	T. & J. Harrison



<i>Tribulus</i>	..	GFIS	1.10.51	H. Sangster	..	P. Marking, L. Dennis, A. Leggett	..	J. Gray	..	Anglo-Saxon Petroleum Co., Ltd.
<i>Tweed</i>	..	GBRP	5.9.51	C. C. Dingle	..	L. Hunter, R. M. Tysoe, R. Foulkes	..	R. Paterson	..	Royal Mail Lines, Ltd.
<i>Umtali</i>	..	GYWB	11.8.51	F. E. J. O'Hea	..	T. Rigby, D. L'Estrange, F. Bush	..	S. Hewitt	..	Bullard, King & Co., Ltd.
<i>Umtata</i>	..	GDQF	13.9.50	P. Rewell	..	J. Thorn, E. LeVine, E. Bicknell, G. T.	..	—	..	Bullard, King & Co., Ltd.
<i>Umzinto</i>	..	GIFQ	11.9.51	R. Harber	..	Gibson, J. Brocklesbury	..	T. Soundy	..	Bullard, King & Co., Ltd.
<i>Vancouver City</i>	..	GIGT	2.10.51	J. H. Thornhill	..	N. Leslie, R. Wise	..	M. Lawrence	..	Sir Wm. Reardon Smith & Sons Ltd.
<i>Vandalia</i>	..	GCRQ	23.10.51	G. S. Evans	..	F. Pollitt, D. Johnson, D. Steff	..	W. Thompson	..	Cunard S.S. Co., Ltd.
<i>Vardulia</i>	..	GCFW	24.5.51	A. N. Sargent, O.B.E., R.D., R.N.R.	..	A. Bull, A. W. Hoyle, J. B. Clemenson	..	—	..	Cunard S.S. Co., Ltd.
<i>Vestra</i>	..	MNNB	23.1.50	D. S. Archibald	..	H. M. Third, D. C. White	..	G. Williams	..	J. T. Salvesen & Co.
<i>Volo</i>	..	GPCJ	31.10.50	A. Morrill	..	S. Wilkinson, H. Hodgson, A. Gillis	..	—	..	Ellerman, Wilson Line, Ltd.
<i>Waimana</i>	..	MATW	4.5.51	C. L. Carroll, D.S.C., R.D., R.N.R.	..	A. C. D. Masters, J. Scott, J. B. Hunt, K. D. Billinghamurst	..	O'Sullivan	..	Shaw, Savill & Albion Co., Ltd.
<i>Waijara</i>	..	GWXQ	24.7.51	R. A. Milne	..	G. Main, J. Collins, B. H. Clarke-Lens, B. Tomalin	..	J. Houghney	..	Shaw, Savill & Albion Co., Ltd.
<i>Wairangi</i>	..	MATX	25.9.51	H. C. Smith	..	A. O. Griffiths, P. H. Carden, I. McIntosh	..	N. V. Howell	..	Shaw, Savill & Albion Co., Ltd.
<i>Waivera</i>	..	GBJB	20.7.51	L. J. Hopkins	..	A. Chandler, D. Williams, C. Tucker	..	J. Downie	..	Shaw, Savill & Albion Co., Ltd.
<i>Walvis Bay</i>	..	GKBB	..	H. Gentles	..	J. Marshall	..	—	..	Sir R. Ropner & Co., Ltd.
<i>Warstead</i>	..	GFLS	23.8.51	D. G. Martin	..	A. J. L. Smith, C. B. O. Shorter, A. M. Brown	..	A. H. Stewart	..	Watts, Watts & Co., Ltd.
<i>Warkworth</i>	..	MALF	..	N. Thompson	..	F. E. Wilson, G. B. Bell, D. Popplewell	..	S. Wardle	..	R. S. Dalglish, Ltd.
<i>Warwick Castle</i>	..	GRRJ	3.10.50	L. H. Farrow	..	I. J. Dawson, —, Hudson, N. Upham	..	G. Shaw	..	Union Castle Mail S.S. Co., Ltd.
<i>Wendover</i>	..	GEML	11.8.51	F. W. Grist	..	D. J. Cunningham, J. Raggot, D. Griffin	..	P. Wiggins	..	Watts, Watts & Co., Ltd.
<i>Winchester Castle</i>	..	GTPZ	20.9.51	H. A. Deller	..	B. Braithwaite, J. R. Diggie, C. Bragg	..	R. Brew	..	Union Castle Mail S.S. Co., Ltd.
<i>Woodford</i>	..	GFMH	18.6.51	W. Shields, O.B.E.	..	J. Swann, J. Kirby, —, Partridge	..	W. McKenzie	..	Watts, Watts & Co., Ltd.
<i>Worcestershire</i>	..	GFZM	16.2.51	F. C. Brooks	..	J. F. Whiteside, A. M. McLean, R. Howe	..	W. Fletcher	..	Bibby Bros. & Co.
<i>Yoma</i>	..	GLPN	19.9.51	S. Thompson	..	J. Thomson, —, Hamilton, J. Fitzgerald	..	W. Allen	..	P. Henderson & Co.
<i>Zealandic</i>	..	MAGJ	29.6.50	P. F. Owens	..	G. Roberts, J. Rutherford, A. Anderton	..	A. McLennan	..	Rio Cape Line, Ltd.



NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>*Queen of Bermuda</i> ..	GZKF		L. F. Banyard, O.B.E.	N. E. James	H. Stennett	Furness, Withy & Co., Ltd.
<i>Comcay, H.M.S.</i> ..	—	8.8.51	E. Hewitt, R.D., Capt. R.N.R.	The Senior Cadets	—	—
<i>Pangbourne Nautical College</i> ..	—	16.8.51	H. C. Skinner, O.B.E., Cdr. R.N.	The Senior Cadets	—	—
<i>Worcester, H.M.S.</i> ..	—	31.7.51	G. C. Steele, V.C., Cdr. R.N. (Retd.)	The Senior Cadets	—	—

\* This ship has been recruited by the Bermuda Meteorological Service.

