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The Marine Observer

*A quarterly journal of Maritime
Meteorology*



Volume XXIV No. 165

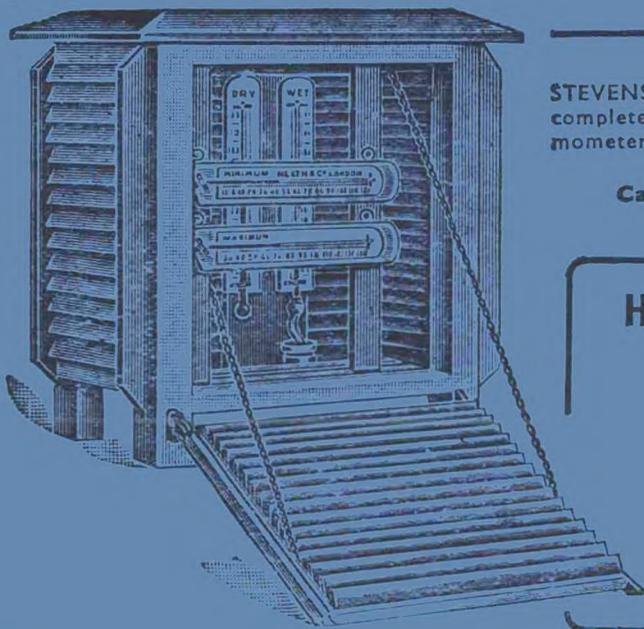
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THE MARINE OBSERVER

A QUARTERLY JOURNAL OF MARITIME
METEOROLOGY PREPARED BY THE MARINE
BRANCH OF THE METEOROLOGICAL OFFICE

VOL. XXIV

No. 165

JULY, 1954

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*Letters to the editor, and books for review, should be sent to The Editor, "The Marine Observer,"
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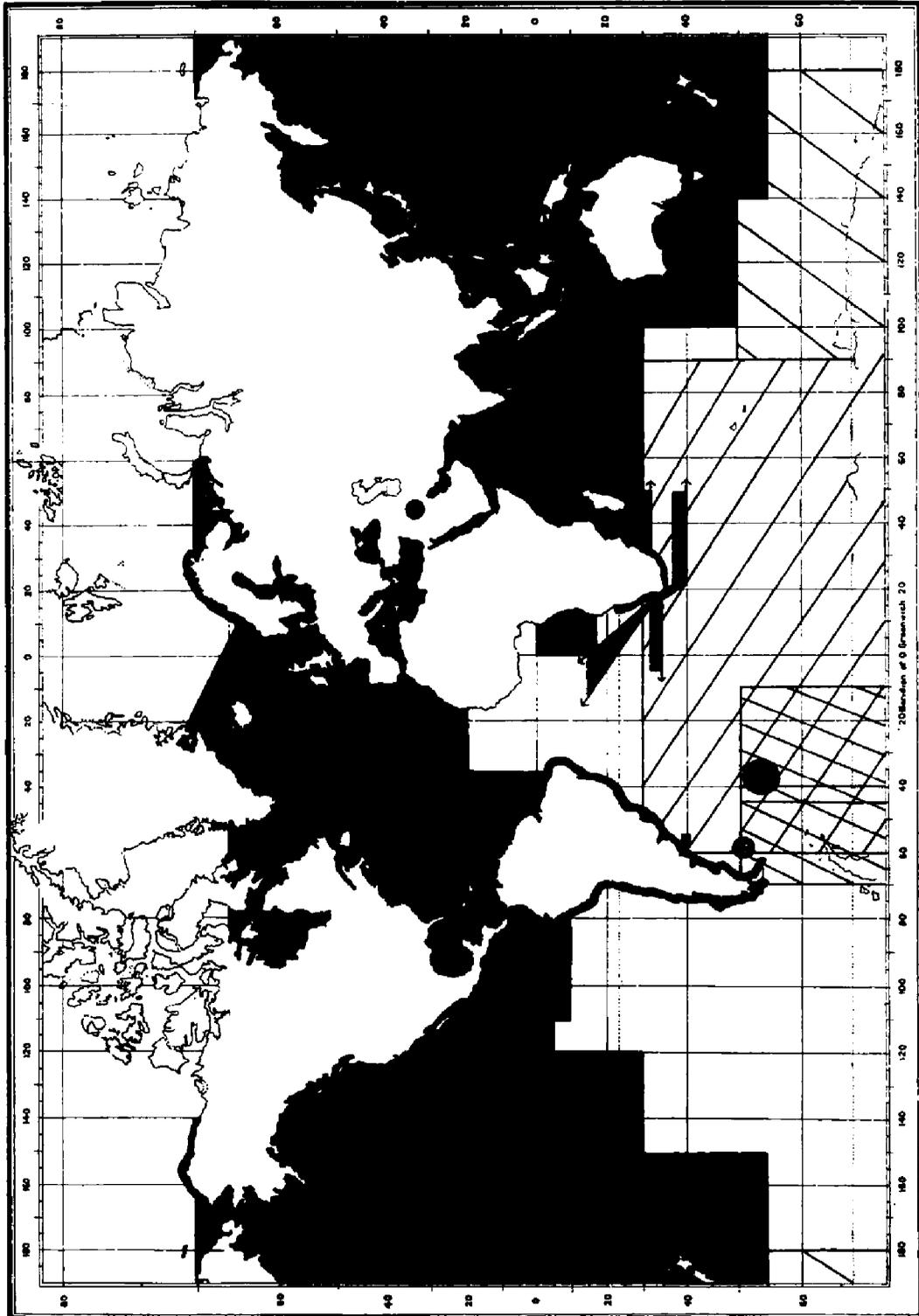
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Editorial

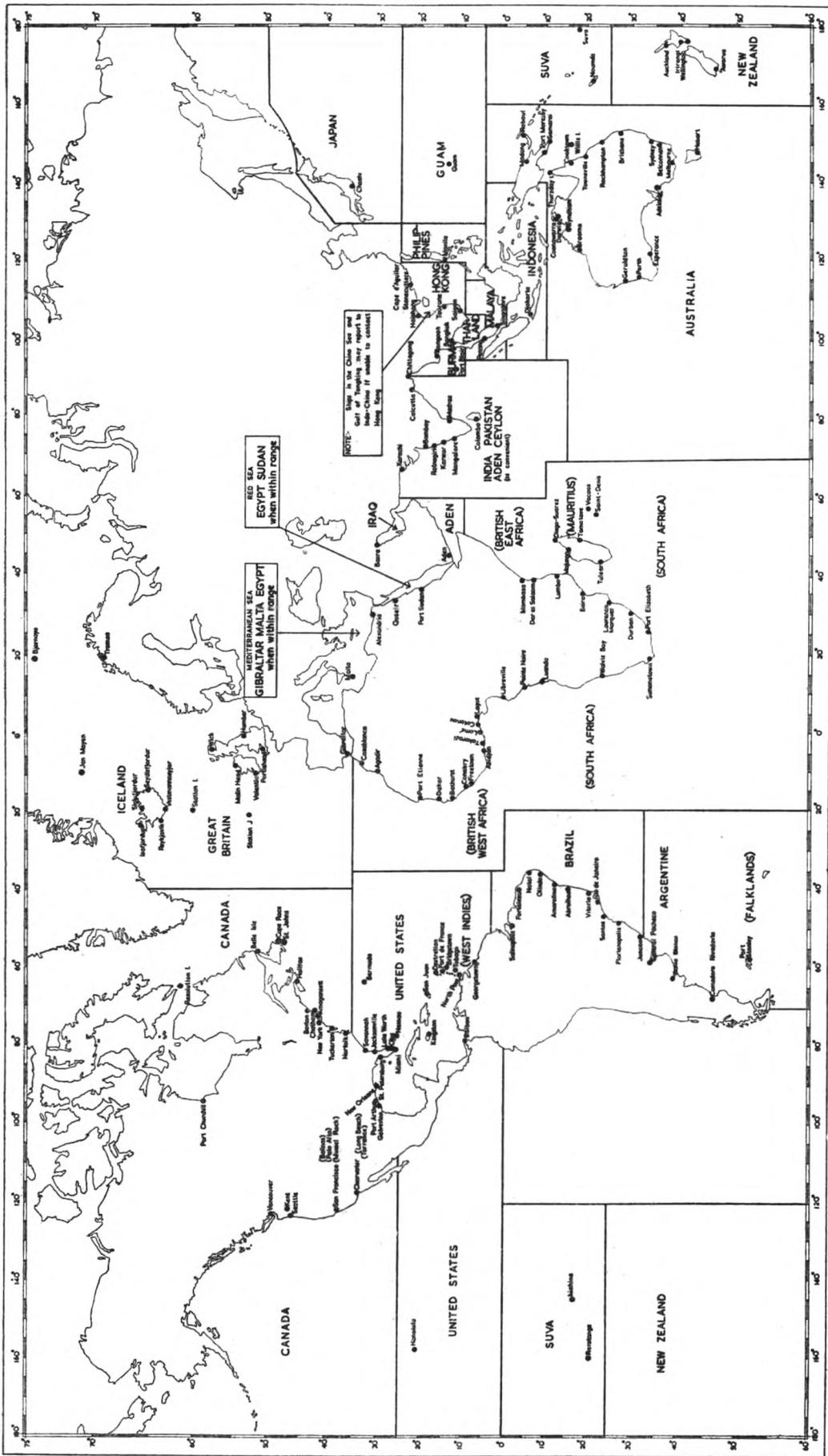
It was in 1861 that Admiral Fitzroy, Director of the Meteorological Office, issued the first daily weather forecast in the United Kingdom. The Meteorological Office had been founded only six years before, in 1855, so Fitzroy did not waste much time in instituting his forecast service, and there seems to be little doubt that he had the needs of shipping primarily in mind. These early forecasts were published in the daily press and supplied by telegram on request; during the same year the first visual gale warning signals for shipping were hoisted at over 100 prominent points on the British coast. Fitzroy had to rely on telegraphic reports from land stations for constructing the weather maps from which his forecasts and gale warnings were deduced. He did not have the advantage of any reports from ships at sea because wireless telegraphy had not then appeared on the scene.

The invention of wireless telegraphy added enormously to the capabilities of the meteorological forecaster, for it not only provided the means of obtaining instantaneous and simultaneous observations from the ocean, but it also enabled the meteorologist to issue his forecasts promptly and frequently by radio. Here again it was shipping which benefited first, for it was some years before radio telephony and broadcasting of the spoken word came into general use. Thus in the early days of radio the only weather information that was broadcast was to shipping, from selected coast stations, by the meteorological authorities of those countries which were primarily interested in shipping. In this pioneer work Germany, France, the United States and the United Kingdom played a prominent part. In the United Kingdom the weather forecast has always formed part of the programme issued by the B.B.C., and it is doubtful if any country at present has such a comprehensive meteorological service for shipping as is provided by the United Kingdom authorities through the medium of radio telephony and radio telegraphy. For some years past shipping around our coasts has been able, by listening either to the G.P.O. coast stations broadcast or to the B.B.C., to receive radio weather bulletins at frequent intervals between 6.55 a.m. and 8.55 p.m. Representations have been made, however, that it would be more advantageous if a bulletin for shipping could be issued somewhat nearer to midnight and thus provide the mariner with as late information as possible as to what was likely to happen to the weather during the hours of darkness. Arrangements have now been made with the B.B.C. whereby, commencing 11th April, 1954, a late forecast combined with a brief description of the current synoptic situation is broadcast on the Light Programme at 11.50 p.m. The synopsis gives the position and direction of movement of the more important depressions and anticyclones over the British Isles and neighbouring areas. Thus the night-time interval during which no bulletins are issued has been reduced to seven hours—a considerable step forward.

The map on page 119 shows what an enormous proportion of the ocean areas of the world is now provided with radio weather bulletins for shipping in one way or another by various meteorological authorities. The arrangements for this coverage of radio weather bulletins are co-ordinated by the World Meteorological Organisation in the same manner as provision is made for the reception of the radio weather messages from shipping which help so materially in the preparation of these forecasts. The map on page 120 shows the areas in which ships send their radio weather messages to various authorities. These two maps illustrate a rather noteworthy international achievement for the benefit of the shipping of all nations and for the safety of life and property at sea, of which all the participating nations, and in particular their seamen, may well be proud. Here we see that the faith of such meteorological pioneers as Maury and Fitzroy has been well justified. The more active the co-operation of the voluntary observers aboard the ships of all maritime nations, the more likelihood there is of the forecasts in all these ocean areas being accurate. The considerable part that British shipping plays in this



Areas of the world which are covered by radio weather bulletins for shipping.
 Hatched areas—seasonal broadcasts for whalers.



Areas of the world in which ships should send their radio weather reports to the specified countries.

international picture of the world's weather is shown in "Work of the Year" on page 122.

Another recent innovation in the presentation of weather information to the public is the personal appearance on the B.B.C. television programmes each evening of a forecaster on the staff of the Meteorological Office to discuss the weather situation, past, present and future, with the aid of simplified synoptic charts. This personal presentation and discussion of the weather has many advantages and it is hoped that it will promote better understanding of the work of the forecaster. It is unfortunate that technical limitations prevent the use of television reception aboard a ship from a station ashore at a greater distance than about 100 miles. The mariner when at sea is thus not able to take advantage of this television service—although it is understood that television is placed aboard certain ships in harbour by their owners. There is little doubt that those connected with the shipping industry who have access to television sets will derive benefit from this service.

On another page in this magazine is an account of the results of the recent North Atlantic Ocean Station Conference whereby the number of ocean weather stations will be reduced from ten to nine. At this conference tribute was paid to the valuable contribution that voluntary observers in selected merchant ships make towards the North Atlantic ocean network of observations. The ocean station vessels represent permanent "islands" whence frequent surface and upper-air observations are obtained, and the enormous gaps between these "permanent" stations are filled in by observations from merchant ships. Thus, thanks to the magic of radio, the meteorologists of every country in Europe can have always before them a reasonably comprehensive picture of the difficult and complicated meteorological situation in that important ocean from which to make their forecasts for the benefit of aviation, shipping and their general public. There is no doubt that the information provided by this network of ships will assist materially in, and is already assisting research into, many meteorological problems, although there is still an enormous amount to be learnt before meteorologists can really understand the physical processes which account for the variabilities of the weather.

A newspaper report concerning the Annual General Meeting of the United Kingdom Chamber of Shipping shows that meteorological ideas figure quite prominently in the mind of the modern shipowner. Press reports quote the President during his presidential address as saying, when referring to the financial outlook of the shipping industry:

There is nothing I would like better today than to forecast fair weather and calm seas; but that unfortunately is not possible. Instead, I must broadcast a gale warning with unsettled conditions and stormy weather that will test to the full your seaworthiness and seamanship.

It is to be hoped that this is one forecast which will not be accurate.

MARINE SUPERINTENDENT.

Obituary

SIR NELSON K. JOHNSON

It is with deep regret that we have to record the death on 23rd March, 1954, of Sir Nelson Johnson, who was Director of the Meteorological Office from September, 1938, until his retirement in September, 1953. In the October, 1953, number of *The Marine Observer* we discussed Sir Nelson's career and wished him happiness and good health in his retirement. It is indeed sad that he had so short a time in which to enjoy a well-earned leisure. There is little doubt that the enormous amount of work and anxiety he had as Director of this Office during the war and during the reconstruction period afterwards had its effect upon his health.

Sir Nelson was not only an able scientist but a very competent administrator.

He took a personal interest in everything which took place in the Meteorological Office and was extremely interested in international meteorology, in which he took a prominent part. He was very conscious of the fact that one can do little in meteorology without international co-operation. As President of the World Meteorological Organisation he was universally respected.

Having an international outlook it was natural that he should take a personal interest in the work of selected ships, which he undoubtedly did. He always welcomed an opportunity of making personal contact with representatives of the shipping industry and was very appreciative of the good work done aboard selected ships. His courteous and unassuming manner made him a very pleasant person with whom to work.

WORK OF THE YEAR (ENDING 31st MARCH, 1954) OF THE MARINE BRANCH OF THE BRITISH METEOROLOGICAL OFFICE AND THE VOLUNTARY OBSERVING FLEET

1. Voluntary observing ships

(a) ORGANISATION AND COLLECTION OF OBSERVATIONS

The Marine Branch has Port Meteorological Officers in London, Liverpool, Southampton, Cardiff and Glasgow, and Agents in the Forth, Tyne and Humber areas. (The agency at the Forth is at present vacant, but a new appointment is expected to be made shortly.) It is their duty to visit the masters and officers of merchant ships, to interest them in keeping meteorological records, to recruit them as voluntary meteorological observers, to instruct them as necessary in making the observations and thereafter to re-visit the ships at regular intervals. They also issue meteorological instruments to certain classes of ships and inspect them as opportunity offers. During the year some 3,920 visits were made to ships by these officers.

(b) BRITISH SHIPS

The Voluntary Observing Fleet is comprised as follows:

- (i) *Selected ships*, which make meteorological observations four times daily (0000, 0600, 1200 and 1800 G.M.T.) on a world-wide basis, in accordance with arrangements made by the World Meteorological Organisation and the International Convention for Safety of Life at Sea. Meteorological instruments, logbooks and instructions for doing the work are supplied to these ships. The observations are transmitted by wireless in the International Meteorological Code to specified meteorological services in whatever ocean the vessel is situated. Approximately 500 British selected ships co-operate in this manner out of a world total of about 1,800 selected ships. Included in this figure are 11 British whaling vessels which were specially recruited for making meteorological observations in the Antarctic Ocean.
- (ii) *Supplementary ships*, which make and transmit their coded reports four times daily by radio (using an abbreviated code) on a world-wide basis, in a similar manner to selected ships. These ships are supplied only with a mercurial barometer, thermometers and screen, such instruments being sufficient for this abbreviated code reporting. The number of supplementary ships is about 50.
- (iii) *Marid ships*, about 86 coasting vessels which make observations of sea temperatures in home waters once daily and transmit the coded reports by radio-telephone to Dunstable, via G.P.O. coast stations.
- (iv) *Lightvessels*, 13 of which make observations of wind, waves, visibility and air and sea temperatures twice daily. Of these vessels 11 transmit the coded reports by radio-telephone to Dunstable via G.P.O. coast stations.
- (v) *Trawlers* fishing in far northern waters, 19 of which make non-instrumental observations and send their coded messages by wireless-telegraphy or

	1953												1954		
	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.			

Table 1. Number of British Observing Ships

No. of Selected Ships on Fleet List	503	504	507	503	505	507	505	512	514	510	506	507
No. of Supplementary Ships on Fleet List	47	45	48	49	52	52	54	54	54	54	55	57
No. of Marid Ships on Fleet List	82	83	80	81	83	84	84	85	85	86	85	85
No. of Lightvessels on Fleet List	13	13	13	13	13	13	13	13	13	13	13	13
No. of Trawlers on Fleet List	23	25	25	24	24	24	24	18	21	19	17	16

Table 2. Ships' Radio Weather Messages received at Dunstable

<i>British Selected Ships</i>												
No. reporting to Dunstable	279	290	275	279	286	272	282	273	270	264	252	285
No. of messages received	2,544	2,732	2,542	2,566	2,599	2,384	2,683	2,327	2,489	2,487	2,145	2,552
No. of groups (excluding address and ship's name)	20,926	21,519	21,577	21,582	21,828	19,972	22,404	20,214	21,301	20,726	17,859	21,148
Daily average of messages	85	88	85	83	84	79	86	78	80	80	77	82
<i>Marid Ships</i>												
No. reporting to Dunstable	46	51	41	45	49	50	49	39	39	42	39	43
No. of messages received	259	306	283	364	381	336	302	250	263	279	227	292
Daily average of messages	9	10	9	12	12	11	10	8	9	9	8	9
<i>Foreign Ships</i>												
No. reporting to Dunstable	164	122	139	109	92	108	92	85	82	98	91	136
No. of messages received	528	433	429	368	333	332	366	363	325	330	327	464
No. of groups (excluding address and ship's name)	4,084	3,288	3,302	2,804	2,493	2,512	2,773	2,693	2,438	2,505	2,542	3,670
Daily average of messages	18	14	14	12	11	11	12	12	11	11	12	15
<i>Lightvessels</i>												
No. reporting to Dunstable	11	11	11	11	11	11	11	11	11	11	11	11
No. of messages received	614	648	597	657	670	616	634	614	658	670	598	659
Daily average of messages	20	21	20	21	21	21	20	21	21	22	21	21

Table 3. Instrumental Equipment on Loan to British Voluntary Observing Ships

1. (a) Full set of M.O. instruments*	493	494	497	493	496	498	496	504	506	502	498	499
(b) Full set of M.O. instruments, except barograph	5	5	5	5	4	4	4	4	4	4	4	4
(c) Full set of M.O. instruments, except barometer	4	4	4	4	4	4	4	3	3	3	3	3
2. Full Marid set of instruments	82	83	80	81	83	84	84	85	85	86	85	85
3. Full Lightvessel set of instruments	13	13	13	13	13	13	13	13	13	13	13	13
4. Supplementary Ships, supplementary set	45	46	46	47	50	50	52	52	52	52	53	55

*Including one with aneroid instead of mercurial barometer. †Including two with aneroid instead of mercurial barometers.

radio-telephony as convenient, to British, Norwegian or Icelandic radio stations. Owing to physical difficulties, no record of these observations is required to be kept aboard the trawlers.

The meteorological observations made aboard all the above vessels, with the exception of trawlers, are recorded in special logbooks and are forwarded to the Marine Branch for climatological analysis.

In July an expedition aboard the yacht *Petula* left the United Kingdom to drift with the Equatorial Current to Barbados. She was equipped as a selected ship for making and transmitting radio weather observations *en route*. Also recruited as a selected ship in October was Dr. B. M. Cwilong's non-magnetic yacht *Princess Waimai*, engaged on a scientific voyage in the Atlantic and Pacific Oceans.

Table 1, page 123, shows the number of vessels of each class monthly throughout the year.

The table below gives an indication as to the trades in which British selected ships are engaged.

Table 4. Numbers of British selected ships on main routes from and to the United Kingdom

Australasia, mainly via Suez or the Cape	58
Australasia, mainly via Panama	47
Far East	70
Persian Gulf	10
South Africa	16
West coast of Africa	8
North Atlantic	65
West Indies	27
Atlantic coast of South America	33
Pacific coast of South America	16
Pacific coast of North America	21
North-west Europe	14
Trooping service	9
Falkland Islands and Antarctic	13
World-wide "tramping"	104

(c) FOREIGN SHIPS

Radio weather messages from ocean weather ships operated by other nations in the North Atlantic and from foreign selected merchant ships have also been received regularly throughout the year at the Central Forecasting Office in Dunstable.

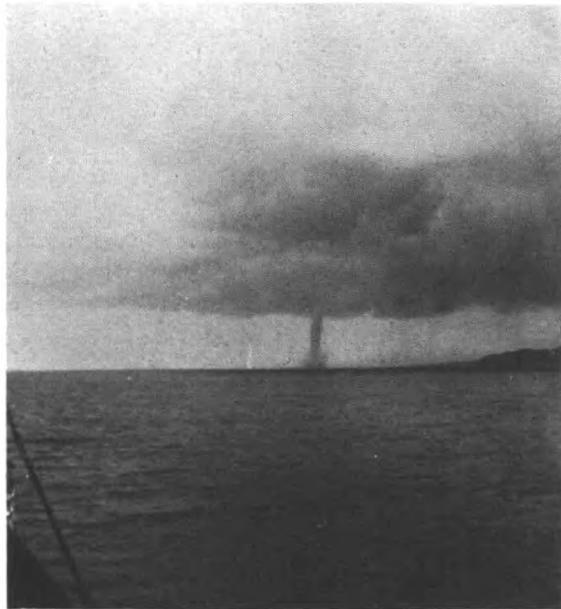
(d) WHALERS

Arrangements were again made for selected British whaling vessels to co-operate in the Antarctic as they did during the previous season. Radio weather messages from these ships in which the ship's position is given in cipher, were routed via South African or Australian radio stations. Eleven British whaling vessels were recruited for the season 1953-54.

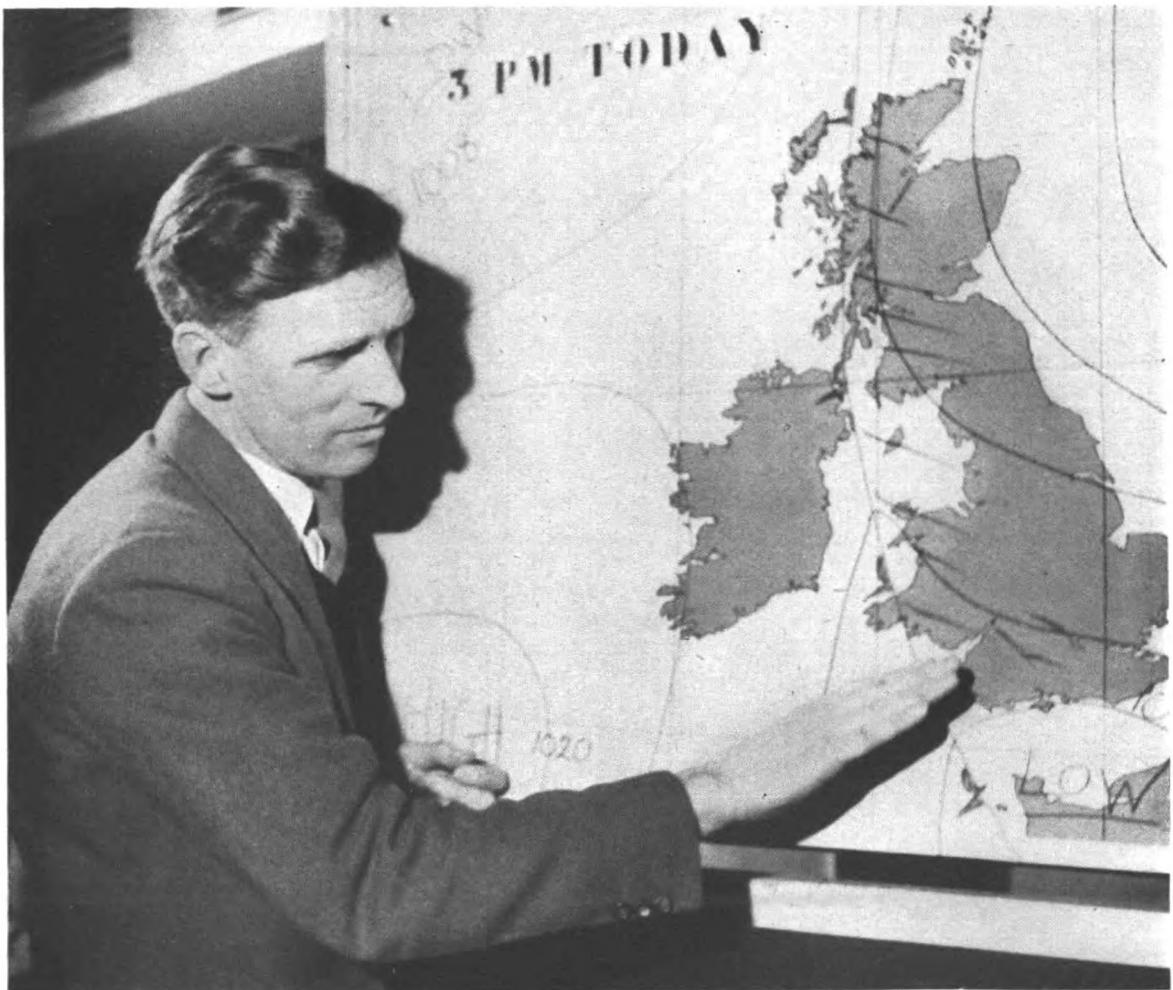
(e) QUALITY OF OBSERVATIONS

A regular and careful scrutiny of the logbooks of British selected and supplementary ships shows that in general the observations are made carefully and accurately by the voluntary observers aboard the ships and that the radio weather messages are regularly transmitted to the various authorities concerned. Port Meteorological Officers and Merchant Navy Agents report that, in the course of their personal visits to the ships, they have ample evidence of the interest that ships' officers show in this voluntary work and in the care they take of the meteorological instruments loaned to them.

The ships thus loyally carry out their voluntary international function. The logbooks and messages from the ships, too, in most cases are prepared with great



Photograph of a waterspout observed from S.S. *Martand* on 12th September, 1953, near the western side of Jabal Zuqar Island, Red Sea (see page 138).



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B.B.C. TELEVISION DAILY WEATHER REPORT

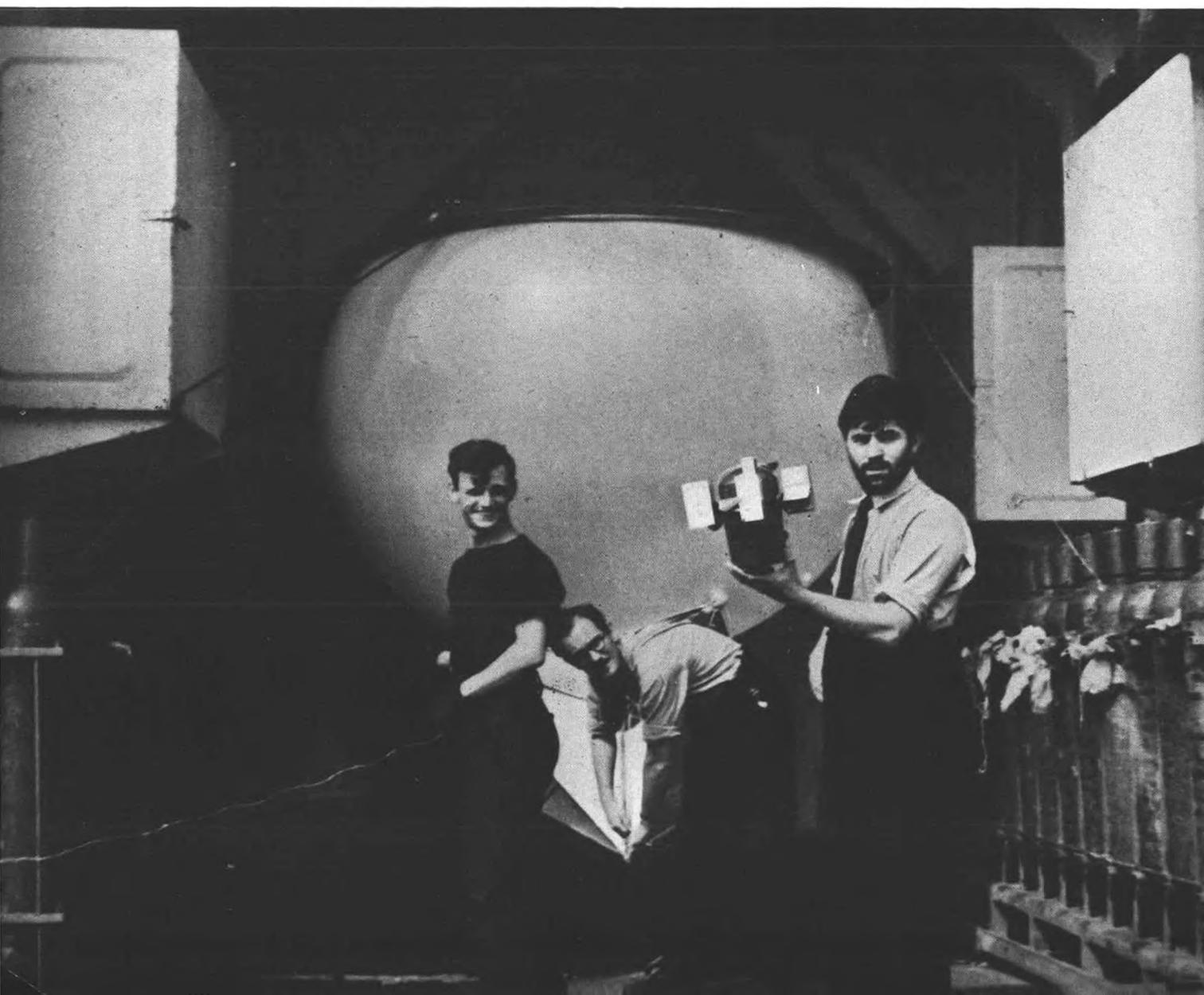
Mr. T. H. Clifton, one of the Meteorological Office forecasters who appear each evening and, with the aid of weather maps such as that shown here, describe the present weather and the forecast.



O.W.S. *Weather Explorer* in Great Harbour, Greenock.

Photographs by M. N. H

Preparing a radio-sonde balloon for launching, in the balloon shelter.



care. Many of the logbooks contain interesting detailed observations of unusual meteorological and astronomical phenomena, as well as of oceanographical and ornithological subjects. On the average this year some 115 logbooks were received monthly in addition to logbooks and forms kept aboard Canadian and Norwegian ships, which are dealt with statistically in this office by arrangement with the authorities concerned.

Among their other activities certain selected and supplementary ships make observations of whales on behalf of the National Institute of Oceanography, and special radar observations are also made aboard selected ships which are fitted with radar.

(f) RADIO REPORTS

Table 2 shows the numbers of British selected ships, Marid ships, foreign ships and lightvessels reporting to Dunstable, and the number of messages received at the Central Forecasting Office, excluding reports received from ocean weather ships. It is not practicable to prepare similar tables for other areas, but the map on page 126 shows the general distribution of British selected ships on a day picked at random.

Of the reports received from selected ships in the eastern Atlantic, a 12-monthly check showed that approximately 56% were received within one hour of the time of observation and 79% within two hours.

(g) EQUIPMENT

Table 3 shows the distribution of instrumental equipment on loan to voluntary observing ships.

2. Ocean weather ships

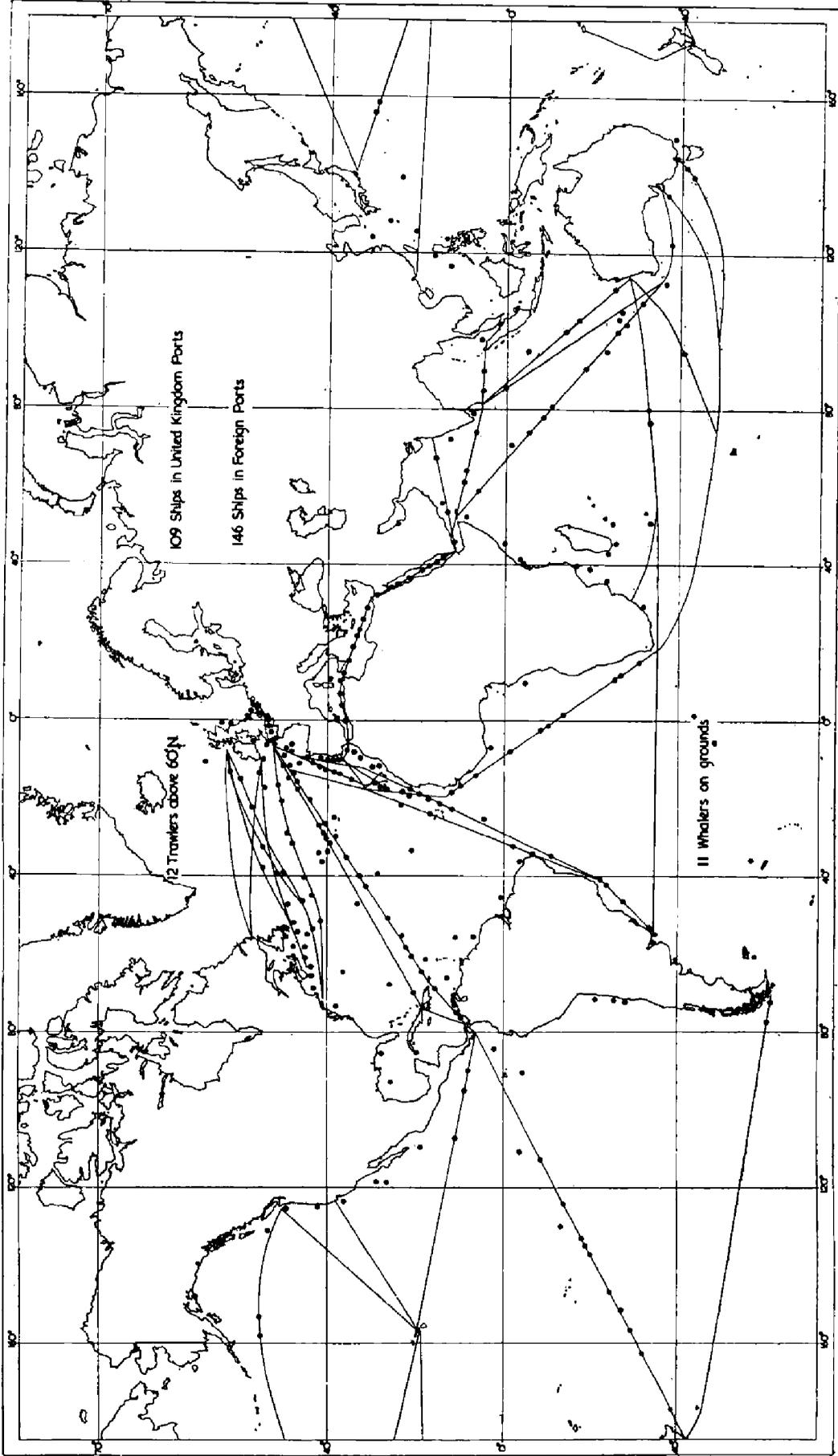
During the year each of the four British ocean weather ships completed six years' service.

Station "J" (JULIETT), in position $52^{\circ} 30'N$, $20^{\circ} 00'W$, was manned on 352 days of the year either by a British or a Netherlands weather ship; the station was vacated on 13 days due to landing sick members of the ships' company to hospital at Londonderry.

Station "I" (INDIA), in position $59^{\circ} 00'N$, $19^{\circ} 00'W$ until 1200 G.M.T. on 29th August, 1953, and subsequently in position $61^{\circ} 00'N$, $15^{\circ} 20'W$, was manned on 305 days by British weather ships; although technically "on station" ships were moved from $59^{\circ} 00'N$, $19^{\circ} 00'W$, to position $60^{\circ} 47'N$, $14^{\circ} 01'W$, for special purposes on a total of 31 days. Other absences amounting to 29 days were occasioned by landing patients to hospital at Londonderry or Stornoway (7 days), search and rescue duties (7 days) and late sailing of relief ship due to repairs (6 days).

The weather ships carried out a full programme of meteorological work, including surface and upper-air observations, which were transmitted to Central Forecast Office w/T. Search and rescue exercises were carried out whenever practicable in co-operation with aircraft of R.A.F. Coastal Command with the aim of keeping the ships' companies conversant with search and rescue drill and organisation. During these exercises mail, newspapers and urgently required stores have been dropped by the aircraft.

The weather ships' navigational aids are used regularly by both civil and military aircraft flying over the North Atlantic; 8,422 aircraft made use of the facilities provided by the ships during the year. Radio contact was made when necessary with ocean weather ships of other nations. Special arrangements were made for the ships to provide navigational aids to the B.O.A.C. aircraft carrying H.M. the Queen to Bermuda, to the aircraft conveying the Prime Minister to Bermuda and return, and to certain Canberra aircraft on trans-Atlantic flights.



The positions of British ships which made meteorological observations on 8th March, 1954 (a day picked at random).

Special routine observations of the sea water temperature-gradient were made aboard *Weather Recorder* with a bathythermograph loaned by the Admiralty. Observations were made twice daily when steaming and when on station down to a depth of 450 ft. Observations utilising a wave recorder, loaned by the National Institute of Oceanography, have been made regularly and satisfactorily aboard *Weather Explorer*.

Oceanographical work was carried out for the Ministry of Agriculture and Fisheries and the Fisheries Division of the Scottish Home Department. This included towing of plankton recorders, taking samples of sea-surface water and jettisoning of drift bottles. Since 1st January, 1954, on behalf of the National Oceanographical Institute, plastic envelopes have been jettisoned daily on station in connection with an investigation into oil pollution. Some special cinematograph observations of waves in rough weather alongside *Weather Explorer* were made from an R.A.F. aircraft, for a special investigation being undertaken by Imperial College. Magnetic variation swings have been carried out on station for the Hydrographic Department of the Admiralty.