Supplementary Ships

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Albis</i> .. ..	GSYV	.. ..	J. Slater	G. Bloomfield, R. Bakies, —, Harrison ..	..	S. G. Embiricos, Ltd.
<i>Baron Scott</i> ..	GBSB	.. ..	W. Fitzgerald	W. Carlaw, W. S. Counsell, W. F. Caldwell ..	..	H. Hogarth & Sons
<i>Bellerby</i> .. ..	MQJF	16.10.51	J. Whamond	W. Grant, A. Dixon, U. Easby ..	..	Ropner Shipping Co., Ltd.
<i>Blairclava</i> .. ..	GGLG	.. ..	J. McVean	S. Judge, I. McGillivray, F. Doyle ..	..	Geo. Nisbet & Co.
<i>British Duke</i> ..	GVSX	16.8.51	—, McIver	L. R. White, —, Stock, —, Verdun ..	..	British Tanker Co., Ltd.
<i>Cedarpool</i> .. ..	MAHG	27.4.51	D. Barrow	V. Rixham, W. Anderson, M. Richardson ..	..	Sir R. Ropner & Co., Ltd.
<i>City of Khios</i> ..	GKYB	.. ..	A. R. Horan	S. Hider, R. F. Arnold, W. Waugh ..	..	Ellerman Lines, Ltd.
<i>Clan Alpine</i> .. ..	GIFF	.. ..	G. Vernon-Greene	.. ..	..	Cayzer, Irvine & Co., Ltd.
<i>Clan Lamont</i> .. ..	GTVD	.. ..	J. E. Townroe	W. H. J. Dilks, R. R. Baxter, J. J. Grigor ..	..	Cayzer, Irvine & Co., Ltd.
<i>Clan MacBrayne</i> ..	MAQA	.. ..	W. H. Dalley	J. Freestone, J. L. Easton, J. C. Duncan ..	..	Cayzer, Irvine & Co., Ltd.
<i>Coptic</i> .. ..	GSND	.. ..	—, Thompson	P. Yeoman, J. Gunning, J. Yarwood ..	..	Shaw, Savill & Albion Co., Ltd.
<i>Dartmoor</i> .. ..	GFQT	.. ..	J. O. Roberts	J. Howe, J. Sutherland, B. Thompson ..	..	Walter Runciman & Co., Ltd.
<i>Devon City</i> .. ..	MBKL	.. ..	F. G. Dodman	J. H. J. Frost, J. R. Harris, B. M. Richards ..	..	Sir William Reardon Smith and Sons, Ltd.
<i>Diomed</i> .. ..	GCRY	.. ..	R. Singleton	.. ..	..	A. Holt & Co.
<i>Eastbank</i> .. ..	GFKR	.. ..	R. Smith	C. G. Watterson, P. Hewitt ..	..	Andrew Weir & Co., Ltd.
<i>Empire Medway</i> ..	GXXV	28.8.51	H. A. Shaw	J. R. Perkins, J. Robertson, W. Howard ..	..	Prince Line, Ltd.
<i>Empire Trooper</i> ..	GLXJ	18.6.51	R. H. A. Bond, O.B.E.	P. Pitcairn, P. Chubb, J. Bowden ..	..	British India Steam Navigation Co., Ltd.
<i>Empire Windrush</i> ..	GYSF	24.8.51	J. Wilson, O.B.E.	P. B. Eccles, O. L. Springett, G. McCarthy ..	..	New Zealand Shipping Co., Ltd.
<i>Folda</i> .. ..	MLFR	.. ..	E. Tulloch	.. ..	..	Chr. Salvesen & Co.
<i>Forthbank</i> .. ..	GJQX	.. ..	D. A. Reid	P. Mitchell, G. W. Hargreaves, G. I. Williams ..	..	Andrew Weir & Co., Ltd.
<i>Greenland</i> .. ..	GCLJ	28.11.50	C. F. McDonald	A. Millar, J. Thompson, J. Borthwick ..	..	Currie Line, Ltd.
<i>Harbation</i> .. ..	GFFX	.. ..	G. Jones	J. T. Baker, G. D. Brown, R. Skinner ..	..	I. & C. Harrison & Co., Ltd.
<i>Hendonhall</i> .. ..	GBTX	.. ..	C. H. Thomas	J. Perfect, J. B. Bewick ..	..	West Hartlepool Steam Nav. Co.
<i>Hestone</i> .. ..	GUGJ	.. ..	M. J. Lewis	G. Robinson, J. McMaster, D. W. Thomas ..	..	Houston Line (London), Ltd.
<i>Hollybank</i> .. ..	MANY	.. ..	A. J. Whiston	.. ..	..	Andrew Weir & Co., Ltd.
<i>Hudson Firth</i> .. ..	GDKM	.. ..	J. Gibbons	W. G. Lambert, M. R. Uminski, —, Oliver ..	..	Hudson S.S. Co., Ltd.
<i>Iceland</i> .. ..	GFFT	4.10.51	R. Borthwick	J. K. Liston, F. G. Saunby, A. G. Marsh ..	..	Currie Line, Ltd.
<i>Leicestershire</i> ..	GDBL	.. ..	R. Cuming, D.S.C.	—, Underdown, J. Howson, St. Q. Beadon, ..	..	British India Steam Nav. Co., Ltd.
<i>Llangibby Castle</i> ..	GPLV	30.3.51	D. D. Mackenzie	D. J. Jones, R. Olden ..	..	Union-Castle Mail S.S. Co., Ltd.
<i>Maple Hill</i> .. ..	MANE	.. ..	S. Cheek	E. E. Ellard ..	..	P. B. Pandelis, Ltd.
<i>Markab</i> .. ..	GCVT	20.5.49	R. Chapman	R. Chapman, A. Stuart, W. Russell ..	..	Phocian Ship Agency, Ltd.
<i>Modasa</i> .. ..	GFDZ	.. ..	R. Brignall	W. Brown ..	..	British India Steam Nav. Co., Ltd.
<i>Mulberry Hill</i> ..	MAKQ	.. ..	J. Campbell	.. ..	..	Counties-Ship Management Co., Ltd.
<i>Northia</i> .. ..	GDQK	.. ..	J. R. Petrie	.. ..	..	Anglo-Saxon Petroleum Co., Ltd.
<i>Peebles</i> .. ..	GYTN	.. ..	R. Thwaites	.. ..	..	B. J. Sutherland & Co., Ltd.
<i>Port Alma</i> .. ..	GSTN	5.7.51	D. F. Morgan	.. ..	..	Port Line, Ltd.
<i>Port Dunedin</i> .. ..	GLCJ	.. ..	W. B. Craig	.. ..	..	Port Line, Ltd.
<i>Port Fairy</i> .. ..	GSTP	.. ..	J. A. Fairbairn	M. Rushan, E. Newstead, W. M. G. Lloyd ..	..	Port Line, Ltd.
<i>Port Victor</i> .. ..	MSWK	.. ..	E. T. N. Lawrey	G. K. Morris, J. A. E. Lascelles, B. B. Skrimshire, W. Duthie ..	..	Port Line, Ltd.
<i>Rembrandt</i> .. ..	GDFD	.. ..	E. E. Roberts	M. L. Mitchell ..	..	Port Line, Ltd.
				R. J. Bostock ..	..	Bolton Steam Shipping Co., Ltd.
				C. Phillips, M. Siddle, J. Parsloe ..	..	

<i>Royal Emblem</i> ..	GDSC	S. Moorhead	J. N. Meeks	J. N. Meeks	..	..	..	..	..	..	..	Hall Bros. Fishery Division, Scottish Home Department
<i>Scottia</i> ..	GPYM	A. M. Findlayson	J. Craig	J. Craig	..	..	..	..	..	..	..	J. A. Billmeir & Co., Ltd.
<i>Stankeld</i> ..	GZQQ	J. McAlpine	..	H. Decahour, B. Willis, T. Cummings	..	..	..	..	..	..	S. Kirkwood	Lyle Shipping Co., Ltd.
<i>Table Bay</i> ..	MFTV	G. E. Miles	..	J. C. Ross, A. C. Toms, W. McOnie	..	..	..	..	..	..	..	Anchor Line, Ltd.
<i>Taranita</i> ..	GIGS	A. J. F. Colquhoun	..	J. Miller, D. C. Penburthy, Foster	..	..	..	..	..	..	..	Hain S.S. Co., Ltd.
<i>Trevoorlas</i> ..	MATL	W. T. Evans	25.9.51	J. Dalgliesh, D. R. Jenkins, D. T. Best	..	..	..	..	..	..	..	Hain S.S. Co., Ltd.
<i>Trelissick</i> ..	GBPR	M. E. Sadler	..	W. Johnson, J. D. W. Collister	..	..	..	..	..	..	..	Chr. Salvesen & Co.
<i>Tronda</i> ..	MMIX	R. J. Sinclair	15.10.51	..	..	..	..	..	..	..	..	Currie Line, Ltd.
<i>Woodland</i> ..	MTCT	C. M. Webster	..	..	..	..	..	..	..	..	..	..