Weather Explorer attended the Review of the Fleet by H.M. the Queen at Spithead on 15th June, 1953. The master and officers of the ship acted as hosts to a number of guests from the Meteorological Office who witnessed the Review, the illuminations and the fireworks.

Weather Recorder when on duty at station INDIA was appointed by the Oceanic Control to direct the search for a missing U.S.A.F. B 36 aircraft, followed by a lengthy search for survivors and wreckage, in which several aircraft also took part. *Weather Recorder* recovered the pilot's body and transferred it to U.S.S. *Wackamore*. O.W.S. *Weather Observer* took over from *Weather Recorder* when she arrived "on station". The search lasted seven days, during which a very large number of the messages were dealt with aboard the ships. The ships steamed 806 miles, but gale force winds made the searching a difficult operation. Both ships located some wreckage.

Inst. Capt. S. W. C. Pack, Deputy Director of Naval Weather Service, Admiralty, sailed as passenger in *Weather Explorer* from Greenock to Londonderry to study the meteorological routine of a weather ship at sea. No major damage was sustained throughout the year by any of the four ocean weather ships, but *Weather Explorer* had her 16-ft dinghy smashed beyond repair when the ship was hit by a heavy sea.

The Marine Superintendent sailed from Greenock as passenger in *Weather Observer* and transferred to *Weather Recorder* at station INDIA for the homeward passage, to gain first-hand knowledge of life and routine aboard a weather ship at sea.

Logbooks and upper-air data were received regularly from all four British weather ships and from the Netherlands weather ship when she operated at station JULIETT. Microfilmed copies were made and distributed to the other nations signatory to the North Atlantic Ocean Stations Agreement.

In accordance with the 1949 North Atlantic Ocean Stations Agreement, a Netherlands ship was scheduled to perform five patrols at station JULIETT during the summer. At the request of the Netherlands Government this schedule was reduced to four patrols, and agreement was reached with the Netherlands Government for a financial settlement to be made to the British Government for providing a British ship to undertake the fifth patrol. Each British weather ship had a period in harbour for overhaul and repairs during the year.

3. Marine climatology

Routine work carried out during the year in the Marine Branch of the Meteorological Office included:

(a) COLLECTION OF OBSERVATIONS

The numbers of meteorological logbooks received each month in the Marine Branch from selected and supplementary ships were as follows:

Table 5. Meteorological logbooks received in the Marine Branch

1953									1954		
April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
189	127	113	113	81	132	116	104	124	118	99	141

Logbooks and upper-air data have been regularly received from ocean weather ships at stations INDIA and JULIETT. Microfilm copies of observations made at all other North Atlantic ocean weather stations and, by courtesy of the U.S.A.A.F., data from Japanese ocean weather ships in the Western Pacific, have also been regularly received.

(b) ANALYSIS OF OBSERVATIONS

- (i) Observations from logbooks received from British voluntary observing ships and from ocean weather ships and from naval logbooks were punched on to Hollerith cards. The total number of observations punched was 257,955. The large number of Hollerith cards which are available in the Marine Branch make possible the special climatological statistics and investigations on a world-wide basis which were undertaken during the year.
- (ii) Tabulations of all observations in the Southern Hemisphere made by British observing ships, totalling 50,100 observations, were supplied to the Massachusetts Institute of Technology for a special project, and since July a replica of these tabulations has also been sent by request to the Union of South Africa.
- (iii) Tabulation of swell and wind conditions in southern North Sea was made by decades and months from the year 1920 to provide data requested by the Royal Netherlands Navy.

4. Currents and ice

The computation of data for the preparation of surface current charts of the North Pacific Ocean, eastward of 160°W, has been continued.

5. Admiralty Pilots and charts

(a) The sections relating to surface currents have been entirely rewritten for new editions of six Admiralty Pilots required during the year, and generalised current charts have been prepared for these where necessary. Sections relating to ice in three of these Pilots have also been rewritten. The revision of the meteorological sections of the six Pilots has been co-ordinated with the world climatology branch and meteorological charts have been prepared for these publications in the Marine Branch.

(b) During the year a new request has been received from the Admiralty to supply information relating to currents to be placed on the series of Admiralty Navigational Charts. Information for six of these charts has been forwarded.

6. Special work

(a) Meteorological and ocean current statistics for ocean stations INDIA and JULIETT in the North Atlantic covering the period April-December, 1950, and the years 1951 and 1952 were prepared and distributed. The preparation of similar statistics for 1953 is well advanced.

(b) Work proceeded on investigations into the incidence and characteristics of temperature inversions at ocean weather stations in relation to the synoptic situation. A series of special observations have been made aboard the ocean weather ships to

determine errors of exposure of air thermometers, hygrometers and rain-gauges aboard ships. As a result of other investigations, modifications have been made to the radar sets to improve accuracy. Trials have been made with some success with a dan buoy associated with electrical resistance thermometers to determine whether this equipment can be used by ocean weather ships for measurement of air temperature-gradient near sea level in moderate or strong winds. Further sets of simultaneous radar wind measurements have been made by pairs of ocean weather ships as often as possible, when they relieve on station, as a check on errors of radar wind observations.

(c) The editorial work of the new edition of the Greenland and Barents Sea Meteorological Atlas was completed and the "copy" forwarded to the printers.

(d) Work proceeded on investigation into wave data, also on climatic fluctuation in the tropics.

(e) Co-operation on such subjects as the measurement of waves was maintained between the Marine Branch and the National Institute of Oceanography, and much use was made of the records held by the Marine Branch in the problem of heat exchange between ocean and atmosphere.

(f) Papers were produced on the following subjects:

(i) Frost smoke and unusually low air temperatures at ocean weather station INDIA.

(ii) The storm of 31st January to 1st February, 1953.

(iii) Variations of air and sea temperatures at ocean weather stations in short periods.

(iv) Humidity over the Atlantic Ocean.

(v) Cargo ventilation aboard ship.

7. Inquiries

(a) Information including statistical tables and charts of marine data were prepared for the Naval Weather Service, other Government Departments, scientific institutions and commercial firms. Examples of such information included:

(i) The occurrence of thunderstorms at sea (for the World Meteorological Organisation).

(ii) Wave statistics supplied to the U.S.A.A.F. and the Royal Netherlands Navy, Saunders Roe Ltd. (flying-boat constructors) and Lloyds Register of Shipping.

(iii) Weather conditions at the time of collision between two ships *Haiti Victory* and *Duke of York* for the U.S. Coastguard Section.

(b) Information was supplied to the Ministry of Transport and Civil Aviation for several formal investigations into serious shipping casualties, which were held during the year. In three of these cases—the *Guava* inquiry in November, 1953, and the *Sheldon* and *Belldock* inquiries in March, 1954—the personal attendance of an officer was necessary. Further information was supplied prior to the appeal against the finding of the Court of Enquiry into the loss of the *Princess Victoria*, which was heard in September, 1953, and information was supplied for the formal investigation to be held on the losses of the *Michael Griffiths*, *Yew Valley* and *Island Magee*.

(c) During the year over 90 inquiries necessitating certified statements of weather conditions were answered in addition to numerous telephone requests.

8. Publications

Quarterly numbers of *The Marine Observer* for April, July and October, 1953, and January, 1954, were published. Reprints of the atlases *Quarterly Surface Current Charts of the Atlantic Ocean* and *Indian Ocean Currents* were published. A completely revised edition of the atlas *Monthly Meteorological Charts and Surface*

Current Chart of the Greenland and Barents Seas was sent to the printer. Replacement No. 1 to the *Marine Observer's Guide* and a revised reprint of *Decode for use of Shipping* were sent for printing. The editing of a new publication *Meteorology for Mariners*, and work on a new atlas *Quarterly Surface Current Charts of the Western South Pacific Ocean*, are nearing completion.

9. International co-operation

(a) The Marine Superintendent in his capacity as President of the Commission for Marine Meteorology of the World Meteorological Organisation carried out considerable international correspondence concerning the work of his Commission and related work for other technical commissions.

(b) The Marine Superintendent attended the third and fourth North Atlantic Ocean Stations Conferences at Brighton on the 8th to 18th July, and Paris from 9th to 22nd February, respectively. At the third I.C.A.O. North Atlantic Ocean Station Conference held in Brighton in July, 1953, the agenda was restricted to financial matters and, as a reduction in the number of stations appeared inevitable, it was recommended that a full technical and financial conference be held as soon as possible in order to review the situation before the present agenda expires on 30th June, 1954. At the fourth I.C.A.O. North Atlantic Ocean Station Conference held in Paris in February, 1954, it was decided to reduce the total number of stations from 10 to 9, as from the beginning of the new agreement on 1st July, 1954. The four British ocean weather ships will continue to operate.

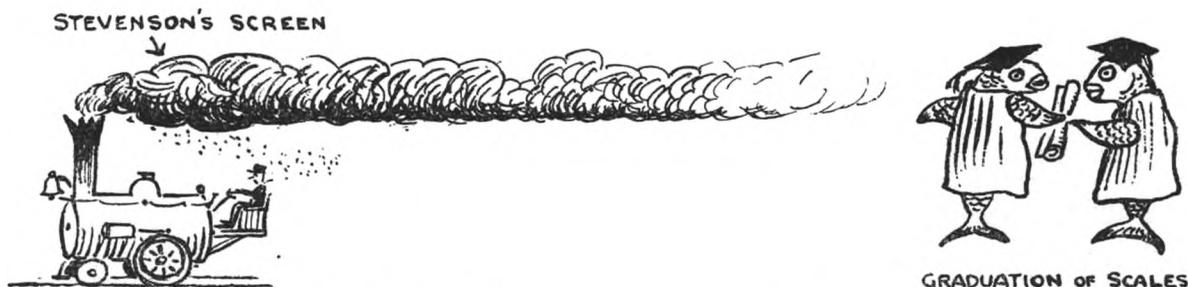
10. Awards

Each meteorological logbook from a ship when received in the Marine Branch is very carefully scrutinised, and the quality of the work classified by a nautical officer, and each year the Director of the Meteorological Office presents Excellent Awards to the captains, principal observing officers and senior radio officers of British selected and supplementary ships whose voluntary meteorological work during the year has been considered of outstanding quality.

One hundred ships are eligible for Excellent Awards, and for the year 1953-54 the award is being made to the individuals named in the table on pages 131 and 132. The book selected is *Climate and the British Scene*, by Gordon Manley.

The fact that 48 shipping companies are represented in this year's list of awards is a measure of the uniformity of the quality of meteorological observations from every type of ship in every trade.

On the Director's behalf we congratulate those whose specially good work has thus been recognised. These Excellent Awards are tokens of encouragement to all voluntary observers at sea. Although only awarded to a selected few, they are nevertheless one way of saying "thank you" to all those masters and officers who carry on the tradition of voluntarily making meteorological observations at sea, for the benefit of world meteorology.



These sketches are two of a number that were drawn by the observing officers of M.V. *Port Wellington* on the cover of a meteorological logbook. The first appeared on page 81 of the April number, and further sketches will appear in future numbers.

EXCELLENT AWARDS (Year ending 31st March, 1954)

SHIP	CAPTAIN	PRINCIPAL OBSERVING OFFICER	SENIOR RADIO OFFICER	OWNERS
<i>Afghanistan</i>	R. Connacher	N. H. Crawford	A. H. Ross	F. C. Strick & Co., Ltd.
<i>Arabistan</i>	J. E. Cooke	P. H. Alexander	A. D. Nicolson	F. C. Strick & Co., Ltd.
<i>Ajax</i>	E. W. Studley	A. R. Davidson	A. E. Holman	A. Holt & Co.
<i>Araby</i>	F. J. Swallow	J. Merson	A. Whittaker	Royal Mail Lines, Ltd.
<i>Argyll</i>	J. Dodds	P. F. J. Woollett	J. MacGillivray	B. J. Sutherland & Co., Ltd.
<i>Armadale</i>	J. S. McLean	H. A. McGill	H. Morrison	Australind Steam Shipping Co., Ltd.
<i>Athens</i>	J. Tierney	T. S. Hayward	H. S. Knight	Shaw, Savill & Albion Co., Ltd.
<i>Australia Star</i>	R. White, D.S.C.	J. Holloway	L. Cooper	Blue Star Line, Ltd.
<i>Avistone</i>	C. K. Evans, O.B.E.	S. T. Burt	L. R. Bradley	Purvis Shipping Co., Ltd.
<i>Avondene</i>	F. Moorcraft	J. Daniel	W. Parry	Dene Shipping Co., Ltd.
<i>Baron Fairlie</i>	T. R. Reid	R. W. Forbes	P. E. Bowles	H. Hogarth & Sons, Ltd.
<i>Baron Murray</i>	E. A. Brown	C. W. Noakes	P. Tew	H. Hogarth & Sons, Ltd.
<i>Baron Renfrew</i>	T. D. Drysdale	P. Turnbull	R. C. Pollard	H. Hogarth & Sons, Ltd.
<i>British Endeavour</i>	J. R. Georjeson	A. W. Henderson	N. Thompson	British Tanker Co., Ltd.
<i>Captain Cook</i>	J. Cook, O.B.E.	A. Maclean	L. Hooper	Donaldson Bros. & Black, Ltd.
<i>Chindwara</i>	B. A. Rogers, D.S.C., R.D., R.N.R.	F. Bell	R. C. Law	British India S.N. Co.
<i>Cingalese Prince</i>	B. R. Simons	A. C. Farrar-Hare	G. Coffey	Prince Line, Ltd.
<i>City of Khartoum</i>	J. L. Robertson	J. Butcher	J. Carroll	Hall Line, Ltd.
<i>Clan Buchanan</i>	J. A. Forster	P. C. W. Hoblyn	J. Brown	Clan Line Steamers, Ltd.
<i>Clan Campbell</i>	H. C. Simpson, O.B.E.	W. Zaboriski	R. F. Cole	Clan Line Steamers, Ltd.
<i>Clan Chattan</i>	J. McCrone	W. S. Clark	E. J. Shillabeer	Clan Line Steamers, Ltd.
<i>Clan Macrae</i>	E. Coulthart	R. S. Schooling	N. Dalzell	Clan Line Steamers, Ltd.
<i>Clan Urquhart</i>	T. W. Inman, O.B.E.	K. Morton	T. D. Sullivan	Clan Line Steamers, Ltd.
<i>Corrientes</i>	K. McLeod	I. Hood	N. Wilding	Donaldson Bros. & Black, Ltd.
<i>Cuzco</i>	R. D. S. Eckford	A. M. Jestico	A. Evans	Pacific Steam Navigation Co.
<i>Darro</i>	T. Powell	G. Rogers	R. Haskayne	Royal Mail Lines, Ltd.
<i>Dominion Monarch</i>	B. Forbes-Moffatt	G. H. Perry	F. V. Harford	Shaw, Savill & Albion Co., Ltd.
<i>Dunkery Beacon</i>	A. C. E. Green	A. Tatchett	G. Delahoy	Crawford Shipping Co., Ltd.
<i>Empire Nene</i>	A. Harkness	L. Lumley	J. A. Gerron	Mungo Campbell & Co., Ltd.
<i>Empire Windrush</i>	W. Wilson, O.B.E.	P. H. Bower	F. W. Fowler	New Zealand Shipping Co., Ltd.
<i>English Star</i>	L. Vernon, M.B.E.	R. Middleton	F. Hill	Blue Star Line, Ltd.
<i>Eucadia</i>	W. S. Thomson, O.B.E.	G. K. Murdoch	D. Sproat	Anchor Line, Ltd.
<i>Eumaews</i>	H. C. Large	H. C. Baldwin	J. Watson	A. Holt & Co.
<i>Esperance Bay</i>	H. C. Smith	J. Yarwood	H. H. Lyons	Aberdeen & Commonwealth Line, Ltd.
<i>Esso Edinburgh</i>	D. J. Davies	K. Mackenzie	J. Otley	Esso Petroleum Co., Ltd.
<i>Famad Head</i>	W. J. Leinster	J. McCauley	W. Mildren	G. Heyn & Sons, Ltd.

EXCELLENT AWARDS (continued)

SHIP	CAPTAIN	PRINCIPAL OBSERVING OFFICER	SENIOR RADIO OFFICER	OWNERS
<i>Gothic</i>	Sir D. Aitchison, K.C.V.O.	T. J. Whiston	A. Gandon	Shaw, Savill & Albion Co., Ltd.
<i>Harpalycus</i>	J. Wharton, M.B.E., D.S.C.	B. O'Sullivan	N. H. Cockayne	J. & C. Harrison, Ltd.
<i>Hororata</i>	E. H. Hopkins	J. A. L. Cosh	T. Green	New Zealand Shipping Co., Ltd.
<i>Hurunui</i>	H. E. Reilly, D.S.C., R.D., R.N.R.	D. J. Newman	A. H. Sandilands	New Zealand Shipping Co., Ltd.
<i>Jessmore</i>	G. Cook	D. M. Harper	P. Wade	Johnston Warren Lines, Ltd.
<i>Lancashire</i>	A. Williamson	J. M. Waldie	A. Jones	Bibby Bros. & Co.
<i>Lingust</i>	W. Weatherall	J. M. Ritchie	H. Sparkes	T. & J. Harrison, Ltd.
<i>Lotarium</i>	T. N. Richardson	C. H. Haworth	S. E. Jones	Shell Tankers, Ltd.
<i>Makalla</i>	N. Clarke	D. S. Evans	L. Barnett	Shell Tankers, Ltd.
<i>Mandasor</i>	H. Simpson	J. A. Kerbyson	A. Halstead	T. & J. Brocklebank, Ltd.
<i>Margay</i>	G. A. Jackson	R. H. Wills	K. G. Fawcett	T. & J. Brocklebank, Ltd.
<i>Mataroa</i>	N. W. Tipple	M. H. S. Salter	E. Leigh	Kaye Son & Co., Ltd.
<i>Muristan</i>	R. G. James, R.D., R.N.R.	J. P. Miller	E. Boyce	Shaw, Savill & Albion Co., Ltd.
<i>Nestor</i>	T. H. Farrar, O.B.E.	S. L. R. Simpson	D. N. Todd	F. C. Strick & Co., Ltd.
<i>New Australia</i>	J. M. Anderson	C. L. Rielow	H. Roberts	A. Holt & Co.
<i>Newfoundland</i>	K. D. G. Fisher	J. S. McEwan	H. Matthews	Shaw, Savill & Albion Co., Ltd.
<i>Nottingham</i>	C. H. Kenyon	P. H. Warne	T. C. A. Hill	Johnston Warren Lines
<i>Nevea Scotia</i>	L. W. Fulcher	A. J. Young	F. R. Jones	Federal Steam Navigation Co., Ltd.
<i>Orari</i>	J. E. Wilson, O.B.E.	J. D. P. Williamson	W. J. Peat	Johnston Warren Lines, Ltd.
<i>Pacuare</i>	J. R. M. Ramsay	A. Stokoe	J. A. Skirrow	New Zealand Shipping Co., Ltd.
<i>Pampas</i>	J. Purviss	H. J. Leslie	S. Ribee	Elders & Fyffes, Ltd.
<i>Papanui</i>	R. C. S. Woolley, R.D., R.N.R.	K. Harper	C. Devine	Royal Mail Lines, Ltd.
<i>Paparoa</i>	H. C. R. Dell	R. B. Hood	M. Hookway	New Zealand Shipping Co., Ltd.
<i>Paraguay</i>	D. Brittain	B. D. Allan	V. Bennett	New Zealand Shipping Co., Ltd.
<i>Parima</i>	W. S. Thomas	J. Connell	P. Goulden	Royal Mail Lines, Ltd.
<i>Paringa</i>	G. S. Grant, R.D., R.N.R.	J. Escolme	A. Tomson	Royal Mail Lines, Ltd.
<i>Philomel</i>	E. J. Kerridge	J. M. Jones	G. Soanes	Peninsular & Oriental S.N. Co.
<i>Port Adelaide</i>	H. Selmer	C. R. Baron	G. Bartram	General Steam Navigation Co.
<i>Port Brisbane</i>	C. R. Townshend	T. J. Stowell	O. A. Livermore	Port Line, Ltd.
<i>Port Dunedin</i>	F. W. Bailey, M.B.E.	K. W. Jayne	W. H. Parratt	Port Line, Ltd.
<i>Port Jackson</i>	L. W. Cady	D. J. Evans	J. W. Davis	Port Line, Ltd.
<i>Port Lincoln</i>	G. G. Langford	J. R. King	R. C. Crompton	Port Line, Ltd.
<i>Port Pirie</i>	J. L. Porter	B. Dunlop-Jones	P. J. McKeon	Port Line, Ltd.
<i>Port Victor</i>	P. H. Pedrick	K. M. Nicol	W. Sharkey	Port Line, Ltd.
	E. T. N. Lawrey	W. Duthie	D. MacNeil	Port Line, Ltd.

<i>Pretoria Castle</i>	G. H. Mayhew	E. Hull	J. Gilbert	Union Castle Mail S.S. Co., Ltd.
<i>Rakaia</i>	C. Cordran	J. Evans	P. H. Broome	New Zealand Shipping Co., Ltd.
<i>Rangitata</i>	A. E. Burton	J. Masson	J. C. Grant	New Zealand Shipping Co., Ltd.
<i>Rangitiki</i>	A. E. Lettington, O.B.E., D.F.C.	I. Excell	D. Charter	New Zealand Shipping Co., Ltd.
<i>Rangitoto</i>	C. R. Pilcher, O.B.E.	P. Lay	G. Parker	New Zealand Shipping Co., Ltd.
<i>Reynolds</i>	J. B. Burns	G. D. Leith	M. H. Mann	Bolton S.S. Co., Ltd.
<i>Rialto</i>	J. A. Etches	A. M. England	C. V. Child	Ellerman's Wilson Line, Ltd.
<i>San Velino</i>	H. R. Shotton	W. Richardson	J. Couchman	Eagle Oil & Shipping Co., Ltd.
<i>Salween</i>	H. V. V. Poole	T. F. Fields	J. H. Brown	P. Henderson & Co.
<i>Somerset</i>	H. R. M. Smith	J. Hannah	T. Mason	Federal Steam Navigation Co., Ltd
<i>Southern Opal</i>	A. F. Baikie	J. W. Murray	T. Johnson	Chr. Salvesen & Co.
<i>Suffolk</i>	F. Pover	T. Rowland	H. G. Hare	Federal Steam Navigation Co., Ltd.
<i>Sussex Trader</i>	H. Young	T. E. Thistleton	G. S. Davies	Trader Navigation Co., Ltd.
<i>Sydney Star</i>	J. B. Kennedy	F. E. Thomas	W. Wade	Blue Star Line, Ltd.
<i>Taranita</i>	A. J. F. Colquhoun	J. S. Watson	H. Williams	Anchor Line, Ltd.
<i>Telemachus</i>	W. J. Moore, D.S.C., R.D., R.N.R.	N. H. F. Weldken	J. C. Noble	A. Holt & Co.
<i>Temple Mead</i>	J. C. Skears	H. W. Young	A. Jones	Lambert Bros., Ltd.
<i>Tenagodus</i>	R. F. Garrod	W. Irvine	W. W. Kay	Shell Tankers, Ltd.
<i>Teotot</i>	H. Davies	G. B. Chamberlain	W. Tomlinson	Royal Mail Lines, Ltd.
<i>Thalamus</i>	J. Kell, M.B.E.	J. A. Forbes	G. P. Shickle	Shell Tankers, Ltd.
<i>Trelissick</i>	M. E. Sadler	D. V. Tattoo	A. Thomson	Hain S.S. Co., Ltd.
<i>Trochiscus</i>	G. Taylor	G. T. Evans	C. D. Boudren	Shell Tankers, Ltd.
<i>Umtali</i>	F. E. J. O'Hea	R. J. Bizzey	P. V. Richmond	Bullard, King & Co., Ltd.
<i>Umzinto</i>	R. Harber	J. G. Campbell	C. V. James	Bullard, King & Co., Ltd.
<i>Vestra</i>	D. S. Archibald	H. M. Third	D. C. White (chief officer working R/T)	J. T. Salvesen & Co.
<i>Wairangi</i>	R. A. Barns	C. Perry	M. Sargent	Shaw, Savill & Albion Co., Ltd.
<i>Warkworth</i>	N. Thompson, M.B.E.	H. Gunton	J. M. Morrison	R. S. Dalgliesh, Ltd.
<i>Winchester Castle</i>	G. W. B. Lloyd	A. D. Mildren	R. Brew	Union Castle Mail S.S. Co., Ltd.
<i>Yoma</i>	S. Thomson	S. B. Hamilton	W. Allan	P. Henderson & Co.

THE MARINE OBSERVERS' LOG



July, August and September

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.

MATING OF FLYING-FISH

Indian coastal waters

S.S. *Clan Macfadyen*. Captain R. R. Baxter. At port of Visakhapatnam. Observer, the Master.

2nd September, 1953, at night. We were dumping sand ballast into the sea and many flying-fish were attracted by the sinking sand as it was shovelled over the ship's side. At any one time several dozen small flying-fish (about 4 in. long) could be seen in the circle of floodlight round the vessel, watching the proceedings curiously and scooting out of the way whenever any stones fell near them. As there were no means of capturing any specimens I cannot be too sure of their species, but I believe they were of the double-wing variety (biplane).

While lazing near the surface they cruised with their pectoral fins fully spread. As they increased their speed they folded these fins nearer and nearer to their sides, until when darting at full speed they were flat against their bodies. On taking off in a glide the fins were kept tightly folded against the body for the first 1-3 ft of the glide when they were opened out, shaken free of water and fully spread.

Two fish about 12 in. in length were observed approaching, one a fat fish cruising slowly along with wings from half to fully spread, and the other a thinner fish darting excitedly round the first in a great state of agitation, sometimes rubbing noses and at others nudging the fat one near the anus from below and behind. The extreme state of agitation of the thin one, with its wings all a flutter, seemed to be communicated to the fat one at intervals of about 2 min. Then the two would come together fluttering violently, belly to belly, anus to anus, interlock their wings and lie still for several seconds; sometimes they would be side by side and sometimes the thin one would be upside-down underneath.

This occurred six times before they passed outside the circle of light. During one mating, when they were directly under the light, a cloudy and slightly phosphorescent streak about 4 ft long was left behind, but only while the fish were in contact. Where this occurred a patch of small bubble-like things remained on the surface of the water until carried away by the tide.

Position of ship: At anchor, 090°, 2 miles from Dolphin's Nose Light, off the port of Visakhapatnam, east coast of India, in 17 fathoms of water.

Note. This report was sent to the British Museum and the Marine Biological Association, who commented as follows:

(a) *From the British Museum (Natural History):*

"This is well worth publication, for there have been very few observations on the mating behaviour of these fishes. Quite recently the pairing of flying-fishes of the genus *Cypselurus* has been seen off the Californian coast. In Indian waters the natives of the Coromandel coast catch spawning flying-fishes with brails as the fishes gather around piles of floating brushwood placed in the water by the natives.

"The 'cloudy and slightly phosphorescent streak' is presumably the milt from the male. Something very similar was seen during the observations off California."

(b) *From Mr. D. N. F. Hall, a scientific officer in the Colonial Research Service, at present working in the Marine Biological Association at Plymouth on an investigation into the flying-fishery of the Barbados:*

"During the course of my investigation into the Barbadian flying-fish fishery it has been necessary to delve deeply into the relevant literature. As far as I am aware, there has been only one previously published record of an observation of mating in flying-fish (Miller, D. J.: "Notes on the embryology and behaviour of the flying-fishes (*Cypselurus*) off the coast of Southern and Baja California"; *California Fish and Game*, Vol. 38, 1952, No. 4). Miller's record though is rather sketchy, which makes the observation of Captain Baxter of great interest: the description of belly-to-belly pairing in flying-fish is quite new. However, I think Captain Baxter must be wrong in his belief that the fish were of the 'biplane' variety.

"All the flying-fish of this form which have so far been studied, have eggs which sink in sea water; the eggs are quite unable to stay at the surface unless they are attached to something, and for this purpose they are provided with sticky tendrils which apparently intertwine, forming strings of eggs which adhere to floating objects. The most frequently found floating objects are pieces of seaweed; off Barbados bunches of Sargassum weed are found with these strings of eggs threaded through and through, though how the fish achieve this result is not known. The eggs (presumably) that Captain Baxter mentioned appear to be floating unsupported, which suggests that the fish were of the 'monoplane' variety (*Exocoetus spp.*): but it should be noted that Miller did not mention weed either, though the fish he was watching were definitely of the 'biplane' variety.

"The large fisheries for flying-fish off Barbados, Cebu and the Coromandel coast of India are carried out by day, and this may account for the dearth of information on the spawning habits. It is interesting to note that both Miller and Captain Baxter made their observations at night—possibly spawning in flying-fish is restricted to the hours of darkness."

CURRENT RIP

North Atlantic Ocean

M.V. *Rangitoto*. Captain C. R. Pilcher, O.B.E. Curaçao to Southampton. Observers, the Master, Mr. P. Lay, 3rd Officer, and Mr. B. Anstey, 4th Officer.

20th September, 1953, 2025 G.M.T. A well-defined current rip was observed running NNE-SSW. On crossing the line of demarcation the vessel yawed quite violently to port. There was no change in sea temperature. Air temp. 81°F, sea temp. 84°.

Position of ship: 24° 31'N, 55° 10'W.

Note. This observation was made in the flow of the North Equatorial Current. There is, however, a good deal of variation of the direction and rate of current in this region, mainly due to wind variation, so that the rip was probably due to the meeting of two local currents produced by different winds.

Gulf of Aden

S.S. *Clan Brodie*. Captain B. Vernon-Browne. Colombo to Aden. Observers, Mr. C. J. Abbott, 2nd Officer, and Mr. E. E. Coote, 3rd Officer.

13th August, 1953, 0930 ship's time. The vessel passed through a very pronounced line of demarcation, running approximately SW-NE, of different currents. While passing through the line the ship's head was swung strongly to the southward, and three turns of the wheel were not sufficient to stop the swing until the stern had cleared the line. The current on the western side was setting strongly to S. It had been observed, by latitude of Venus on meridian at 0900, that the ship had

been set to northward since 0530. The position of the ship and the line of demarcation coincided with the position and direction of the 1,000 fathom line on the chart.

Position of ship: $12^{\circ} 46'N$, $47^{\circ} 25'E$.

DISCOLOURED WATER

Gulf of Aden

S.S. *Lancashire*. Captain A. N. Williamson. Aden to Colombo. Observers, Mr. D. C. Montieth, 2nd Officer, Messrs. J. W. Waldie and J. F. Code, 3rd Officers.

14th September, 1953. From 0000 to 0520 S.M.T. the vessel passed through four clearly defined areas of discoloured water. It had a milky appearance and was apparently luminous, but only in the fourth area (0505 to 0520) were there any signs of phosphorescence. While passing through the third area (0255 to 0310) a marked fishy odour was noted. In all the areas the height of the waves decreased and wave crests were invisible. Soundings were taken at frequent intervals but the bottom was not reached at 150 fathoms. Sea and air temperatures were constant throughout. At 0200 Ras Baduwa was observed at bearing 117° , distant 30 miles, by radar. Wind S, force 5-6. Sea and swell moderate. Temperatures: dry bulb $76^{\circ}F$, wet bulb 73° , sea 74.7° . Cloud, Sc 2/8.

Position of ship at 0000: $12^{\circ} 54'N$, $53^{\circ} 18'E$.

PHOSPHORESCENCE

Arabian Sea

M.V. *Glenartney*. Captain H. E. Readshaw. Colombo to Aden. Observer, Mr. A. W. E. Johnson, 3rd Officer.

15th to 16th August, 1953, 1823 to 0200 zone time. At 1823 milky phosphorescence was observed of a slight greenish colour, which had the same light value as the sky so that the horizon was difficult to discern. At 1830 the phenomenon brightened suddenly to a full milk-white. Spray looked darker than the surrounding sea. At 2004 the luminous appearance of the sea ceased abruptly, although a glow could be seen in the sky ahead. The appearance of the sea at 1823 and 1830 was repeated at 2023 and 2045 respectively. The full milk-white appearance reached maximum brightness at 2103 when the horizon was very sharply defined. At 2133 the brightness commenced to fade again until the light values of sea and sky were the same. More variations of brightening and fading occurred again from 2200 to 2203, but at 2219 the phosphorescence brightened so that the horizon was easily discernible, and these conditions remained much the same until 2320 when it all ceased abruptly. Maximum brightness occurred at 2310. Further patches of milky phosphorescence of moderate brightness were seen at 2345; these patches became continuous at about 0010, when the horizon was easily discernible until daybreak.

It was noted that the phosphorescence was not carried aboard by spray, this appeared dark against the background of the sea. During the brightest periods the phosphorescence completely masked the wave crests and gave the sea an appearance of unnatural calm at once belied by wind, motion of the ship and spray coming aboard. Wind W-SW, strong breeze to moderate gale, rough sea, moderate swell. Visibility clear, no moon.

Position of ship at 1823: $11^{\circ} 48'N$, $56^{\circ} 03'E$; at 0200: $13^{\circ} 02'N$, $54^{\circ} 22'E$.

Note. Many observations of the bright white uniform phosphorescence known as "white water" have been published in this journal. The special points of interest in the present observation are that the white water was seen in a preliminary phase, less bright and greenish in colour, and that this process was repeated a second time, after all luminosity had disappeared, resulting in a re-establishment of the white water at full brilliance.

Gulf of Aden

M.V. *Enton*. Captain R. F. Hellings. Aden to Fremantle. Observer, Mr. F. N. Dalzell.

8th September, 1953, 1930 G.M.T. Sparkling pinpoints of light were observed in the area illuminated by the vessel's deck lighting. The bow wave appeared creamy green in colour. Frequent milky-white blobs of phosphorescence were observed with average diameter 25 to 30 ft, which, on coming within the range of the vessel's deck lighting glowed a bright green. These blobs were visible about 200 to 300 yd ahead. Wind calm. Sea smooth, slight swell. Temperatures: air 85°F, wet bulb 80°, sea 84°.

Position of ship: 12° 40'N, 45° 48'E.

Off Coast of Sumatra

M.V. *Anshun*. Captain A. Naismith. Jeddah to Penang. Observer, Mr. F. T. Quinn, 2nd Officer.

13th September, 1953, 1930 G.M.T. Dull and infrequent patches of phosphorescence about 3 ft in diameter were observed close to and on both sides of the ship. The luminosity, frequency, diameter and area of these patches increased considerably with increasing precipitation, which at 1940 was heavy, reducing the visibility to 2 miles.

At this time phosphorescent bands were observed passing from port to starboard, about one every 3 sec, emitted from a point 1 mile ahead and 2 points on the starboard bow. The bands were moderately bright and during the time of observation retained the same brightness and maintained the same apparent speed of revolution until they disappeared at 1950. During this phase the patches of phosphorescence were exceptionally bright, those close to the vessel illuminating the superstructure to a considerable degree and having a diameter from 6 to 12 ft.

The patches became less frequent and duller after the disappearance of the bands and by 2000 they also disappeared, although the prevailing weather conditions existed for two hours after the phenomenon was last observed. Air temp. 85°F, dew point 80°, sea temp. 87°. Light E'ly breeze, sky heavily overcast with Ns and Fs. Weather, moderate rain; visibility 8 miles.

Position of ship: 06° 00'N, 96° 00'E.

Note. This is another interesting observation of the phosphorescent wheel, several instances of which have been published in the post-war volumes of this journal.

STORM

Red Sea

M.V. *Wairangi*. Captain R. A. Barns. Aden to Suez. Observers, Mr. D. A. Rogers, 3rd Officer, and Mr. M. J. England, 2nd Officer.

31st July, 1953, 0630 G.M.T. A bank of what appeared to be dust passed south-eastward and was visible on the radar screen in a manner similar to rain. Ac and As were developing to N and building up towards the ship, wind NW'N, force 2, sea irregularly rippled. At 0700 the ship crossed a line of sand suspended in the water extending NE-SW, in which small quantities of green slime or vegetation could be seen. At this time towering Cu clouds were prominent to N and E and increased rapidly in amount. By 0750 the sky was almost black to N with Fb and Cb. A few minutes later the wind increased from NNW, force 3 to force 8 very rapidly, and lightning was seen. At 0805 there was torrential rain with wind force 10-11, waves increased in height and the sea was covered with driving spray. There was very frequent lightning and heavy rolls of thunder. Visibility was very short indeed, the air being filled with rain and spray, and the ship almost stopped. Air temperature fell from 89°F. to 77°.

At 0815 conditions began to improve, wind from N decreased to force 8 and the

rain eased considerably. The sky was still completely overcast, visibility about 2 miles and improving. Until 1010 the ship passed through rain squalls of varying intensity but conditions were moderating, although at various points to windward the sea was seen to break with spray driving over the surface. During the next two hours weather gradually improved and air temperature rose to 82°. Much lightning was observed during the ensuing night.

Position of ship at 0800: 14° 50'N, 42° 09'E.

WATERSPOUT

Red Sea

S.S. *Martand*. Captain H. Fosbrooke. Port Said to Aden. Observer, Mr. D. Moore, 3rd Officer.

12th September, 1953, 0855 G.M.T. On approaching Abu Ail channel a narrow waterspout was observed near the western side of Jabal Zuqar Island. It proceeded in a NE'ly direction and increased in width as it travelled. At 0907 it reached its maximum diameter and then began to become narrower and longer until 0909, when it disappeared. The waterspout reformed at 0911 but only remained visible for 2 min, and finally disappeared midway between Jabal Zuqar Island and Abu Ail Island. The photograph shown opposite page 124 was taken from the ship.

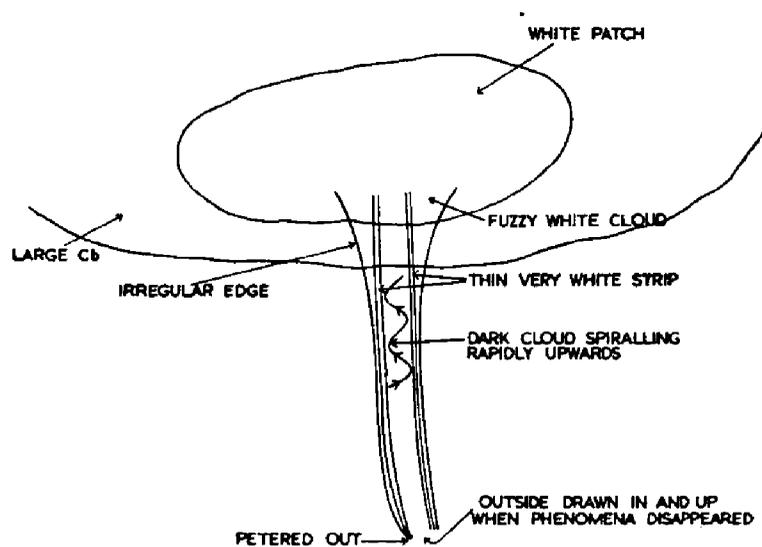
Position of ship at 0900: 14° 11'N, 42° 43'E.

North Atlantic Ocean

S.S. *Manchester Explorer*. Captain J. L. McLaren. Campbellton to United Kingdom. Observer, Mr. G. K. Booker, 3rd Officer.

28th August, 1953, 1740 G.M.T. A large Cb cloud was observed 20° on the port bow, base 5,000 ft. From the base of this cloud a slim pencil-like cloud grew rapidly. At first this thin cloud protruded straight from the base of the Cb, but later it curved slightly to one side. The phenomenon was plainly visible for about 10 min, and when it disappeared 5 min later it seemed to be rolled up from the bottom, giving the impression of a sleeve being pulled inside out. Course 096°, 12 kt.

Position of ship: 55° 42'N, 10° 05'W.



ST. ELMO'S FIRE
North Atlantic Ocean

S.S. *Macharda*. Captain R. A. Penston. Port Said to Savannah. Observer, Mr. G. W. Sinclair, 2nd Officer.