## FLEET LIST (Australia)

### VOLUNTARY OBSERVING SHIPS

The following is a list of observing ships voluntarily co-operating with the Meteorological Service of Australia

NAME OF VESSEL	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/AGENTS
<i>Selected Ships:</i>				
<i>Canara</i> ..	W. Bird, O.B.E.	T. Woodward, J. D. Campbell, C. C. Springall	P. A. Stuart	British India Steam Nav. Co.
<i>Chupra</i> ..	J. D. Woods	C. Allerton, H. S. Strawbridge, W. L. Hilcoat	R. C. Whiting	British India Steam Nav. Co.
<i>Idomeneus</i> ..	J. L. Johnston	W. A. Clark, G. D. F. Cruickshank, P. S. Lombard, G. Moncks	A. N. Williams	A. Holt & Co.
<i>Koolinda</i> ..	J. S. Airey	J. Paulsen, J. Palfreyman, R. Seaward	H. White	Western Australian State Steamships
<i>Koomilya</i> ..	F. W. Roberts	C. Stewart, R. Sicklin, G. Steinbeck	F. Mackie	McIlwraith, McEacharn, Ltd.
<i>Koorunga</i> ..	F. McLean	A. D. Hanson, V. Bovell, J. A. Grey	..	McIlwraith, McEacharn, Ltd.
<i>Lowana</i> ..	L. Fry	C. A. Blow, T. H. Millidge, J. K. Saint	R. M. Rees	Melbourne Steamship Co., Ltd.
<i>Nellore</i> ..	T. Mills	A. Johnston, G. Champion, G. Cleveland, K. Skinner	J. Bell	Eastern & Australian S.S. Co., Ltd.
<i>Orestes</i> ..	F. J. Cockburn	A. Surtees, G. Kitching, R. Denning, P. Beckett	J. Dunnison	A. Holt & Co.
<i>River Burnett</i> ..	L. G. Ramsay	R. Campbell, H. W. Robinson, T. Beckinsale	F. E. Audsley	Australian Shipping Board
<i>River Clarence</i> ..	W. W. Fish	A. T. Lake, I. K. S. Adam, S. F. Dockwell	G. Harper	Australian Shipping Board
<i>River Mitta</i> ..	A. Knight	G. Davies, K. Clarence, W. Wiggins	M. Pearson	Australian Shipping Board
<i>Triadic</i> ..	A. Rhoades	J. P. Milton, W. L. Harbord, W. B. Jeavons	M. Hayter	British Phosphate Commission
<i>Trienza</i> ..	P. Richardson	D. Neilson, D. Robb, K. Oliver	J. Ward	British Phosphate Commission
<i>Triona</i> ..	C. L. Evans	F. W. Thompson, S. E. B. Harris, B. J. Robertson	R. G. Neale	British Phosphate Commission
<i>Wanganella</i> ..	—	..	—	Huddart, Parker, Ltd.
<i>Supplementary Ships</i>				
<i>Diomed</i> ..	A. M. Caird	H. A. Jeffrey, K. W. Dunlop, E. Webb	C. Palmer	A. Holt & Co.
<i>Derrigo</i> ..	..	..	..	Australian Shipping Board
<i>Kybra</i> ..	..	..	..	Western Australian State Steamship

# FLEET LIST (Hong Kong)

## VOLUNTARY OBSERVING SHIPS

The following is a list of observing ships voluntarily co-operating with the Royal Observatory, Hong Kong

NAME OF SHIP	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	SHIPPING COMPANY OR OPERATORS
<i>Anking</i> ..	A. Taylor ..	W. Davidson, J. D. de C. Veale, St. E. M. F. Haslett ..	G. W. Moore ..	China Navigation Co., Ltd.
<i>Anshan</i> ..	J. McKinlay ..	C. N. Stewart, J. R. Brett, D. S. Southey ..	P. L. Littin ..	China Navigation Co., Ltd.
<i>Benclouch</i> ..	G. M. McGill ..	J. R. Morrison, C. R. D. McLeod, J. S. Steele, E. O. E. R. Price ..	J. W. Dick ..	Ben Line, Ltd.
<i>Caroline Moller</i> ..	W. J. Lang ..	L. G. M. Warner, N. F. Andrade, Yuan King Lau ..	P. N. Bhatt ..	Mollers' (H.K.) Ltd.
<i>Chang Sha</i> ..	C. P. Miller ..	V. R. Woolfe, S. Fergusson, J. R. Young, P. Baxter ..	G. W. Bourne ..	China Navigation Co., Ltd.
<i>Choy Sang Chun Sang</i> ..	J. F. G. Fotheringham ..	F. H. Main, A. A. Watson, R. J. Cooper ..	R. M. Legg ..	Indo-China Steam Navigation Co., Ltd.
<i>Eastern Glory</i> ..	D. G. R. Kinnear ..	E. M. Norman, D. N. Snashall, P. S. Sullivan ..	P. J. Behan ..	Indo-China Steam Navigation Co., Ltd.
<i>Eastern Queen</i> ..	L. McRae ..	T. J. Ashcroft, R. P. Farquhar, R. W. E. Little ..	C. D. Evans ..	Indo-China Steam Navigation Co., Ltd.
<i>Eastern Saga</i> ..	D. G. Burleigh ..	M. I. Groundwater, D. R. McFadzien, E. Jones, J. H. Jeffries ..	D. Johnson ..	Indo-China Steam Navigation Co., Ltd.
<i>Eastern Trader</i> ..	S. Schofield ..	C. Thomson, M. J. K. Crighton, G. J. Eastwood, A. F. Cameron ..	R. E. Stewart ..	Indo-China Steam Navigation Co., Ltd.
<i>E Sang</i> ..	J. L. Baines ..	Tai Ai-Chun, Chin Kwo Chiang, Lo Shao Hsin ..	Chang Min Sen ..	Great Southern Steamship Co., Ltd.
<i>Fengning</i> ..	J. Shiel ..	I. H. Thomas, C. Przybylinski, T. Y. Yuan ..	W. I. Briggs ..	Indo-China Steam Navigation Co., Ltd.
<i>Fengtien</i> ..	F. N. Booth ..	D. W. R. Gash, S. E. B. Harris, P. Bulatoff ..	E. G. Inwood ..	China Navigation Co., Ltd.
<i>Foochow</i> ..	F. Gibbs ..	A. Harper, J. F. O'Connor, J. C. Mark ..	R. A. Castro ..	China Navigation Co., Ltd.
<i>Fort Charlotte</i> ..	F. Kelly ..	S. H. Liu, R. A. Button, A. P. Sokoloff ..	P. S. Peryar ..	China Navigation Co., Ltd.
<i>Fukien</i> ..	D. C. B. Ralph, O.B.E., D.S.C. ..	A. M. Teller, T. J. Owen, W. P. Martinson ..	H. C. W. Rankin ..	Royal Fleet Auxiliary
<i>Funing</i> ..	A. H. Finnie ..	D. I. Robertson, R. Perry, C. F. Chen ..	Leung Man Hin ..	China Navigation Co., Ltd.
<i>Green Ranger</i> ..	J. Taylor ..	M. D. B. Sweeney, D. L. Wilson, G. Young ..	G. Whitehead ..	China Navigation Co., Ltd.
<i>Greystone Castle</i> ..	E. Payne ..	W. Rennie, A. D. Walters, W. Carr ..	B. Rowan ..	Royal Fleet Auxiliary
<i>Hai Lee</i> ..	L. Rowe ..	A. Erskine, K. Rowe, P. B. Kelman, A. A. Gibbons ..	D. G. Sims ..	Mollers' (H.K.), Ltd.
<i>Hai Meng</i> ..	J. Hansen ..	T. Thorkildsen, Erling Tufte, Marius Sandvik ..	Ip Ki Tseng ..	China Siam Line.
<i>Hang Sang</i> ..	Walter Hannevig ..	O. Schibsted, E. Tommervik ..	Wong On Chung ..	China Siam Line.
<i>Hanyang</i> ..	L. W. Harrison ..	J. E. Williams, R. Grieve, A. Nelson ..	Lo Kin Chek ..	Indo-China Navigation Co., Ltd.
<i>Heinrich Jensen</i> ..	J. W. Evans ..	P. Flory, F. W. Ridley, P. Y. Lam ..	E. Bellard ..	China Navigation Co., Ltd.
<i>Hermelin</i> ..	R. D. Nielsen ..	C. S. Jensen, J. N. Holst, Yeh Kiong Yi ..	Lai Kwong ..	Jebsen & Co.
<i>Hermod</i> ..	H. A. Johnsen ..	Aaake Andersen, A. Skjorvestad, Hans Berge ..	Ho Hung Ki ..	China Siam Line
<i>Hwa Sang</i> ..	Olaf Apold ..	Johannes Eide, Robert Gronnold ..	Ma Ping Leung ..	China Siam Line
<i>Hin Sang</i> ..	R. G. Stanton ..	L. C. Cox, J. G. Perrin, M. T. G. Fish ..		Indo-China Steam Navigation Co., Ltd.
	G. W. F. Edwards ..	W. E. Reeve, L. I. Ovsiannikoff, J. M. Taylor ..		Indo-China Steam Navigation Co., Ltd.