14th July, 1953, 0600 G.M.T. St. Elmo's Fire was observed on the main aerial. It commenced as numerous small luminous globes strung the length of the aerial, which became brighter and merged together until the whole of the wire was glowing brightly from end to end. The phenomenon lasted for 15 min. Sky completely overcast with continuous rain; lightning visible to northward but not close to the ship.

Position of ship: 31° 58'N, 72° 40'W.

FOG
Off River Plate

S.S. *Imperial Toronto*. Observer, Mr. R. Barnes, 3rd Officer.

20th September, 1953. It was noted that when passing the mouth of the River Plate there was a large drop of pressure, the wind shifted to the SW and there were two hours of fog. Once clear of the river area the weather cleared and the pressure rose again.

26th September, 1953. Bad weather was experienced once more as we passed the River Plate, northbound. The pressure dropped, and it was completely overcast with continuous light to moderate drizzle. The weather improved once we were clear of the area again.

Note. The above observations were forwarded to us by the Controller, Canadian Meteorological Division, who commented as follows:

"We suggest that the bad weather might have been due to a marine inversion over the area. The following observations were taken from the ship's logbook on the 20th.

Time	Position	Air Temp. (°F)	Dew Point (°F)	Sea Temp. (°F)	Pressure	Present Weather	Past Weather	Wind
0000	33° 24's, 51° 48'w	62	57	58	1012.5, falling	c	o	30°, 16 kt
0600	34° 30's, 53° 00'w	60	57	58	1011.3, falling	o-	o	10°, 15 kt
1200	35° 30's, 54° 18'w	58		58	1003.3, falling	o	f	270°, 9 kt

"Both air and sea temperatures dropped sharply, with the air temperature finally remaining higher than the sea. Under these conditions St cloud apparently formed at the top of the inversion, which would account for the drizzle. Fog could also be expected in these conditions."

UPWARD MOVEMENT OF RAIN
Mediterranean Sea

T.E.S. *Tectus*. Captain F. Leask. Casablanca to Vado. Observer, Mr. R. G. Taylor, 2nd Officer.

27th August, 1953, 1530 G.M.T. As a Cu mass moved over Conajeta Island a large turret began to form and rain was observed falling. As the cloud became centred over the valley (marked X in the sketch) the precipitation could be seen rising again in a marked upward stream on the mountain slope. At no time, however, did it appear to reach the cloud base again.

Position of ship: off Ibiza Island (Balearic group).

Note. It is possible for rainfall seen from a distance to appear to rise by perspective if a strong horizontal wind is carrying it towards the observer. In the interesting observation above, however, the conditions prevailing at the time indicate that the rain was really being carried up. On the previous day a shallow depression with a wide warm sector had moved ESE into northern Spain, and by noon on the 27th the warm front had spread across Spain

and become nearly stationary over the Balearic Islands, where winds in the lowest levels were NE'ly. Associated with the arrival of this depression, colder air was brought over the area of these islands at higher levels, making conditions favourable for strong convection. A second cause assisting convection was provided by the sloping hillside over which the rain was ascending. This ground was probably strongly heated by the sun from about 0530 local time. The formation of the turret cloud is evidence of strongly rising air, which was sufficient to carry the rain upwards nearly, but not quite, to the cloud base.

REVOLVING CLOUD

Atlantic Ocean (off Casablanca)

T.E.S. *Tectus*. Captain F. Leask. Punta Cardon to Casablanca. Observer, Mr. M. P. Fisher, 3rd Officer.

23rd August, 1953, 1010 G.M.T. The wind dropped completely and at 1015 it rapidly veered through S to SW and NW, reaching force 6. A low cone-shaped cloud was observed bearing 340°, revolving in its passage. At the same time a large mass of very low, black, ragged Fb (maximum height 1,000 ft) was seen bearing 020°. This was also revolving anticlockwise, the upper edges being clearly seen to be in constant movement downward. Both these cloud masses moved northward. At 1020 the air temperature had risen 3° to 77°F, causing a very warm (close) atmosphere, during which an air current could be clearly seen dividing almost overhead; coming from E it split into two marked streams, NW and S. Fragments of Cu could be seen being sucked into the vortex of the large Cu mass.

By 1030 the cone cloud had disappeared and the second cloud became elongated. The barometer at this time had fallen sharply to 1010.5. At 1045 the wind was again NNE force 2-3. Air temp. 75°F. Barometer 1013.0 and rising. Other cloud formations at the time, dense Cs, dissolving, high Sc and Ac, 7 oktas.

Position of ship at 1010: 33° 31'N, 08° 44'W.

Note. This is interesting, as observations of rapid rotatory or "boiling" movements in cloud are usually made only when the undersurface of a thunderstorm cloud is directly overhead. The synoptic chart for this date shows no unusual features, so that the cloud revolution must have been due to some very local conditions.

LINE OF CLOUDS

Off Nova Scotia

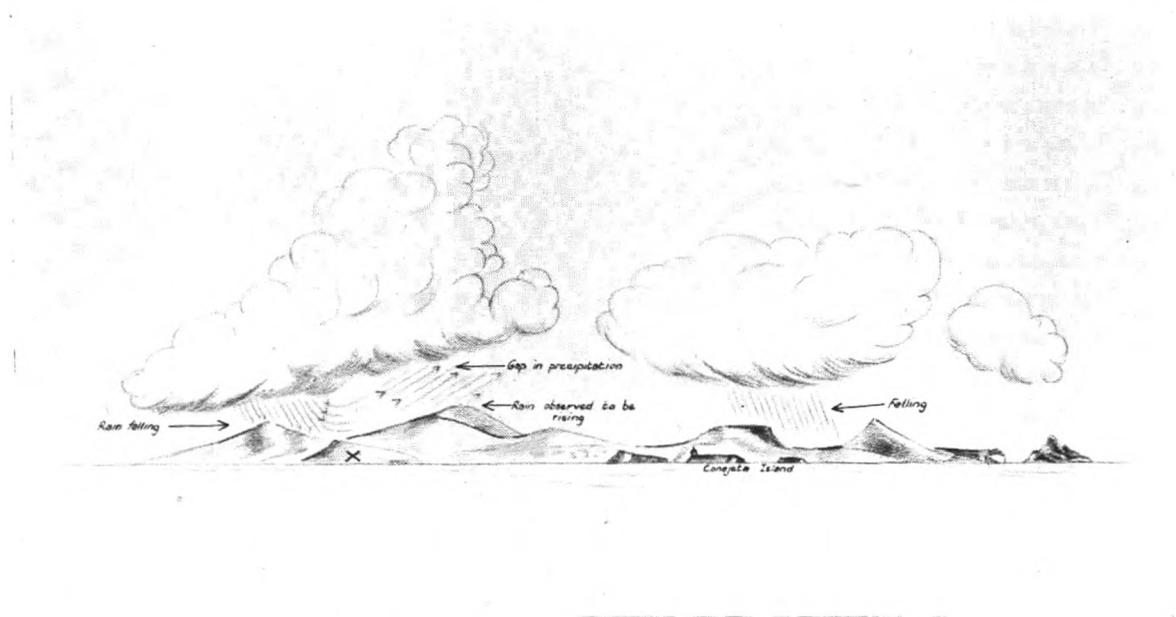
S.S. *Fort Avalon*. Captain B. Powell. Halifax to St. Johns. Observer, Mr. R. W. Keene, 1st Officer.

1st July, 1953, 1900 G.M.T. On a bearing of 030°(T) a cloud was observed in the shape of a smooth rounded hummock or mound. The upper edge was smooth and clearly defined but the bottom was obscured in thin stratus cloud. After a few minutes this developed into four equally clearly defined hummocks which began to grow quite rapidly, the upper edges breaking off into fragments. At 1915 the mass joined and was seen to be moving SE, taking the shape of a huge spiralled horizontal cone, the leading edge forming the apex. At the time of the motion the formation was rapidly dispersing outwards, until at 1930 it was bearing 115° in the form of detached Sc. The height of the base of the cloud was estimated to be 800 to 1,000 ft.

Air temp. 63°F, sea 51°. Wind 270°, 15 kt. Visibility 10 miles, very light haze. Course 074°, 14 kt.

Position of ship: 45° 26'N, 58° 54'W.

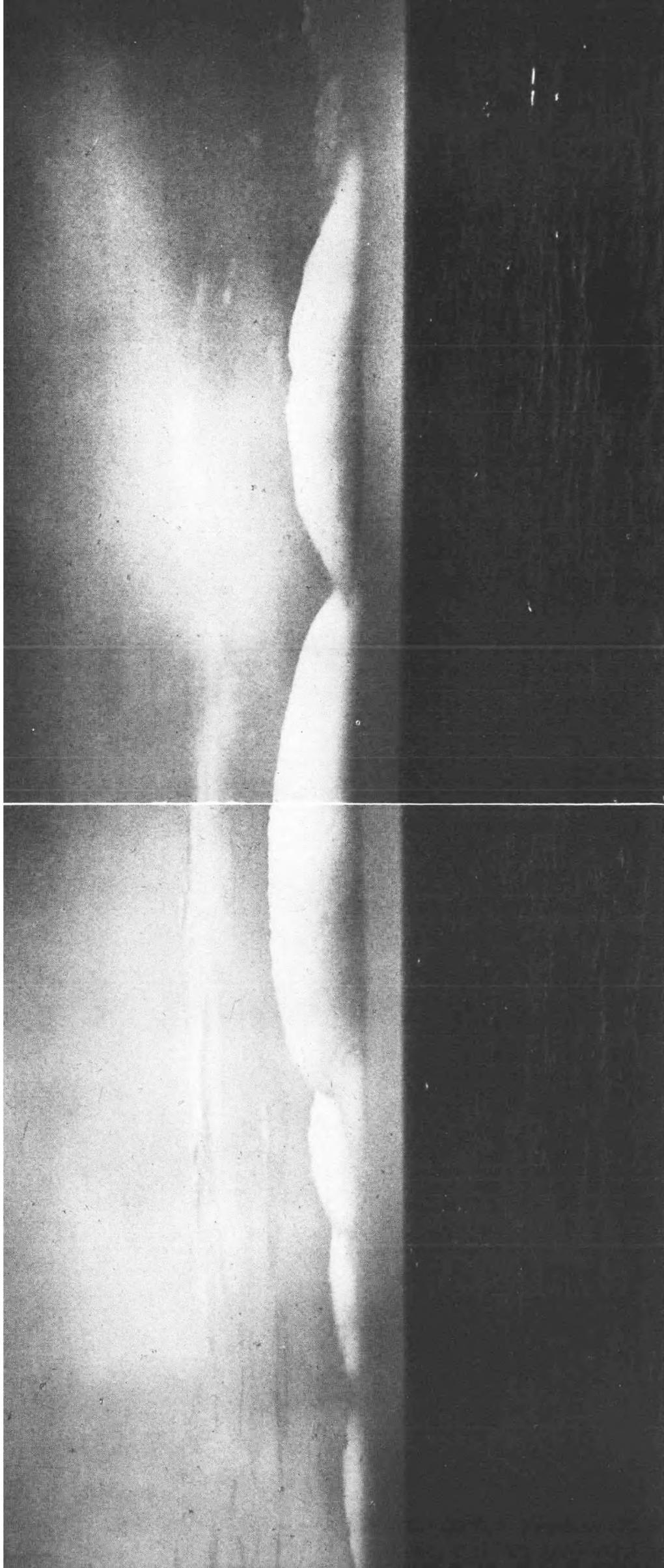
Note. Synoptic charts for 1st and 2nd July show that a cold front moved in a SE direction over the ship at about 1900 G.M.T. on the 1st. The pressure gradient along the front was weak, with little if any precipitation along it; the cloud was mainly at medium cloud level. The observation and photographs suggest that the lenticular clouds were lying along a



A sketch of the phenomenon of upward movement of rain observed from T.E.S. *Tectus* on 27th August, 1953, off Ibiza Island (see page 139).



A sketch of revolving cloud observed from T.E.S. *Tectus* on 23rd August, 1953, off Casablanca (see page 140).



Photographs of a line of clouds observed from S.S. *Fort Avalon* on 1st July, 1953, off Nova Scotia (see page 140).

straight line and marked the boundary between the air masses at the front near the surface. The photographs suggest that the bases of the clouds were horizontal and at nearly the same level, and the horizon can be seen beyond. Very likely they were the last remains of a line-squall cloud and marked the position where the wedge of cold air was pushing south-eastward and lifting the warmer air from the surface. A linear cloud of probably similar origin was observed by T.E.V. *Beaverdale*, approaching the Strait of Belle Isle from the eastward, see the July, 1952, number of this journal, page 123, and photograph opposite page 128.

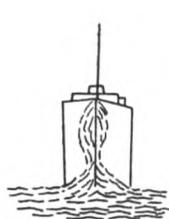


Fig. 1

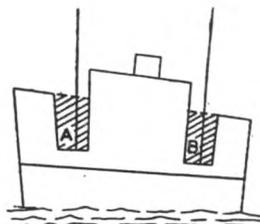


Fig. 2

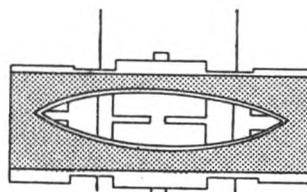


Fig. 3

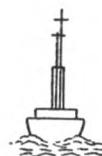


Fig. 4

ABNORMAL REFRACTION

Off Cape Finisterre

M.V. *Duke of Athens*. Captain T. Walton. London to West Africa. Observer, Mr. T. Owen, Chief Officer.

12th September, 1953, 1615 zone time. A low haze was observed all round the horizon and visibility was reduced to about 5 miles, although the tops of mountains could be seen at 22 miles. A ship was observed on the port bow, 5 miles distant with hull and bow wave greatly distorted (Fig. 1). Five minutes later the ship appeared as in Fig. 2, with the gaps marked A and B filling in alternately as the ship was pitching. When abeam the ship appeared normal, but at 1635, when a point abaft our beam, an inverted image appeared underneath and then an oval shape appeared in the centre with two part images (Fig. 3). The hull of the ship was painted grey, but the white of the bulwark plate could be seen clearly around the oval. As the ship disappeared from view masts and funnel were elongated (Fig. 4).

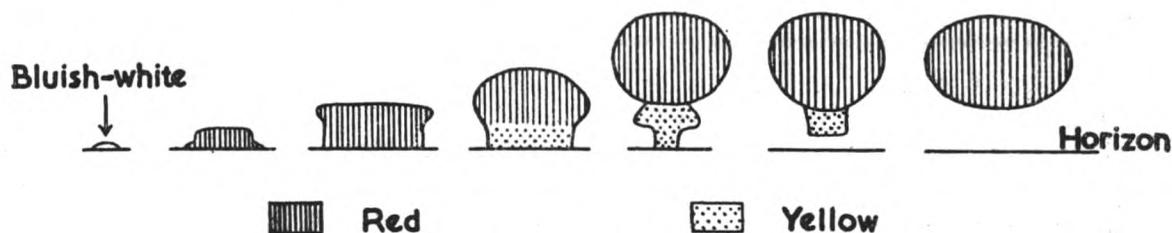
Position of ship: off Cape Finisterre.

New Zealand Waters

S.S. *Kent*. Captain P. P. O. Harrison. At Napier Harbour. Observer, the Master.

22nd September, 1953, 0605 S.M.T. At sunrise an instantaneous bluey-white flash occurred, followed by a deep red. The various shapes shown in the sketch were then seen until the sun was about two diameters high. Sky cloudless.

Position of ship: at Napier Harbour.



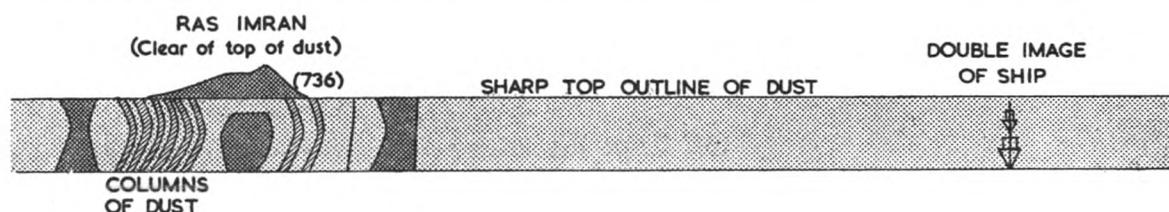
Gulf of Aden

S.S. *Velletia*. Captain D. T. Keddie. Suez to Mena-al-Ahmadi. Observer, Mr. J. McP. Pratt, 3rd Officer.

26th August, 1953, 0945 G.M.T. A dust storm was observed ahead. It appeared to develop on the starboard bow and moved slowly across our course (090°) on to the land. During the next three hours numerous similar storms were seen, all moving in the same direction. They were well defined and had the appearance of being low-lying islands, golden-brown in colour, and about 2 miles long. At 1219 another was observed ahead right across the horizon from the land to 4 points on the starboard bow. Excessive refraction was observed: ships appeared to have elongated funnels and deck-houses, and seemed to be well clear of the water. One ship appeared to have another planted on top of her masts. The actual columns of dust were plainly seen through binoculars and reached to 250 to 300 ft.

In the drawing below the darker shading appeared to be the double image of lower lying land around Ras Imran.

Position of ship at 1215: $12^{\circ} 30'N$, $44^{\circ} 27'E$.



WIND-DOG

Bay of Biscay

S.S. *Rembrandt*. Captain B. F. R. Thomas. La Goulette to Middlesbrough. Observers, the Master and Mr. J. Parsloe, 2nd Officer.

28th September, 1953, 1150 G.M.T. A "wind-dog" was observed 3 points on the port bow. The sun was obscured by an overcast sky, but the colours of the spectrum were distinctly visible reflected on the surface of the water; violet was nearest the ship and red furthest away, apparently at the horizon. A pale yellow luminosity extended about 30' in altitude above the spectrum, which covered 10° in azimuth at its most brilliant instant. As the "dog" approached the colours became less distinct, finally merging together and then fading away. A belt of light rain from Cb then passed over the ship. The duration of the phenomenon was about 5 min. Wind NW force 4.

Position of ship: $46^{\circ} 30'N$, $06^{\circ} 50'W$.

Note. "Wind-dog" is an old name popularly applied to a fragment of a rainbow seen on the clouds and believed to presage the approach of rain and presumably, also, wind. In the observation above the fragment of rainbow was seen against the sea surface, as not infrequently happens at sea when complete rainbows are seen.

ULLOA'S RING

South Pacific Ocean

S.S. *Kent*. Captain P. P. O. Harrison. Liverpool to Wellington via Panama. Observer, the Master.

23rd July, 1953, 0815 S.M.T. An almost completely white rainbow was observed with only a faint touch of the red visible on its outer edge. The phenomenon lasted in this condition for several minutes before a normal rainbow developed. Thin haze-like cloud scudded quickly before the wind. In the area of the ring no precipitation was apparent, but at the western base of the bow, in a gap in the Cb,

the full range of the spectrum was visible. Sun's altitude $29\frac{3}{4}^{\circ}$, bearing 057° . Wind SE force 5.

Position of ship: $13^{\circ} 52'S$, $102^{\circ} 25'W$.

Note. This observation was accompanied by a coloured sketch which cannot be reproduced here. It shows rather more than half a complete rainbow the greater part of which is white tinged with yellowish or pale orange colour on its upper edge. Towards the horizon the bow is obscured by cumulonimbus cloud from which heavy rain is falling. In a clear gap in the rain sheet the bow is seen continuing for the short distance between the undersurface of the cloud and the horizon. In this small section it appears as a normal rainbow showing the colours of the whole spectrum, in the order appropriate to the primary bow.

Brilliantly coloured rainbows are formed by raindrops greater than $\frac{1}{8}$ in. diameter. White rainbows are formed by fog or cloud containing very much smaller drops, $\frac{1}{10}$ in. or less in diameter. The observation is of interest as we do not remember ever having received one where part of a bow was white and part coloured, or where, owing to the approach of the heavy cloud, what was essentially a white rainbow was changed into a wholly coloured one.

LUNAR HALO

South Pacific Ocean

T.S.S. *Captain Cook*. Captain J. Cook. Balboa to Wellington. Observer, Mr. A. MacLean, 2nd Officer.

19th July, 1953, 0730 zone time. A distinct lunar halo was observed with radius 20° and width 3° . At 0930 the radius was 30° and width 3° , but at 1115 it had disappeared. Throughout the observation the sky appeared to be cloudless.

Position of ship: $33^{\circ} 40'S$, $167^{\circ} 24'W$.

Note. The large halo was perhaps Scheiner's halo, the radius of which seems to be somewhat variable, but averages 28° , measured to the inside edge. Another possibility is Feuillée's halo with radius of nearly 32° . Both these halos are rarely seen. An observation of Scheiner's halo by S.S. *Mandasor* is given in the previous number of this journal, page 79.

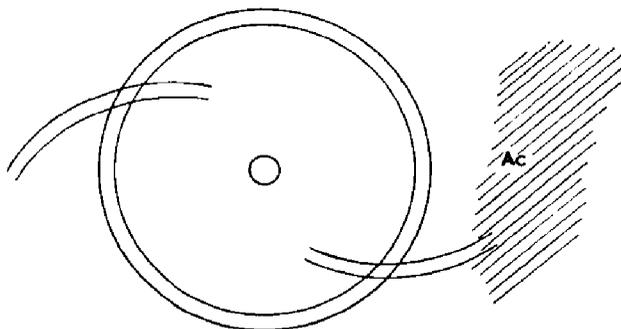
Bay of Bengal

S.S. *City of Khios*. Captain W. Dick. Bombay to Vizagapatam. Observer, Mr. J. A. Parsons, 3rd Officer.

19th September, 1953, 1530 G.M.T. A lunar halo was observed with two arcs of contact. The inner radius of the halo was $20^{\circ} 46'$. The edges of the halo and the contact arcs were soft and merged gradually into the night sky. The arcs were slightly fainter than the halo. The phenomenon was observed for one hour, when it was obscured by Ac. Altitude of moon, $54^{\circ} 35'$.

Position of ship: $14^{\circ} 32'N$, $83^{\circ} 06'E$.

Note. This is an interesting observation, as the two arcs intersecting the halo, which seem to have been quite clearly seen, are not included in the recognised halo phenomena.



DAY-TIME SKY COLORATION

South Pacific Ocean

S.S. *Kent*. Captain P. P. O. Harrison. Curaçao to Wellington. Observer, the Master.

30th July, 1953, 1700 S.M.T. (0600 G.M.T.). Cloud during the day had been thick As and Ns, but about 1630 wind freshened W, force 4 to force 5 and a clear patch developed between 190° and 220° and altitude 10°. All the sky that could be seen in this patch was a pale green in colour and of a uniform intensity.

Wellington Weather broadcast a "low" 990 mb as being in 40°S, 147°W, moving E, which subsequently passed about 400 miles due S from the ship.

Position of ship: 34° 31'S, 135° 51'W.

Note. The observation of a green coloration of a patch of clear sky in the day-time, in distinction to a similar green sky seen in the west at or after sunset, is one of the old nautical prognostics of bad weather. We rarely receive an observation of it.

GREEN FLASH

North Atlantic Ocean

S.S. *Macharda*. Captain R. A. Penston. Port Said to Savannah. Observer, Mr. J. W. S. Dunn, 4th Officer.

10th July, 1953, sunset. A cobalt-blue flash was observed, the duration of which was about 4 sec. Visibility excellent.

Position of ship: 32° 57'N, 51° 52'W.

Indian Ocean

M.V. *Port Napier*. Captain D. G. H. Bradley. Fremantle to United Kingdom. Observer, Mr. E. R. Jenkins, 3rd Officer.

25th July, 1953, at sunrise. A brilliant blue and green flash was observed lasting 2 to 2½ sec.

Position of ship: 25° 42'S, 103° 24'E.

Pacific Ocean

S.S. *Kent*. Captain P. P. O. Harrison. Panama to Wellington. Observers, the Master, Mr. T. Bennett, Chief Officer, Mr. B. Smith, 4th Officer.

26th July, 1953, 1720 S.M.T. The sun set with a brilliant green flash which turned to cobalt blue at the last instant. The whole phenomenon lasted for 3½ sec (timed).

Position of ship: 24° 25'S, 116° 40'W.

New Zealand Waters

S.S. *Kent*. Captain P. P. O. Harrison. Liverpool to Wellington via Panama. Observer, the Master.

23rd September, 1953. At sunrise there was a brilliant instantaneous green flash, followed by a steady emerald green of about 1 sec duration. The sun was slightly flattened on its vertical axis but there was no other change from its normal appearance. The early dawn sky was very red.

Position of ship: 39° 27'S, 177° 07'E.

Sea of Japan

S.S. *Lake Pennask*. Captain A. Donald. Vancouver to Moii. Observer, Mr. B. N. Kasmer.

24th September, 1953, 0850 G.M.T. At sunset, as the upper limb of the sun dipped behind a bank of Sc, it turned from orange to whitish-yellow (about the colour of the moon when high), then flashed a bluish-purple or violet colour. Air

temp. 72.3°F, wet bulb 68°, sea 73.4°. Weather, showers, sky overcast with Cu and Sc except where the sun was setting, where the Sc was very broken.

Position of ship: 37° 42'N, 135° 36'E.

Note. The above constitute an unusually interesting batch of green flash observations. Those of S.S. *Lake Pennask* were forwarded to us by the Controller, Canadian Meteorological Division. There are three observations of the blue flash, which is not often seen. A further example of this will be found in the observation of S.S. *Kent*, under the heading of Abnormal Refraction. It should be noticed that the durations of the flashes seen as blue ones, or as a green flash followed by a blue one, are longer than are usually given for this phenomenon. The blue flash is an additional part of the phenomenon not usually seen and therefore the combined duration when it is seen must be longer. To see the blue flash, the atmosphere near the horizon must be unusually clear; in most cases the blue light is scattered during its travel through the long horizontal extent of air. This applies with even greater force to the observation of the violet flash, the wavelength of light of this colour being still shorter, and the observation of S.S. *Lake Pennask* is therefore of very great interest, such an observation having very rarely been made. The observation of S.S. *Kent* on 23rd September is also of interest as showing two different green colours in succession. This has been seen on a few previous occasions; it means that towards the end of the green flash a certain amount of blue light got through, changing the colour to emerald green.

SCINTILLATION

Atlantic Equatorial Waters

M.V. *Paraguay*. Captain W. S. Thomas. Las Palmas to Recifé. Observer, Mr. J. Connell, 2nd Officer.

25th August, 1953. During the middle watch, after the sky in the E had cleared, Canopus was observed to be apparently rapidly changing colour from red to violet through all the colours of the spectrum. After about half an hour the principal stars of Orion were seen to be similarly affected. Sirius and Canopus were the most noticeable, and the phenomenon was plainly visible to the unaided eye. Visibility excellent.

Position of ship: 02° 44'S, 31° 56'W.

Red Sea

M.V. *Arabistan*. Captain J. E. Cooke. Suez to Aden. Observer, Mr. P. H. Alexander, 2nd Officer.

25th September, 1953, evening. In the vicinity of the Daedalus Reef the stars Sirius, Procyon, Achernar, Canopus, Dubhe, Kochab and Deneb were observed to be changing colour. Sirius clearly showed flashes of bright blue and green with a slight tinge of red. Achernar and Canopus showed very bright red and bright green, and the other stars red and green. Achernar was the first to be noticed and was seen with the unaided eye; Canopus on rising could also be seen changing colour without optical aid, but all the other stars required binoculars to see the colour changes. With Canopus and Achernar it was possible to see the colour changes, red-white-green-white-red, etc., one colour to the next every $\frac{1}{3}$ to $\frac{1}{2}$ sec. The apparent colour changes with Sirius ceased when its altitude reached 27 $\frac{1}{2}$ °, when Procyon reached 26° and Dubhe 20°. The other stars changed colour continuously as none of them exceeded an altitude of 15°. Sky cloudless.

Note. It is unusual for scintillating star colours to be seen so clearly with the unaided eye, except sometimes in connection with the brightest stars, such as Sirius. This is particularly so in the case of S.S. *Paraguay*'s observation, where all the spectrum colours were so seen.

PURPLE LIGHT

Caribbean Sea

S.S. *Kent*. Captain P. P. O. Harrison. Liverpool to Wellington via Panama. Observers, the Master, Mr. T. Bennett, Chief Officer, Mr. B. Smith, 4th Officer.

13th July, 1953, 1855 to 1905 S.M.T. The first purple light was observed between bearings 230° and 340°, at an altitude approximately 25°. Sunset had occurred at

1844. The second purple light at 1920 to 1925 was not so well defined as the first, and was seen first at an altitude of approximately 10° , descending to about 5° . This phenomenon was observed a little to the s of the sunset. At the same time the northern portion of the horizon was an egg-shell blue merging to a brilliant orange further s. The purple twilight appeared above the orange. At the time of the first purple light a bluish crepuscular ray was observed radiating to an altitude of 37° in a NE'ly direction from the direction of the sunset. Cloud $1/8$ Sc on horizon.

Position of ship: shortly after leaving Curaçao, bound for Colon.

Note. A number of observations of the first and second purple lights on dates between the 13th and 26th July, seen both after sunset and before sunrise, have been received from S.S. *Kent*. Space will not permit the publication of these observations in full; the first one is given above.

The first and second purple lights are normal phenomena of a clear sky after sunset but are not by any means regularly or clearly seen, especially in temperate latitudes. The first purple light appears as a pink or purple glow, the margins of which are ill-defined covering a considerable part of the western sky, when the sun is about 3° below the horizon. It reaches its greatest brilliancy when the sun has descended to 4° , and disappears when the sun is about 6° below the horizon. Before sunrise the order is reversed. In the various observations of S.S. *Kent* the duration of the phenomenon was from 5 to 15 min. The altitude of the glow descends as the sun descends, and on one occasion S.S. *Kent* observed it to extend down to an altitude of 5° before disappearance. The second purple light is fainter and more difficult to observe, beginning when the first one ends and ending, according to theory, at the time of disappearance of astronomical twilight, i.e. when the sun is 18° below the horizon, though long before that time it is much too faint to be seen.

There is a special point of interest in S.S. *Kent*'s observations of the second purple light. It was seen with durations between 5 and 18 min on different evenings and mornings, and appeared to be localised like the first purple light, the altitude and bearing being recorded. According to theory, the second purple light should cover the whole sky uniformly, though it would only be likely to be seen in the western part of the sky. This and other phenomena of the clear sky at twilight do, however, vary considerably and probably require further investigation.

AURORA

Gulf of St. Lawrence and North Atlantic Ocean

S.S. *Rialto*. Captain J. A. Etches. Hull to Montreal. Observers, Mr. J. A. Pettinger, 2nd Officer, and Mr. A. M. England, 3rd Officer.

11th August, 1953. A magnificent display was observed commencing at 0110 G.M.T. and lasting until daylight at 0700. It started in the NW at about 5° altitude and rose to 90° in the course of 10 min, gradually extending to the eastern and western horizons. The aurora took on many varied shapes during the first two hours, and then became arranged into three separate layers running E and W. The brilliancy of the display was equal at times to civil twilight; the colour was whitish throughout.

Position of ship: $52^\circ 37'N$, $52^\circ 37'W$.

12th August, 1953. Aurora was observed commencing at 0130 G.M.T. and lasting until daylight at 0700. The first signs were in the NW at an altitude of 10° ; it rose to 90° and spread over the whole of the northern sky. There was nothing spectacular about this display and it was not very bright, about equal to the brightness of the Milky Way; the brightest part was in the NW. By 0230 cloud had developed and obscured most of the aurora for about an hour. At 0330 the cloud cleared and a fascinating display was then observed. Many different shapes were noted in rapid succession. One of the main features was the varying brilliance, as though an electric current was being stepped up and down at rapid intervals. By 0430 the area covered was from 40° above the northern horizon to 20° above the southern. The colour was white throughout and the brilliance equal to civil twilight.

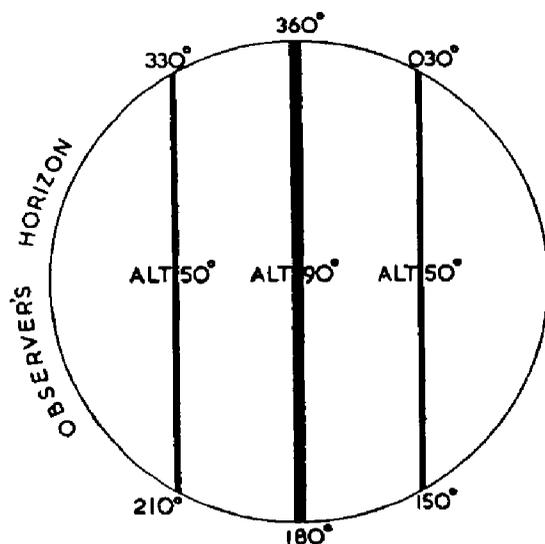
Position of ship: Gulf of St. Lawrence, north of Anticosti Island.

13th August, 1953. At Father Point aurora was observed commencing at 0120 G.M.T. in the E, then forming a whitish band running E-W. The altitude was 50° from the northern and southern horizons. This lasted until daylight.

20th September, 1953, 0045. A mild display was observed which took various forms and changed with great rapidity. By 0100 the sky became completely overcast with thick As and no further observations of the aurora were possible, but during a slight break in the cloud sheet it was noticed that two moons were visible, one overlapping the other by about one-third. The true moon was the upper, with its image overlapping its lower edge.

Position of ship: north of Anticosti Island.

Note. The observation of the double moon is remarkable. A similar observation by M.V. *Derryclare* was published on page 16 of the January, 1951, number of this journal. What makes these observations so interesting is the fact that there is no known explanation of the phenomenon, occurring, as in these observations, with the moon at considerable altitude. The doubling of sun or moon, or parts of them, by abnormal refraction near the horizon is a different thing altogether and is fairly common. It is noteworthy that the separation of the second moon from the real one is the same in both observations, about $10'$.



South Pacific Ocean

M.V. *Rangitoto*. Captain C. R. Pilcher. Balboa to Wellington, New Zealand. Observers, the Master, Mr. A. Finch, 2nd Officer, Mr. B. Anstey, 4th Officer, Mr. M. Candler, 2nd Radio Officer.

9th July, 1953. About half-an-hour after sunset three distinct auroral arcs were observed. Referring to the diagram, the centre arc passed through the observers' zenith on the plane of the true meridian. The altitude of the other two arcs was 50° . The three arcs were regular in form and extended to the horizon with uniform light. The arcs remained distinct for a period of about 10 min and then gradually faded, the eastern arc being visible longest. There was no moon and no dark segment was apparent. Weather had been fair with occasional passing showers of rain. No magnetic disturbance was recorded. Clouds $3/8$ Cu and Fc.

Position of ship at 0412 G.M.T. (1730 S.A.T.): $34^{\circ} 38'S$, $160^{\circ} 14'W$.

METEORS

North Atlantic Ocean

S.S. *Oregon Star*. Captain R. T. Hales. Cristobal to Le Havre. Observer, Mr. J. L. Mate, 4th Officer.

26th August, 1953, 2140 G.M.T. An extremely bright meteor was observed, but as the sky was completely covered with As, through which the moon appeared as a "woolly glow", it was not possible to estimate its flight or magnitude. It was sufficiently bright to illuminate the vessel with a green glow. It was observed for about 1 sec and its track appeared to be in a s'ly direction from $270^{\circ}(T)$ at altitude 40° , to $220^{\circ}(T)$ at altitude about 30° , when it disappeared with a very bright flash.

Position of ship: $44^{\circ} 01' N$, $28^{\circ} 48' W$.

Note. As the moon was nearly full on 26th August (two days past full) and as it was only able to transmit a "woolly glow" through the cloud, this meteor must have been of most exceptional brilliance, considerably exceeding the light of the full moon. Very few meteors attain this magnitude and it is unfortunate that it was not seen in a better sky.

S.S. *Baron Fairlie*. Captain T. Scott. Tyne to Wabana. Observer, Mr. G. C. E. Gibbs, 3rd Officer.

27th September, 1953, 2115 G.M.T. A meteor was first observed at bearing $260^{\circ}(T)$ and altitude about 15° . Its slow flight described a parabola towards the S, at first increasing altitude to 30° and then decreasing until its disappearance at about 10° at bearing 190° . On attaining its maximum altitude (30°) it was seen to have a reddish-purple trail, and after its disappearance the trail remained as a pinkish-white streak for several seconds. Duration of flight of the meteor 3 to 5 sec. The sky was clear.

Position of ship: $56^{\circ} 37' N$, $21^{\circ} 02' W$.

Atlantic Equatorial Waters

M.V. *Glenbank*. Captain J. W. Grey. Buenos Aires to Avonmouth. Observer, Mr. A. F. Wigham.

24th August, 1953, 0023 G.M.T. An orange-coloured meteor, magnitude about -1 , was first observed above a cloud at an altitude slightly over 11° , bearing 270° . It moved eastward on a curved path, passed about 10° below Vega and 20° below Deneb before attaining its greatest altitude at 34° . The meteor then curved downwards towards the E, diminished slightly in magnitude and finally disappeared at about altitude 22° and bearing 070° . The trail was quite well defined and plainly visible for just over 45 min while it maintained its original shape and appeared almost stationary. The meteor's chief characteristic was the apparent slow speed of its movement across the sky; its duration was 15 to 20 sec.

Position of ship: $03^{\circ} 55' S$, $31^{\circ} 26' W$.

Note. The duration of this meteor trail was very exceptional, though still longer ones up to two hours or more have been recorded on a few occasions. Another point of considerable interest is the fact that the trail maintained its original shape for such a long time, implying the absence of wind in the upper air at the heights occupied by the trail. Almost invariably the trails change in form or show slow movement across the sky, even if they remain visible for only a few minutes.

Pacific Ocean

S.S. *Devon*. Captain R. G. Hollingdale. Balboa to Sydney. Observer, Mr. D. R. Layard, 3rd Officer.

25th September, 1953, 0727 G.M.T. A large white object was observed bearing 250° , altitude 30° (approx.), and was in the vicinity of the star Nunki. The object was falling rapidly and almost immediately burst into an intensely brilliant green flash lasting about $\frac{1}{2}$ sec. The mast and rigging were sharply outlined in the flash. As soon as the light faded a streak of dull light, with a golden tinge, was noticed

extending downward from the point of explosion, with at least three small dark falling objects being distinctly observed. The whole phenomenon occurred in approximately $1\frac{1}{2}$ sec. It was a dark night, the moon being obscured by a heavy bank of cloud.

Position of ship: $13^{\circ} 12' S$, $124^{\circ} 53' W$.

Note. This is a very remarkable and possibly unique observation. We have had many observations in which a meteor exploded and threw off bright portions but none, so far as we can remember, in which portions of the meteor were seen as dark objects subsequent to the explosion. They could only have been visible because they were seen with the light streak as a background. Even so they must have been very large. Evidently the original meteor was a large object which had it not exploded would have reached the earth's surface as a meteorite. As it was, the pieces observed must have ultimately fallen into the sea.

PHOTOGRAPHS OF ICE

Gulf of Pechihli

A report of ice seen from S.S. *Hunan* in February, 1953, was published in the January, 1954, number of *The Marine Observer* on page 7, together with three photographs opposite page 16. The photographs were taken by Mr. D. S. Southey, 2nd Officer, who also recorded meteorological observations at the time. We regret that these observations were not received in time for publication with the photographs; in view of their importance we decided that, although late, they are worth publishing, and are given below:

5th February, 1953, 0600 G.M.T. Photographs taken of ice. Air temp. $19^{\circ} F$, wind NE, force 2. Position of ship: $38^{\circ} 52' N$, $118^{\circ} 10' E$ (14 miles from Taku lightvessel).

During January and February the ship was making voyages between Hong Kong and Tientsin. Mr. Southey also reported that during the winter ice was seen as far out as 50 miles from Taku lightvessel. The lowest temperature recorded was $02^{\circ} F$ on 16th January, 2000 G.M.T., 9 miles S of Taku lightvessel, where the ship was stuck fast for 42 hours in close pack, of estimated thickness 18 in.