<i>Hiram</i> ..	..	G. Hamre ..	..	Guy Sundholm, H. Fredenborg ..	..	Chiu Tse Kong ..	China Siam Line
<i>Hoi Houw</i> ..	..	A. Fjeldheim ..	..	K. Munkeford, O. Ofsted, H. Kristoffersen ..	..	A. Jensen Takvam ..	Karsten Larssen & Co. (Hong Kong), Ltd.
<i>Hoi Wong</i> ..	..	M. Bjerkenes ..	..	B. Maeland, A. Vespstad, M. Madsen ..	..	O. Torresdal ..	Karsten Larssen & Co. (Hong Kong), Ltd.
<i>Hunan</i> ..	..	H. Pilling ..	..	W. J. Coburn, P. C. J. Cockburn, J. H. M. Twibill ..	..	Choi Pong Cheung ..	China Navigation Co., Ltd.
<i>Hupoh</i> ..	..	N. E. Awcock ..	..	J. C. Christal, C. Stark, C. F. Chan ..	..	Tsang Kau ..	China Navigation Co., Ltd.
<i>Kueiyang</i> ..	..	W. B. B. Paul ..	..	J. F. O'Dowd, S. W. Owen, L. C. Wang ..	..	Liu Yuk Kong ..	China Navigation Co., Ltd.
<i>Lok Sang</i> ..	..	R. I. Groundwater ..	..	T. C. W. Marr, I. Rowland-Jones, K. C. Yeung ..	..	J. E. Chew ..	Indo-China Steam Navigation Co., Ltd.
<i>Mui Ann</i> ..	..	A. Bj. Justad ..	..	H. Pettersen, T. Johnsen, H. Aashem ..	..	A. Ovlund ..	Chin Seng Hong Shipping Co., Ltd.
<i>Mui Heng</i> ..	..	Karl M. Svendsen ..	..	Martin S. Severinsen, Egil Linde ..	..	Cheng Shan Wai ..	Chin Seng Hong Shipping Co., Ltd.
<i>Muncaster Castle</i> ..	..	G. Anderson ..	..	E. W. Stubbs, C. R. Blair, H. Wilson, R. Crichton ..	..	A. G. Pearce ..	Mollers' (Hong Kong), Ltd.
<i>Pakhoi</i> ..	..	G. P. Cope ..	..	S. J. Yeandle, G. Baxter, T. C. Tsai ..	..	Leung Kan ..	China Navigation Co., Ltd.
<i>Poyang</i> ..	..	D. S. Sim ..	..	R. Tasker, A. Bartley, C. M. Li ..	..	Li San Kau ..	China Navigation Co., Ltd.
<i>Produce</i> ..	..	A. S. Bugge ..	..	T. K. Kobiesen, H. Sivertsen, B. Nordhus ..	..	T. Solheim ..	Karsten Larssen & Co. (Hong Kong), Ltd.
<i>Sangola</i> ..	..	A. G. Brooks ..	..	J. D. Sleight, J. M. Woolcock, J. R. D. McLeod ..	..	R. O. Smith ..	British India Steam Navigation Co., Ltd.
<i>Shansi</i> ..	..	L. V. Rowe ..	..	J. F. Follett, E. Shakeshaft, C. W. Lau ..	..	Edward Toyit ..	China Navigation Co., Ltd.
<i>Shengkong</i> ..	..	D. Mc.G. Holmes ..	..	C. A. N. Baker, D. J. Coombes, S. K. Chen ..	..	R. M. Inwood ..	China Navigation Co., Ltd.
<i>Shillang</i> ..	..	H. I. Perry ..	..	H. D'aeth, E. Snowden, D. Harrison ..	..	W. Mathews ..	P. & O. Steam Navigation Co.
<i>Sinkiang</i> ..	..	R. E. Selwyn Jones ..	..	P. H. Ward, I. Robinson, S. T. Sung ..	..	Chin Fook On ..	China Navigation Co., Ltd.
<i>Sirdhana</i> ..	..	W. Brawn, M.B.E. ..	..	D. C. Murison, R. I. Higgins, D. T. Brown ..	..	J. Orman ..	British India Steam Navigation Co., Ltd.
<i>Soochow</i> ..	..	A. Naismith ..	..	B. M. McLennan, J. C. Anderson, S. N. Lai ..	..	R. R. Stevenson ..	China Navigation Co., Ltd.
<i>Szechuen</i> ..	..	G. T. M. Ramsay ..	..	I. Storey, W. T. Masters, V. A. Boutsloi ..	..	Tsang Pui Leung ..	China Navigation Co., Ltd.
<i>Tai Chung Shan</i> ..	..	A. H. Bathurst ..	..	S. F. Smith, S. C. Chan, H. J. Liu ..	..	S. T. Fong ..	Shun Cheong Steam Navigation Co.
<i>Taiyuan</i> ..	..	Y. N. Campbell ..	..	A. Watson, H. A. Ledeboer, F. T. Quinn, R. J. Porter ..	..	D. F. MacDonald ..	China Navigation Co., Ltd.
<i>Tak Sang</i> ..	..	W. T. Rochester ..	..	N. B. Hall, J. M. Marshall, K. Y. Feng ..	..	E. A. West ..	Indo-China Steam Navigation Co., Ltd.
<i>Thai</i> ..	..	O. I. Ihre ..	..	E. V. E. Lieberaph, R. A. Fricksson, K. A. Alebresson ..	..	T. G. Nilsson ..	Everett Steamship Corporation
<i>Tsinan</i> ..	..	W. E. Hargrave ..	..	A. O. Atkinson, J. Paton, C. K. Tao ..	..	Wai Pun Un ..	China Navigation Co., Ltd.
<i>Wing Sang</i> ..	..	N. H. King ..	..	G. Parish, W. E. McLackland, Keng Jen Ko ..	..	A. G. Lum ..	Indo-China Steam Navigation Co., Ltd.
<i>Wo Sang</i> ..	..	G. Owens ..	..	R. C. Traill, W. E. S. Cream, P. D. Coles ..	..	T. Ovens ..	Indo-China Steam Navigation Co., Ltd.
<i>Yochow</i> ..	..	J. W. E. Warrior ..	..	E. W. Woodcock, R. D. A. Owen, K. W. Wu ..	..	Cheung Shing Cheung ..	China Navigation Co., Ltd.
<i>Yunnan</i> ..	..	E. Bruce ..	..	G. A. Abbs, J. R. Suffren, Lai Wai ..	..	Tye Cho Chun ..	China Navigation Co., Ltd.