METEOROLOGICAL OBSERVATIONS IN THE NORTH SEA

It has long been customary aboard British selected and supplementary ships not to make official meteorological observations when in coastal waters around the United Kingdom. It seems that the general practice is to cease making observations when in the vicinity of the 100-fathom line. From a series of 50 consecutive logbooks received in the Marine Branch and chosen at random, it was found that only two contained observations east of a line Ushant to Scilly and only one contained observations north of a line Fastnet to Scilly. Each of these ships had only recorded one or two observations in these areas. It is fairly obvious that the reason for this is the large amount of shipping in these narrow waters, necessitating constant vigilance on the part of the deck officer on watch.

Included in this area is the North Sea, which is a district where there is a great lack of meteorological information. Selected and supplementary ships, when in the North Sea and out of sight of land, are requested to transmit radio weather messages in the normal manner whenever circumstances permit. Even if a full message in code form F.M. 21 is not practicable, an abbreviated message in F.M. 22 (the first six groups) or the short non-instrumental message F.M. 23 (four groups) of the code will be very acceptable by meteorological authorities. The message should be addressed in the normal way to Weather Dun Wire London through any British coast station. These observations need not necessarily be entered in the meteorological log because it is realised that ships' officers are normally fully occupied by navigational duties. It would, however, help in the eventual assessment of the logbook if a note could be made in the "additional remarks" pages that radio messages continued to be sent in the English Channel and/or North Sea.

C. E. N. F.

The Detection of Ice by Radar

An official investigation by scientists of the United Kingdom and Canadian Governments into the detection of ice by radar took place in the summer of 1952 in the Hudson Strait. A report of the expedition, in which Mr. L. S. Le Page and Mr. A. L. P. Milwright of the Royal Naval Scientific Service and Mr. A. Hood of the National Research Council of Canada participated, appears below; an account of the investigation has also appeared in the Journal of the Institute of Navigation, Vol. VI, No. 2.

Introduction

The need for investigations into the detection of ice by radar became apparent in the first instance when merchant ships reported that ice formations appeared to be inconsistent radar targets, and that ships relying upon the aid of radar in navigating through ice areas might in some cases be led into danger. Certain investigations into the subject, notably those carried out by the U.S. Coastguard Service and by the Swedish Defence Research Institute, resulted in the publication of a great deal of useful descriptive information, but were not accompanied by measurements of the actual echoing power of ice targets.

With the object of carrying the matter further, a special inquiry was made during the 1950 and 1951 North Atlantic ice seasons, when a number of British ships on the North Atlantic routes completed questionnaires in which the sizes and shapes of ice formations were noted together with their radar detection ranges. This inquiry was instituted by the Operational Research Group in the Marine (Navigational Aids) Division of the Ministry of Transport, which later analysed the data collected and issued a report. There were, however, certain limitations in this investigation. For example, the performances of the radars were not known, not only because of inherent differences but because none of the ships carried instruments, such as echo-boxes, for checking performance; further, propagation conditions at the time of making the observations were not known.

The Ministry therefore considered the opportunities available for obtaining quantitative scientific data, and the possibility of making observations from a Canadian Government ice-breaker was followed up. The Canadian Department of Transport was consulted, and offered accommodation on board the ice-breaker *N. B. McLean* for a party to carry out the investigation. It was appreciated that facilities for ice observation were necessarily subject to the routine programme of the ship, but it was believed that a useful quantity of data could nevertheless be obtained. The vessel is fitted with a Type 268 radar, which is quite suitable for the measurement of echo strength; furthermore, on this ship the remote display used for navigation is in the wheelhouse and other work can be carried out on the main set in the chartroom. In respect of discrimination and size of scale, however, this type of set is of course considerably inferior to a modern commercial set, and these limitations affected other aspects of the investigation.

Aims and objects

- (a) To assess the extent to which radar can assist in the navigation of ice-infested areas such as those of the Hudson Bay and its approaches.
- (b) To examine and classify the radar identification characteristics of the various types of ice.
- (c) To determine desirable procedures for making the most efficient use of radar in ice navigation.
- (d) To determine the requirements of a radar which will be fully satisfactory for ice navigation, e.g. in finding and navigating through leads in the ice.
- (e) To take measurements of the echo strengths of ice formations encountered, and simultaneously to take such physical measurements as are possible in order to relate echo strength to range, target size and shape, etc. In this latter connection it was possible to make use of photography to a large extent. Measurements of temperatures and humidity were also taken in

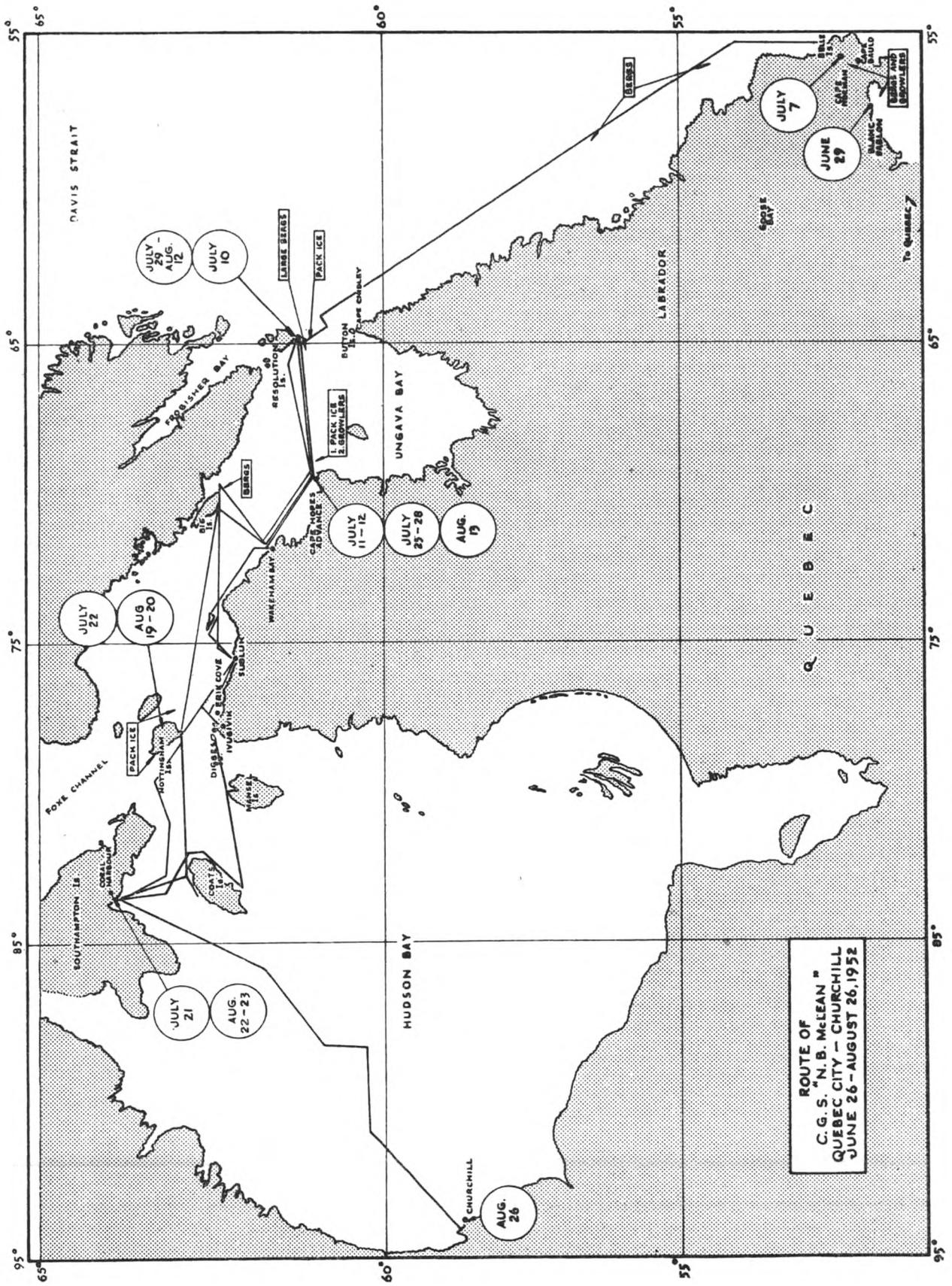


Fig. 1. Map illustrating the voyage of N. B. McLean.

order to determine the refraction conditions existing. When possible, it was proposed that a radar reflector on a dan buoy dropped near the target would be used as a standard of comparison, and the ice formation studied from four or more aspects.

In the investigation, it was found possible to carry out a fair amount of this programme subject to the limitations of the Type 268; but the dropping of a radar reflector near targets proved impracticable as it would have involved the ship in delays.

The work of the investigators was expected to fall into four main tasks:

- (a) Measurement of the overall physical dimensions of the ice formations.
- (b) Photography, not only with the object of obtaining a permanent record of the shapes of the icebergs but also to record the P.P.I. display of echoes from field ice and pack ice.
- (c) Meteorological measurements. These were considered desirable because sub-refraction has so frequently been referred to as a possible cause for the irregular detection of bergs.
- (d) Observation of the radar echoes on the screen, and the measurement of the strength of these echoes.

The description of the methods adopted and of the results obtained follows the account of the voyage.

Account of the voyage

The *N. B. McLean* (3,254 g.r.t.) is a fully-fledged ice-breaker, her plates up to well above the waterline being an inch in thickness. In the winter she is engaged on ice-breaking in the St. Lawrence, and in summer visits the Hudson Strait and Bay for the benefit of the ships loading grain at Port Churchill. The duties of this vessel in the summer season are numerous. She takes out food, oil and coal to certain lighthouses at the entrance to Belle Isle Strait, and to the Government radio stations and the mission stations in the Hudson Strait. She carries relief radio operators and cooks for manning the radio stations, and takes off those who have completed their year of duty. She services the navigational lights in the Hudson Strait at the beginning of the navigational season, recalibrates the D/F stations, and remains in the Strait or the Bay until the navigational season is over, in case any ship should require her assistance. Although she is not a selected weather ship, she broadcasts ice warnings intended for the benefit of the grain ships on the route to Churchill.

The master, Captain C. Caron, and the ship's officers proved to be extremely helpful, and did everything in their power to assist the investigation.

The voyage of the ice-breaker may be followed from Fig. 1. She sailed from Quebec on 26th June, three days before the official opening of the Belle Isle Strait to Atlantic shipping. On passage down the St. Lawrence, the meteorological apparatus was rigged and the photographic gear prepared. Ice was first encountered when approaching Blanc Sablon, a town on the mainland at the western end of Belle Isle Strait. In the next ten days, in the Strait and its entrance from the sea, there were seen an appreciable number of growlers and bergs, some of the latter of immense size, and radar measurements and photographs were made of many of these.

Leaving Belle Isle, the *N. B. McLean* proceeded in a direct route to Resolution Island, at the eastern end of Hudson Strait. Off Labrador six medium and large bergs were passed sufficiently close for experimental purposes, and many more were seen but were too far off to be of value to the investigation.

Field ice was first encountered near Resolution Island on 10th July, and on the next morning, approaching Cape Hopes Advance, the vessel was in heavy pack ice for about 27 miles (Fig. 10). There was brilliant sunshine and a cloudless sky at the time; photographs were taken of the ice and its echoes, and measurements were

also made of echo intensity. After calling at Cape Hopes Advance, the ship proceeded westwards through the Hudson Strait, carrying out her various duties, but little ice was seen until on the way back from Southampton Island, when pack ice was again encountered, this time near Nottingham Island on 22nd July. This ice was moving out of the Foxe Channel, which is the source of much of the summer ice found in the eastern end of the Strait. Continuing eastwards, growlers and bergs were encountered, especially near Big Island, and many large bergs were later seen in the vicinity of Resolution Island.

It may be mentioned here that the bergs found in the Hudson Strait originate in the Greenland glaciers. They are swept by tide or wind into the Strait north or south of Resolution Island, and may travel westwards as far as Big Island, eventually crossing to the south and either being grounded in Ungava Bay or leaving the Strait by Cape Chidley.

The Hudson Strait was then traversed for the third time, the ship finally leaving Southampton Island on 23rd August, and arriving at Port Churchill on 26th August. No ice was seen in Hudson Bay, though a large field had been reported off Churchill earlier in the season. This concluded the ice investigation and the party returned to Ottawa by train. The *N. B. McLean* had spent seven weeks in the Straits, making 28 calls. The total distance covered since leaving Quebec was about 5,000 miles.

Considering that in the quest for ice the programme of the ship was in no way altered, the amount observed was very satisfactory indeed, especially since the ship was under way at sea for only 37 days out of 61. All types of summer ice were seen, from soft pack ice up to bergs 180 ft high, and were photographically recorded, while detailed radar measurements were carried out on some 60 ice formations, together with physical measurements and meteorological observations.

Apparatus used, measurements, and results obtained

(a) PHYSICAL MEASUREMENTS

For determining the sizes of the ice formations, the method employed was to measure the sextant angles subtended overall in the horizontal and vertical directions, using the range as given by the radar echo in calculating the required dimensions. The first measurements on a target were made at a range of 10,000 yd or less according to the size of the formation, and usually at a range indicated by a calibration ring on the radar. Since the horizontal dimension varied with aspect, several measurements were made each time, usually commencing with the formation a few degrees on the bow, next with it about 45° on the bow, and finally with it abeam. For the calculation of height the vertical angle subtended when the formation was 1,000 yd from the ship was found satisfactory in most cases. At closer range, and especially for growlers and small ice, it was essential for the sake of accuracy to take the sextant reading from a low deck so as to be as near sea level as possible.

Where no echo was obtained from ice under observation—for example, from a growler in sea clutter—a running-fix method was used to determine range. This was facilitated by taking readings of distance run from the log indicator, and since both ship and ice were similarly affected by tidal currents, the method was considered to be reasonably reliable. An optical range-finder was available for ranges up to 500 yd and was used on a few occasions.

Some difficulty was experienced at first in relating a radar echo to the ice producing it, especially when several formations appeared at long range ahead of the ship. This difficulty was minimised by installing a pelorus on the ship's bridge for the use of the observer, so that the bearing of the ice relative to ship's head could be measured with accuracy; microphone communication from radar to bridge also speeded identification.

It was originally hoped that it would be possible to make observations on two

or three targets at once, but the number of measurements required in the time available prevented this from being done satisfactorily, and attention was therefore concentrated on one formation at a time. The speed of the ship was usually about 10 kt, so that in most cases there was less than half an hour between the first echo of ice appearing on the screen and the formation coming abeam of the ship.

(b) PHOTOGRAPHY

For visual photography of ice, there was available a De Vry 35 mm cine-camera fitted with a Wallensak $f4.5$ telephoto lens of 6 in. focal length. Red and yellow filters were also available, together with a number of reels of panchromatic film. This apparatus was supplied by the Photographic Section of the British Admiralty Signal and Radar Establishment.

Photography of the P.P.I. screen was carried out by using an automatic arrangement that had been developed by the National Research Council of Canada. This consisted of a Bell and Howell 35 mm movie camera adapted for single-frame exposure by altering the shutter pawl and fitting a rotary solenoid below the shutter housing. A Simplex timer was used to set the interval and exposure times, the exposure being maintained constant at 3 sec, i.e. one complete sweep of the trace, while the interval time was adjusted to suit the ship's speed (Fig. 2). The National Research Council also supplied materials and a tank for developing 35 mm film, and it was therefore possible to carry out development of this film on board, though this work was handicapped by the lack of a running water supply.

Photographs of ice formations were usually taken at about the same time as the sextant angles were measured. The principal intention of such photographs was to record the shapes of the bergs, etc., while the photograph taken abeam would show the slope of the berg face that had first been towards the ship, on the assumption that the berg had no rotatory motion. A record of the time and position of each shot was set up on a board and photographed after each set of exposures.

These photographs were not as satisfactory as had been hoped in respect of clarity and amount of detail, even allowing for the fact that lighting was sometimes poor and some photographs had to be taken into the sun. It is thought that better results would be obtained with a plate camera with a telephoto lens for distant shots of focal length two or three times that used in this investigation. The motion of the bergs relative to the ship affords a means of taking stereoscopic doubles; such photographs show not only the details of berg shape but also the sea state better than a single photograph. Not as much improvement of contrast as was expected resulted from the use of the red filter, and the yellow filter was used on the majority of occasions. Photography of pack ice from the lower crows-nest at about 60 ft above sea level was tried, but lanes were insufficiently visible for the photographs to be related to the corresponding P.P.I. pictures.

Photographs of ice formations finally obtained as enlargements were suitable for the main purpose of measuring the echoing areas presented at various bearings.

(c) METEOROLOGICAL MEASUREMENTS

In order to determine propagation conditions, it was necessary to measure the refractive index gradient of the atmosphere in a vertical direction. Since this refractive index is a function of temperature and vapour pressure, the required information was obtained by the use of psychrometers. The instruments used were an Assman psychrometer, employing mechanically aspirated mercury thermometers and an electrical psychrometer, in which temperature sensitive resistance elements are aspirated by the wind. All the instruments used were supplied by the British Meteorological Office.

The electrical psychrometer was specially constructed at short notice for the work on the *N. B. McLean*. The great advantage of this type of instrument is convenience in taking readings, since it can be mounted in one position and read

at another, in this case up to 50 ft distant (Figs. 2 and 3). In order to measure the vertical temperature and humidity gradients, it was originally intended to use this psychrometer at a series of heights. A trial of this method was made on S.S. *Beaverford* while crossing the Atlantic, and it was decided that it was more practicable in a ship not exclusively engaged in weather observations to have psychrometers at fixed heights, unless special guide wires could be erected. On the *N. B. McLean*, therefore, it was decided to use the electrical psychrometer only for the highest level. For intermediate and low-level readings the portable Assman psychrometer would be used, and at the middle level the standard wet and dry bulb hygrometer in a screen would serve as a check.

General weather conditions throughout the voyage were good, and the ship's officers considered them rather better than were usually experienced. On many days the sea was almost flat calm, while bad weather was unusual and did not persist for more than a day or so. There was a high proportion of sunshine and hardly any rain. Fog was encountered off Belle Isle, Cape Hopes Advance, Nottingham Island and Resolution Island. On these occasions the radar was invaluable in giving warning of the presence of bergs or in giving assurance that none was drifting down on to the ship. Day temperatures averaged about 43°F (standard thermometer in screen), the highest being 57.2°, recorded off Cape Bauld, and the lowest 33.4°, noted at 0515 local time on 11th July over an icefield near Cape Hopes Advance.

Sea temperatures were measured by using a special meteorological water bucket to collect water, the bucket being emptied after the first filling and then filled again, the thermometer bowl being filled twice from each bucketful before the reading was considered reliable. Temperatures averaged about 39°F, with a maximum of 47.9° noted in the River St. Lawrence, while 30.1° for the water between loose pack ice was the minimum observed.

Conditions likely to lead to sub-refraction were particularly looked for, especially when caused by the air flowing over the sea being appreciably colder than the sea itself. It was found, however, that the air temperatures at all heights measured were almost invariably higher than the corresponding sea temperatures. From time to time, however, temperature conditions that might cause super-refraction were evident. Visual mirages, often extremely marked and persistent, were seen at various places. On one occasion at Cape Hopes Advance, such a mirage was observed to extend over the whole range of the unobstructed horizon, and an ice field appeared to be lifted up into the sky. Even apart from this, the clarity of the atmosphere on fine days was remarkable, high land near the Labrador coast at 70 miles range being clearly visible on one occasion. Bergs could often be seen at 20 miles or more, outside radar range, and were often approached near enough to form outstanding visual objects to the eye before their echoes appeared on the radar screen. In fact each radar target of ice encountered was seen by eye before the radar gave warning of its presence, unless the weather was foggy or misty at the time.

The electrical psychrometer was found to work well, and no electrical troubles were experienced with it. It was, however, regarded by the Meteorological Office as an experimental model only, and later it was possible to make some suggestions to this Department for improving the design from the point of view of maintenance. The Assman psychrometer was found to be very satisfactory though rather slow in settling down to steady readings. It was used for measurements at the two lower levels, about 30 ft and 6 to 10 ft above the sea.