## FLEET LIST (India)

The following is a list of observing ships, voluntarily co-operating with the India Meteorological Department.

NAME OF VESSEL						OWNERS
Selected Ships:						
<i>Alavi</i>	..	..	..	..	..	Mogul Line Ltd.
<i>Bahadur</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Bombay</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Chanda</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Dara</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Darressa</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Dumra</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Dwaraka</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Englestan</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Havildar</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Islami</i>	..	..	..	..	..	Mogul Line Ltd.
<i>Jalazad</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jaladuta</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalaganga</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalamani</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalamanjari</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalaprakash</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalashmi</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalaveera</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalayamuna</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jahangir</i>	..	..	..	..	..	Mogul Line Ltd.
<i>Kampala</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Karanja</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Khosrou</i>	..	..	..	..	..	Mogul Line Ltd.
<i>Maharaja</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Mahadevi</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Nadir</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Nurjehan</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Rajput</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Rajula</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Santhia</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Shahjehan</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Singu</i>	..	..	..	..	..	Burma Oil Co., Ltd.
<i>Sirsa</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Subadar</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Tairea</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Warla</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Yenang Yaung</i>	..	..	..	..	..	Burma Oil Co., Ltd.
Supplementary Ships:						
<i>Akbar</i>	..	..	..	..	..	Mogul Line Ltd.
<i>Badarpur</i>	..	..	..	..	..	Burma Oil Co., Ltd.
<i>Barala</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Begum</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Bharatjal</i>	..	..	..	..	..	Bharat Line, Ltd.
<i>Bharat Rani</i>	..	..	..	..	..	Bharat Line, Ltd.
<i>Itaura</i>	..	..	..	..	..	British India Steam Navigation Co., Ltd.
<i>Jaladurga</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalagopal</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalagawahar</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalakendra</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalaketu</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalakrishna</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalamayur</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalaratna</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Jalavijaya</i>	..	..	..	..	..	Scindia Steam Navigation Co., Ltd.
<i>Malika</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Masimpur</i>	..	..	..	..	..	Burma Oil Co., Ltd.
<i>Nurani</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Risaldar</i>	..	..	..	..	..	Asiatic Steam Navigation Co., Ltd.
<i>Rizwani</i>	..	..	..	..	..	Mogul Line, Ltd.

## FLEET LIST (New Zealand) VOLUNTARY OBSERVING SHIPS

The following is a list of observing ships voluntarily co-operating with the Meteorological Service of New Zealand.

NAME OF VESSEL	OWNERS
<b>Selected Ships:</b>	
<i>Kauri</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Karitane</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Kaitoke</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Kawaroa</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Komata</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Kopua</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Koromiko</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Kurou</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Matua</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Maui Pomare</i> .. .. .	New Zealand Government.
<i>Monowai</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Waimate</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Waipori</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Wairata</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Wairimu</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Waitaki</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Waitemata</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<b>Supplementary Ships:</b>	
<i>Kaipoi</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Kaitanawa</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Kaimiro</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Kaitangata</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Kaitawa</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Karepo</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Kartigi</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Katua</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Kawatiri</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Kiwitea</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Konui</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Korowai</i> .. .. .	Union Steam Ship Company of New Zealand, Ltd.
<i>Piri</i> .. .. .	Imperial Chemical Industries, Ltd.
<i>Port Waikato</i> .. .. .	Holm & Company, Ltd.
<i>Viti</i> .. .. .	Tasman Steam Ship Company, Ltd.

# FLEET LIST (South Africa)

The following is a list of observing ships voluntarily co-operating with the Weather Bureau of South Africa.

NAME OF SHIP	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	SHIPPING COMPANY OR OPERATOR
<i>Abraham Larsen</i> ..	R. L. V. Shannon, O.B.E.	A. Thomas, D.S.C., L. Moon ..	D. M. McVicar ..	Union Whaling Co., Durban
<i>Africana II</i> ..	R. Lewis ..	S. J. Hurst, — Sharp ..	R. Parker ..	Department of Fisheries, Cape Town
<i>Aquilas</i> ..	S. S. Edwards ..	A. F. Horden, G. P. Brandt ..	M. Leahy ..	S.A.R. Ships, Cape Town
<i>Aloe</i> ..	H. Flowerdew ..	R. Ranter, G. Cooke, G. F. Williams ..	H. Pypers ..	S.A.R. Ships, Cape Town
<i>Catamar</i> ..	H. H. Cook ..	L. W. Coltham, P. Nankin ..	C. L. Hagan ..	Elder Dempster
<i>Cape Coast</i> ..	F. Honeyman ..	G. D. Duguid, P. A. T. Gordon, D.S.M. ..	H. Fluitman ..	Thesen's S.S. Co., Cape Town
<i>Constantia</i> ..	E. N. Stewart ..	P. J. Cox, G. Mouat ..	S. P. Garnett ..	S.A. Marine Corp, Cape Town
<i>Dalia</i> ..	J. Lundberg, M.B.E.	O. Mohr, G. Salmon ..	P. Goggin ..	S.A.R. Ships, Cape Town
<i>Gilia</i> ..	G. E. Hine ..	B. I. Algar ..	G. Adey ..	Irving & Johnson, Cape Town
<i>Isolda</i> ..	P. F. M. Buchholtz ..	M. A. Hoffman ..	G. A. Chapman ..	Tristan Development Co., Cape Town
<i>Kaaplana</i> ..	P. Bolam ..	A. Fawthorp, D. A. Danks ..	A. Williams ..	South African Lines, Cape Town
<i>Mashona</i> ..	O. C. Olsen ..	F. Thomas, G. W. Clancy ..		Thesen's S.S. Co., Cape Town
<i>Matabele Coast</i> ..	A. Astill ..	M. T. Scott ..		Thesen's S.S. Co., Cape Town
<i>Morea</i> ..	D. Thorpe ..	A. Lemarchand, H. R. M. Maigrot ..		Irving & Johnson, Cape Town
<i>Morgenster</i> ..	A. J. Watt ..	R. Thompson, H. Poulton ..		S.A. Marine Corp., Cape Town
<i>Pequena</i> ..	B. Ashworth ..			Tristan Development Co., Cape Town
<i>Rondeval</i> ..	R. Gardner ..			Van Riebeeck Line, Cape Town
<i>Vergelegen</i> ..				S.A. Marine Corp., Cape Town

# FLEET LIST (Canada)

## VOLUNTARY OBSERVING SHIPS

The following is a list of observing ships voluntarily co-operating with the Meteorological Service of Canada.

NAME OF VESSEL	OWNERS
Selected Ships	
<i>Aorangi</i> .. .. .	Canadian Australasian Line.
<i>Canadian Challenger</i> .. .. .	"Canadian Challenger", Ltd. (Canadian National Steamships).
<i>Canadian Constructor</i> .. .. .	"Canadian Constructor", Ltd. (Canadian National Steamships).
<i>Canadian Cruiser</i> .. .. .	"Canadian Cruiser", Ltd. (Canadian National Steamships).
<i>Esso Knoxville</i> .. .. .	Imperial Oil, Ltd.
<i>Fort Amherst</i> .. .. .	Furness, Withy & Co.
<i>Fort Townshend</i> .. .. .	Furness, Withy & Co.
<i>Imperial Alberta</i> .. .. .	Imperial Oil, Ltd.
<i>Imperial Charlottetown</i> .. .. .	Imperial Oil, Ltd.
<i>Imperial Fredericton</i> .. .. .	Imperial Oil, Ltd.
<i>Imperial Quebec</i> .. .. .	Imperial Oil, Ltd.
<i>Imperial Toronto</i> .. .. .	Imperial Oil, Ltd.
<i>Imperial Winnipeg</i> .. .. .	Imperial Oil, Ltd.
<i>John S. Pillsbury</i> .. .. .	Upper Lakes and St. Lawrence Transportation Co. Ltd.
<i>Lady Nelson</i> .. .. .	"Lady Nelson", Ltd. (Canadian National Steamships).
<i>Lady Rodney</i> .. .. .	"Lady Rodney", Ltd. (Canadian National Steamships).
<i>Lake Manitou</i> .. .. .	Western Canada Steamship Co., Ltd.
<i>Lake Minnewanka</i> .. .. .	Western Canada Steamship Co., Ltd.
<i>Lake Pennask</i> .. .. .	Western Canada Steamship Co., Ltd.
<i>Lake Sicamous</i> .. .. .	Western Canada Steamship Co., Ltd.
<i>Lake Winnipeg</i> .. .. .	Western Canada Steamship Co., Ltd.
<i>Lakemba</i> .. .. .	B. C. Ship Chartering Co., Ltd.
<i>Ottawa Valley</i> .. .. .	Montreal, Australia, New Zealand Line, Ltd.
<i>Pinnacles</i> .. .. .	Deep-Sea Tankers, Ltd.
<i>Rupertsland</i> .. .. .	Hudson's Bay Co., Ltd.
<i>Tantara</i> .. .. .	Johnson Walton Steamships, Ltd.
<i>Waihemo</i> .. .. .	Canadian Union Line, Ltd.
<i>Waikawa</i> .. .. .	Canadian Union Line, Ltd.
<i>Wairuna</i> .. .. .	Canadian Union Line, Ltd.
<i>Waitomo</i> .. .. .	Canadian Union Line, Ltd.
Lightships :	
<i>Lurcher Lightship</i> .. .. .	Minister of Transport.
<i>Sambro Lightship</i> .. .. .	Minister of Transport.

# LIGHT VESSELS

The following Light Vessels voluntarily observe and report from coastal waters of Great Britain.

NAME OF VESSEL	MASTERS
<i>Dowsing</i> .. .. .	J. R. Audley, S. R. Smith
<i>East Goodwin</i> .. .. .	A. Giblin, F. M. England, W. S. Parish
<i>Galloper</i> .. .. .	S. J. Vincent
<i>Humber</i> .. .. .	F. I. Butcher, L. A. Brett
<i>Newarp</i> .. .. .	T. J. Sales, W. J. Rogers
<i>Royal Sovereign</i> .. .. .	W. J. Sheaf
<i>Seven Stones</i> .. .. .	H. C. King, —, Appleby
<i>Shambles</i> .. .. .	J. H. Cooper, W. C. Moulard
<i>Shipwash</i> .. .. .	G. W. Broom, C. G. Isaac
<i>Smith's Knoll</i> .. .. .	W. J. Hall, J. W. R. Reeve, B. Hadden

# MARID SHIPS

The following is a list of ships voluntarily observing and reporting sea temperatures from coastal waters of Great Britain. Captains are requested to point out any errors or omissions in the list.

NAME OF VESSEL	CALL SIGN	CAPTAIN	OWNERS/MANAGERS
<i>Actuality</i> .. ..	GPPF	W. Conn .. ..	F. T. Everard & Sons, Ltd.
<i>Allurity</i> .. ..	MGFS	W. N. Fisher .. ..	F. T. Everard & Sons, Ltd.
<i>Amsterdam</i> .. ..	MFBP	C. R. Baxter, D.S.C. .. ..	British Railways (Eastern Region)
<i>Angelo</i> .. ..	GQFY	S. N. Stokes .. ..	Ellerman's Wilson Line, Ltd.
<i>Ariosto</i> .. ..	GKPW	J. R. Stilwell .. ..	Ellerman's Wilson Line, Ltd.
<i>Atlantic Coast</i> .. ..	GWSY	P. A. Johnson .. ..	Coast Lines, Ltd.
<i>Auk</i> .. ..	MRCQ	C. T. Stone, O.B.E. .. ..	General Steam Nav. Co., Ltd.
<i>Barra Head</i> .. ..	MPQZ	G. Garden .. ..	A. F. Henry & MacGregor, Ltd.
<i>Belhaven</i> .. ..	MNXZ	P. L. Irvine .. ..	London & Edinburgh Shipping Co., Ltd.
<i>Belravock</i> .. ..	MKGV	T. Wallace .. ..	London & Edinburgh Shipping Co., Ltd.
<i>Belvina</i> .. ..	MLZF	J. Robertson .. ..	London & Edinburgh Shipping Co., Ltd.
<i>British Scout</i> .. ..	GJKD	W. G. Dunbar .. ..	British Tanker Co., Ltd.
<i>Cambria</i> .. ..	GBKT	J. Hughes .. ..	British Railways (L.M. Region).
<i>Cantick Head</i> .. ..	GOBZ	W. Flett .. ..	A. F. Henry & MacGregor, Ltd.
<i>Clupea</i> .. ..	GOAJ	J. Jappy .. ..	Fishery Division, Scottish Home Department.
<i>Corfen</i> .. ..	GDJX	E. R. W. Allen .. ..	Wm. Cory & Son, Ltd.
<i>Corfleet</i> .. ..	GWTD	A. G. Waller .. ..	Wm. Cory & Son, Ltd.
<i>Corfoss</i> .. ..	MAHX	F. E. W. Farrant .. ..	Wm. Cory & Son, Ltd.
<i>Cormain</i> .. ..	MAHT	R. B. Armstrong .. ..	Wm. Cory & Son, Ltd.
<i>Cormead</i> .. ..	GDBX	T. Slack .. ..	Wm. Cory & Son, Ltd.
<i>Cormist</i> .. ..	GDVT	R. J. Barrow .. ..	Wm. Cory & Son, Ltd.
<i>Cormoat</i> .. ..	GLKV	J. U. Hansen .. ..	Wm. Cory & Son, Ltd.
<i>Cormull</i> .. ..	MAHS	E. S. Keene .. ..	Wm. Cory & Son, Ltd.
<i>Corncrake</i> .. ..	MJKL	K. Carmalt .. ..	General Steam Nav. Co., Ltd.
<i>Crane</i> .. ..	MMCS	K. R. Nicholls .. ..	General Steam Nav. Co., Ltd.
<i>Drake</i> .. ..	MMYC	W. Lockhart .. ..	General Steam Nav. Co., Ltd.
<i>Duke of Argyll</i> .. ..	GNVX	F. Adern, D.S.C. .. ..	British Railways (L.M. Region).
<i>Duke of Lancaster</i> .. ..	GCPQ	E. B. Serjeant .. ..	British Railways (L.M. Region).
<i>Duke of Rothesay</i> .. ..	GNVL	A. E. Willmott, D.S.C. .. ..	British Railways (L.M. Region).
<i>Eildon</i> .. ..	MLZL	J. Little .. ..	G. Gibson & Co., Ltd.
<i>Empire Cedric</i> .. ..	GRSC	W. N. Johnson .. ..	Frank Bustard & Sons, Ltd.
<i>Empire Gaelic</i> .. ..	MAVR	H. T. Green .. ..	F. Bustard & Sons, Ltd.
<i>Explorer</i> .. ..	MRCZ	D. Stevens .. ..	Fishery Division, Scottish Home Department
<i>Fidra</i> .. ..	MKQQ	T. Henry .. ..	Glen & Co., Ltd.
<i>Golden Dawn</i> .. ..	MLZV	A. Adamson, M.B.E. .. ..	The Captain.
<i>Grebe</i> .. ..	MAEY	J. A. Traynier .. ..	General Steam Nav. Co., Ltd.
<i>Guernsey Coast</i> .. ..	MANS	H. Keilit .. ..	British Channel Islands Shipping Co., Ltd.
<i>Harrogate</i> .. ..	MNDB	F. E. Lovern .. ..	Associated Humber Lines.
<i>Hibernia</i> .. ..	MBMT	R. Woodhall .. ..	British Railways (L.M. Region)
<i>Highwood</i> .. ..	MLQQ	J. Coupland .. ..	E. R. Newbigin, Ltd.
<i>Hindlea</i> .. ..	GWDQ	P. Cullen .. ..	Hindlea Shipping Co., Ltd.
<i>Horsa</i> .. ..	MPFJ	D. Dickson .. ..	Currie Line Ltd.
<i>Isle of Guernsey</i> .. ..	GQYJ	F. E. Trout .. ..	British Railways (Southern Region).
<i>Isle of Jersey</i> .. ..	GRBQ	A. Light .. ..	British Railways (Southern Region).
<i>Isle of Sark</i> .. ..	GTSR	C. E. Durley .. ..	British Railways (Southern Region)
<i>Jura</i> .. ..	MARU	L. J. Blanche .. ..	Glen & Co., Ltd.
<i>Kinnaird Head</i> .. ..	GCSQ	W. A. Williams .. ..	A. F. Henry & MacGregor, Ltd.
<i>London Merchant</i> .. ..	MBRZ	C. A. Piper .. ..	London Scottish Lines, Ltd.
<i>Marine Craft Unit</i> (R.A.F.) No. 1102 .. ..		Flt.-Lt. L. Ambler .. ..	No. 1102 Marine Craft Unit.
<i>Melrose</i> .. ..	MCFD	G. Simpson .. ..	Geo. Gibson & Co., Ltd.
<i>Melrose Abbey</i> .. ..	GSYW	J. Laverack .. ..	Associated Humber Lines.
<i>Minna</i> .. ..	GKPS	T. Mather .. ..	Scottish Home Office.
<i>Moray Coast</i> .. ..	MKDL	J. T. Williams .. ..	Coast Lines, Ltd.
<i>Ocean Coast</i> .. ..	GYMP	G. Mearns .. ..	Coast Lines, Ltd.
<i>Petrel</i> .. ..	MBGV	R. Warran .. ..	General Steam Nav. Co., Ltd.
<i>Plover</i> .. ..	MLLV	A. W. Sinclair .. ..	General Steam Nav. Co., Ltd.
<i>Rora Head</i> .. ..	MKVB	A. F. Ramsay .. ..	N. of Scot. & Orkney & Shetland S.N. Co., Ltd.
<i>Runa</i> .. ..	GFSW	J. Gilfillan .. ..	Glen & Co., Ltd.
<i>St. Clair</i> .. ..	MMFX	T. Gifford .. ..	N. of Scot. & Orkney & Shetland S.N. Co., Ltd.
<i>St. Clement</i> .. ..	GRGM	W. Mackay .. ..	N. of Scot. & Orkney & Shetland S.N. Co., Ltd.
<i>St. Helier</i> .. ..	GIBT	R. Pitman, D.S.C. .. ..	British Railways.
<i>St. Julien</i> .. ..	GLBV	L. J. Richardson .. ..	British Railways.
<i>St. Magnus</i> .. ..	GFYK	W. G. Stout .. ..	N. of Scot. & Orkney & Shetland S.N. Co., Ltd.
<i>St. Niman</i> .. ..	GJBB	A. M. Dundas .. ..	N. of Scot. & Orkney & Shetland S.N. Co., Ltd.
<i>Seamew</i> .. ..	GBWY	E. C. Painter .. ..	General Steam Nav. Co., Ltd.
<i>Selby</i> .. ..	MLFT	J. Collier .. ..	Associated Humber Lines.
<i>Slieve Bawn</i> .. ..	MQCC	J. Irwin .. ..	British Railways (L.M. Region).
<i>Slieve Bearnagh</i> .. ..	MLNL	N. W. Greenwood .. ..	British Railways (L.M. Region).
<i>Slieve Bloom</i> .. ..	MQDD	R. E. Sherwood, D.S.O. .. ..	British Railways (L.M. Region).
<i>Slieve Donard</i> .. ..	MQCQ	A. C. Borthwick .. ..	British Railways (L.M. Region).
<i>Slieve League</i> .. ..	MQCM	W. E. Meade .. ..	British Railways (L.M. Region).
<i>Slieve More</i> .. ..	MQBM	C. A. Winkle .. ..	British Railways (L.M. Region).
<i>Southern Coast</i> .. ..	MASD	G. Goldman .. ..	Coast Lines Ltd.
<i>Thelma</i> .. ..	MBKK	F. Fairweather .. ..	Glen & Co., Ltd.
<i>Truro</i> .. ..	GJTO	J. B. Dunkley .. ..	Ellerman's Wilson Line, Ltd.
<i>Vanellus</i> .. ..	GDVW	J. E. Green .. ..	British & Continental S.S. Co., Ltd.
<i>Vienna</i> .. ..	GTBR	A. Pearson Sutton .. ..	British Railways (Eastern Region).
<i>Winga</i> .. ..	MAGC	—, Woods .. ..	Glen & Co.

## NOTICES TO MARINE OBSERVERS

### Postal Arrangements

The quarterly numbers of *The Marine Observer* are published on the last Wednesdays of December, March, June and September.

*The Marine Observer* is addressed to the Captain, S.S./M.V....., c/o the owners, and captains are requested to make their own arrangements for forwarding.

Shipowners, Marine Superintendents, and all concerned in the despatch of mails to ships are asked to kindly facilitate the despatch and delivery of mail received at their offices from the Meteorological Office and "Air Publications and Forms Stores", to their ships abroad.

Addressed to the captains of ships, this contains information required for the conduct of meteorological work at sea, and is most effective if received by the captains at the earliest possible date.

### "The Marine Observer"

Captains of observing ships are requested to ensure that all officers, who participate in the voluntary meteorological work carried out by the ship, have access to *The Marine Observer*.

### Ice Observation

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

See Chapter 12, pages 96-98 of the *Marine Observer's Handbook*, Seventh Edition.

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

Marine observers will greatly assist by noting the conditions of ice, either drifting or fast, in the pages provided at the end of the logbook (Form 911), or on Form 912, which may be supplied to the captain of any British ship on application to a Port Meteorological Officer or Merchant Navy Agent.

Observing ships using the Trans-North Atlantic tracks are requested to record not only when ice is encountered, but also when they have passed through the ice region during the ice season without encountering ice. In this case a "nil" report should be returned, since it is desirable as far as possible to determine when tracks have been clear of ice.

### RETURN OF LOGBOOKS

Owing to the need for strict economy in the use of paper, observing officers should endeavour to fill up their logbooks (Forms 911), before returning them to the appropriate Meteorological Service, except when insufficient space remains for the recording of observations during a further complete passage.

### Indicator "OBS" in Radio Weather Messages

The attention of marine observers and particularly of radio officers in Observing Ships is drawn to the necessity of strict adherence to the use of the indicator—"OBS"—preceding the telegraphic address to which the radio weather message is transmitted. Failure to comply with this regulation leads to considerable delay in the clearance of the weather messages.



## Address and Despatch of Radio Weather Messages

It will be much appreciated if the Masters of all Selected Ships will be good enough to draw the attention of their Radio Officers to the fact that radio weather messages should only be addressed as specified in Part IV of *The Marine Observer's Guide*, M.O. 477, 2nd Edition, 1951, or the *Admiralty List of Radio Signals*, Vol. III. Not only should the message have the address appropriate to the area in which the ship is located, but it should only be transmitted to the radio station or stations specified for the receipt of such messages in that area.

If radio weather messages are incorrectly addressed, or are transmitted to inappropriate radio stations, extra expense, confusion and often much correspondence between the authorities concerned, may arise.

## Atlantic Weather Bulletin for Shipping (Great Britain)

Radio officers who are accustomed to receive the Atlantic Weather Bulletin regularly will have noticed that the frequencies on which it is broadcast from Portishead Radio are changed at rather irregular intervals. These changes are not made haphazardly, but are designed to secure the best radio reception for ships in the North Atlantic.

For the convenience of radio officers the table below gives a complete list of all the frequencies which may be used by Portishead Radio to broadcast the Atlantic Weather Bulletin.

Call Sign	Frequency (kc/s)	Wavelength (metres)
GKU 6	109	2751
GKU 4	4025	74.53
GKB 7	4280	70.09
GKK	4995	60.06
GKB 2	6300	47.62
GKC 2	6435	46.62
GKT 2	6443	46.56
GKC 3	8210	36.54
GKT 3	8220	36.50
GKB 3	8340	35.97
GKC 4	12612	23.79
GKT 4	12622	23.77
GKB 4	12678	23.66
GKB 5	16440	12.48
GKC 5	16885	17.77
GKT 5	16895	17.56
GKC 6	22010	13.63
GKB 6	22020	13.62

The frequencies in use until March, 1952, are those associated with the following call signs:

0930:	GKU 6	GKC 3	GKT 3	GKB 5	GKC 5
1130:	GKU 6	GKC 4	GKT 4	GKB 5	GKC 6
2130:	GKU 6	GKB 7	GKK	GKB 2	GKC 3

## NAUTICAL OFFICERS AND AGENTS OF THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE, GREAT BRITAIN

Captains and observing officers of the Voluntary Corps of Marine Observers will always be welcomed at headquarters, where the Marine Superintendent will be pleased to show them how their observations are utilised in meteorological research and weather forecasting.

**Headquarters.**—Commander C. E. N. Frankcom, O.B.E., R.D., R.N.R., Marine Superintendent, Meteorological Office, Air Ministry, Headstone Drive, Harrow, Middlesex. (Telephone: Harrow 4331, Ext. 324.)

Commander J. Hennessy, R.D., R.N.R., Deputy Marine Superintendent. (Telephone: Harrow 4331, Ext. 323.)

Lieut.-Commander L. B. Philpott, D.S.C., R.D., R.N.R., Nautical Officer. (Telephone: Harrow 4331, Ext. 221.)

**Mersey.**—Commander M. Cresswell, R.N.R., Port Meteorological Officer, Room 617, Royal Liver Building, Liverpool, 3. (Telephone: Central 6565.)

**Thames.**—Commander C. H. Williams, R.D., R.N.R., Port Meteorological Officer, Room 218, Ibex House, Minorities, London, E.C.3. (Telephone: Royal 1721.)

**Bristol Channel.**—Mr. J. C. Matheson, Port Meteorological Officer, 2 Bute Crescent, Cardiff. (Telephone: Cardiff 4474.)

**Southampton.**—Captain J. R. Radley, Port Meteorological Officer, 50 Berth, Old Docks, Southampton. (Telephone: Southampton 4295.)

**Clyde.**—Captain R. Reid, Port Meteorological Officer, 53 Bothwell Street, Glasgow. (Telephone: Glasgow Central 2558.)

### AGENTS

**Forth.**—Captain G. More, "Craigneuk", Dechmont, West Lothian. (Telephone: Dechmont 19.)

**Humber.**—Captain R. E. Dunn, c/o Principal Officer, Ministry of Transport, Trinity House Yard, Hull. (Telephone: Hull 36813.)

**Tyne.**—Captain F. B. West, Custom House Chambers, Quayside, Newcastle-on-Tyne. (Telephone: Newcastle 23203.)

**Some Atlases prepared in the Marine Branch of the Meteorological  
Office and published by His Majesty's Stationery Office**

**Atlantic Ocean**

Monthly Meteorological Charts of the Atlantic Ocean (M.O. 483, 1948).  
19 $\frac{3}{4}$  in.  $\times$  24 in. £2 15s. (1s.).

Monthly Sea Surface Temperatures of the North Atlantic Ocean (M.O.  
527, 1949). 19 $\frac{3}{4}$  in.  $\times$  12 $\frac{1}{4}$  in. 10s. (3d.).

Quarterly Surface Current Charts of the Atlantic Ocean (M.O. 466, 1945).  
22 $\frac{1}{2}$  in.  $\times$  17 $\frac{3}{4}$  in. 12s. (6d.).

Monthly Ice Charts of Western North Atlantic (M.O. 478, 1944). 12 in.  
 $\times$  7 $\frac{1}{2}$  in. 4s. (3d.).

**Indian Ocean**

Monthly Meteorological Charts of the Indian Ocean (M.O. 519, 1949).  
15 $\frac{1}{4}$  in.  $\times$  22 in. £3 3s. (11d.).

Indian Ocean Currents (M.O. 392, Second Edition 1939, reprinted 1950).  
30 in.  $\times$  20 in. 10s. (3d.).

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