Simultaneous measurements at the three heights were not possible. Consecutive readings were therefore taken, commencing and finishing with the high-level reading. Not all readings were possible on all occasions. With an overtaking wind the warm air and smoke blowing forward from the funnels rendered the electrical psychrometer readings unreliable, while in rough weather the low-level observation

was impracticable. Due to the fact that the instruments could not be mounted away on the windward side clear of the ship, deflections of air flow caused by the presence of the ship may have meant that the indicated temperatures were not exactly those of the corresponding height in the free air around the ship. It is believed though that the sign of each gradient measured was correct, and that the value was reasonably close to the true one holding at the time.

Barometric pressure was measured on the ship's aneroid barometer. Any inaccuracy caused by not employing a standard mercury barometer was likely to have very little effect on the rate of change of n with height as calculated from the formula below.

Calculations were made to determine the refractive index and hence the value of M at each height, using the formulae:

$$(n - 1) 10^6 = \frac{79}{T} \left(p - \frac{e}{T} + 4800 \frac{e}{T} \right)$$

$$M = (n + h/a - 1) 10^6$$

Where n = refractive index of the atmosphere

T = absolute temperature

p = total atmospheric pressure in millibars

e = partial pressure of water vapour in the atmosphere in millibars

M = excess modified refractive index

h = height of observation above sea level

a = radius of the earth.

M -curves have been drawn for those occasions on which sufficient temperature and humidity readings were obtained; humidity near sea level is at the conventionally assumed figure of 98%, and vapour pressure has been calculated accordingly. The curves indicate that in the measurements of 41 formations, conditions tended to reduce echo strengths and thereby detection ranges on 32 occasions (i.e. some degree of sub-refraction was present) and to increase them on seven occasions. These results have been discussed with Dr. J. A. Saxton of the Radio Research Organisation of the British Department of Scientific and Industrial Research, and it is his opinion that within, say, three miles of the ship the reduction in echo strength due to the conditions found in this investigation would be of little significance, and very much steeper gradients of M would be required were sub-refraction (as ordinarily understood) really the cause of the "freak" short detection ranges which have been reported by ships.

Another theory which has been put forward, and which might be mentioned here, is that local sub-refraction occurs due to a pocket of cold air lying to leeward of a berg. Dr. Saxton's opinion is that there is little to justify this theory, and those results of the present investigation which can be used to test it do not indicate any obvious relationship between wind direction and echo strength.

Thus, while the possibility cannot be discounted that atmospheric conditions may be such as severely to reduce detection ranges in some areas or circumstances in which ice is found, no positive indications of this were discovered in the present investigation.

(d) RADAR MEASUREMENTS

The set fitted in the *N. B. MacLean* was a Type 268 marine radar slightly modified to improve the automatic frequency control and to provide remote controls at the bridge display position. All measurements were, however, carried out from the main display position in the chartroom at times when the equipment was not being used for navigation.

In order to provide a continual check of the performance of the radar, a 3-cm test set was installed and was permanently coupled into the main waveguide run by a 20 db directional coupler. The test set was a Type TS-13-AP and included a signal generator with an output variable down to 90 decibels below 1 milliwatt

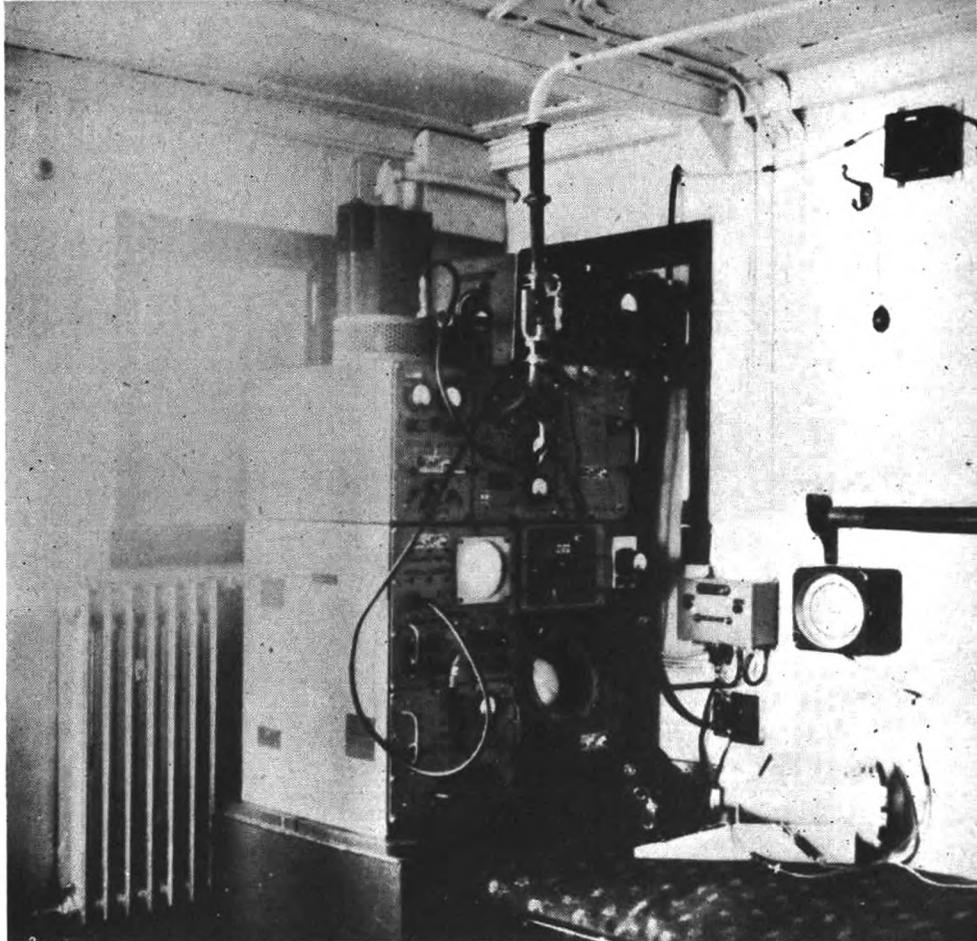
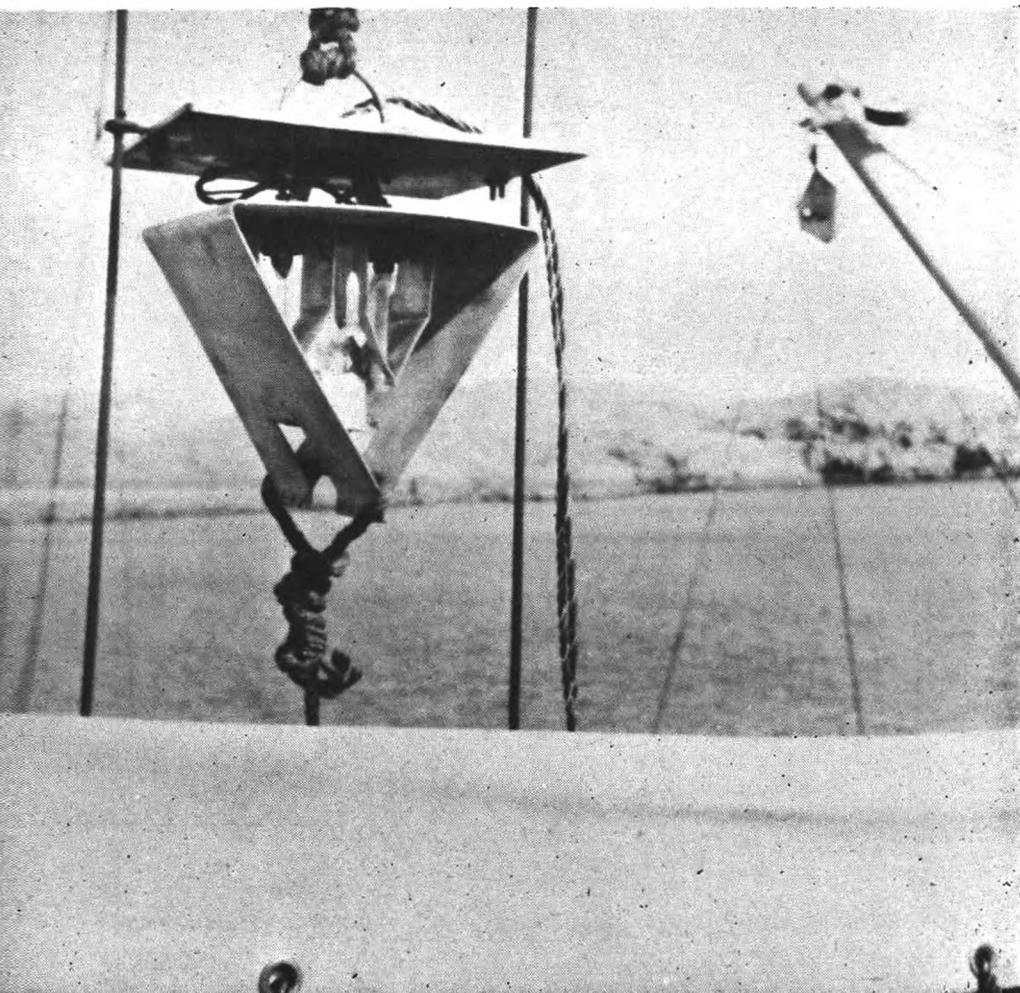


Fig. 2
Radar Type 268 main unit in the chartroom. Also shown are the R.F. signal generator, P.P.I. camera (on couch), simplex timer dial, remote indicator for electrical psychrometer (on bulkhead, top right)

Fig. 3. Electrical psychrometer.



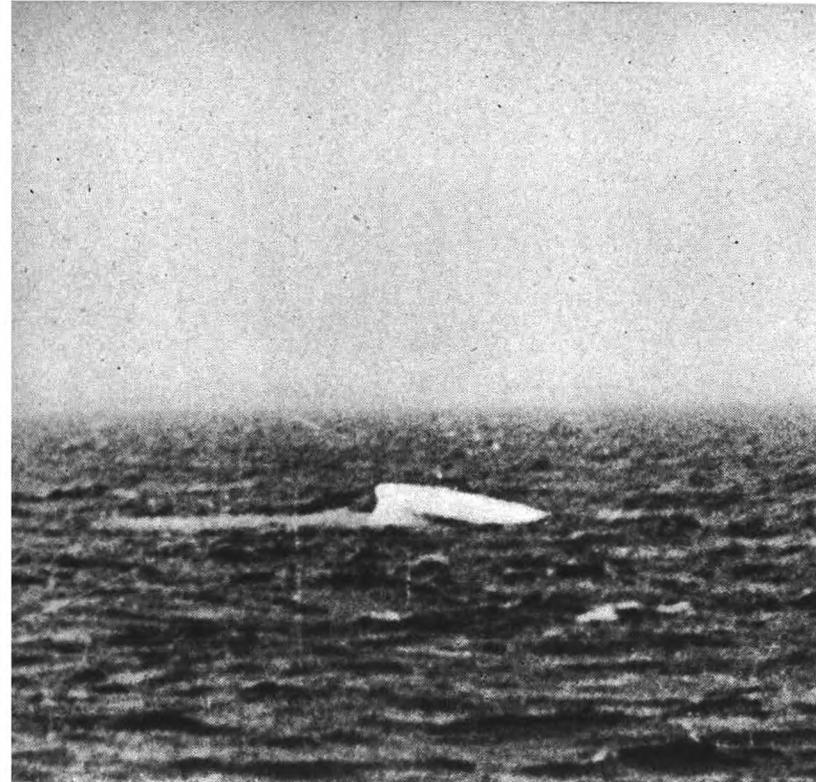


Fig. 4. Growler undetected by Type 268 radar in 3,500 yd sea clutter.



Fig. 5. Growler undetected by Type 268 radar in 3,000 yd sea clutter.

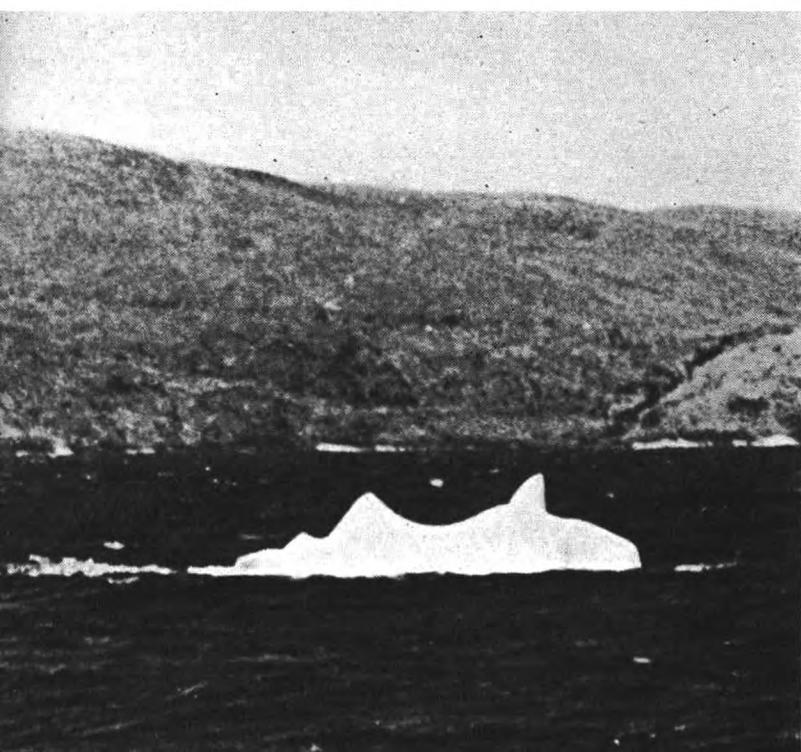


Fig. 6. Growler undetected by Type 268 radar in 4,000 yd sea clutter.

Fig. 7
P.P.I. picture in an icefield showing a
lead through the ice running across the
ship's track (6,000 yd range scale).

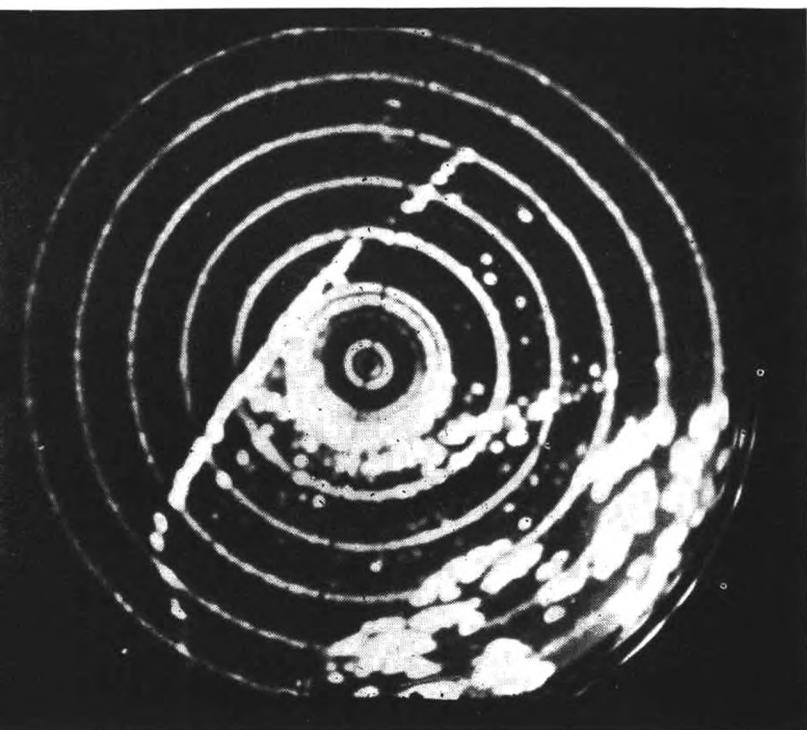
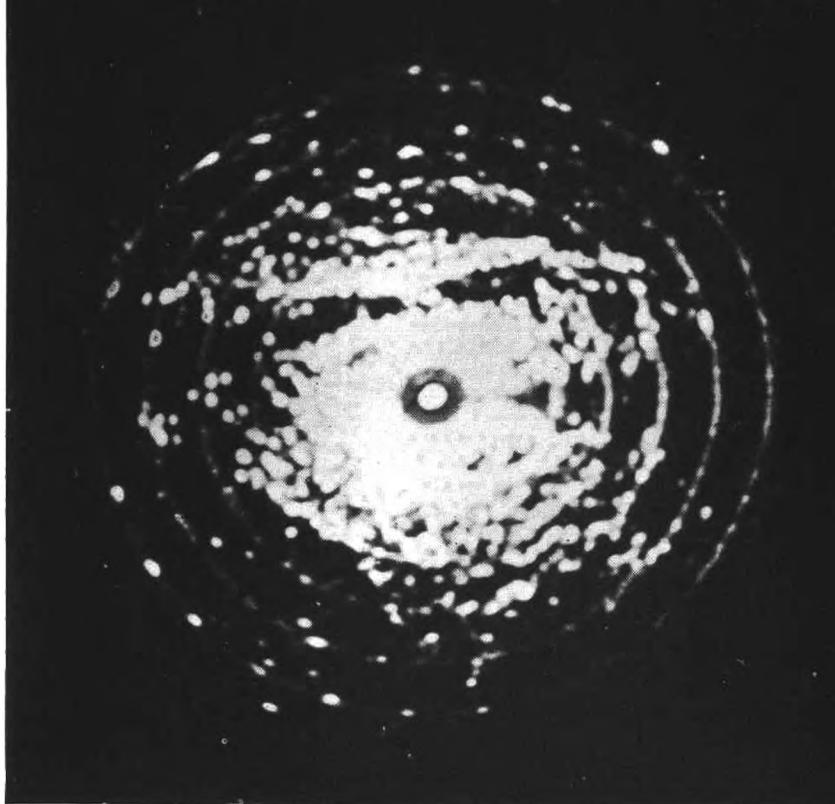
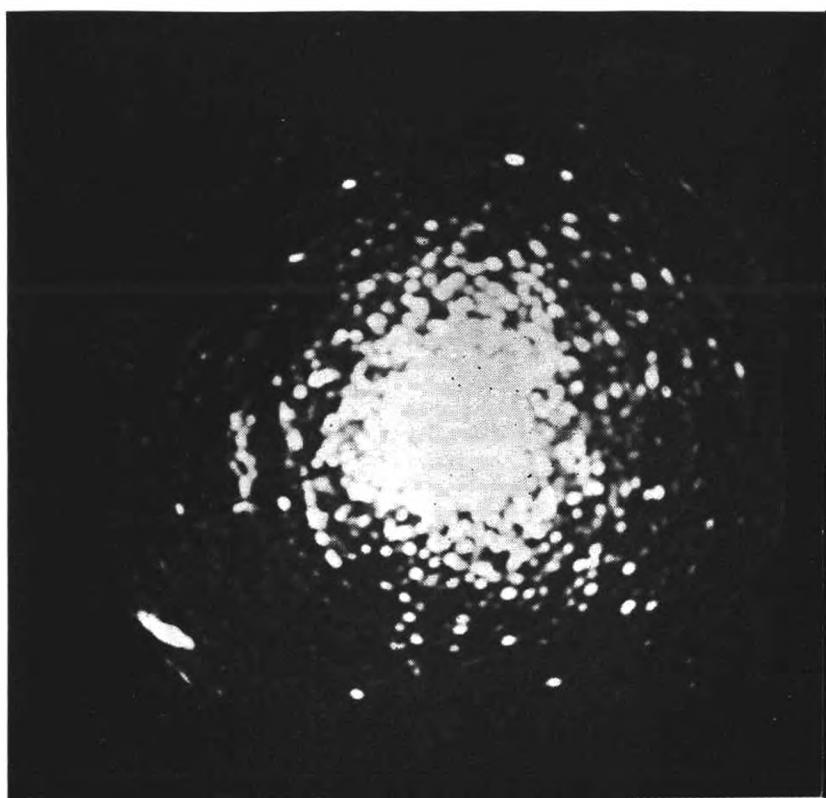


Fig. 8
P.P.I. picture showing strings of ice off
Resolution Island.

Fig. 9
P.P.I. picture of ice clutter in an icefield.



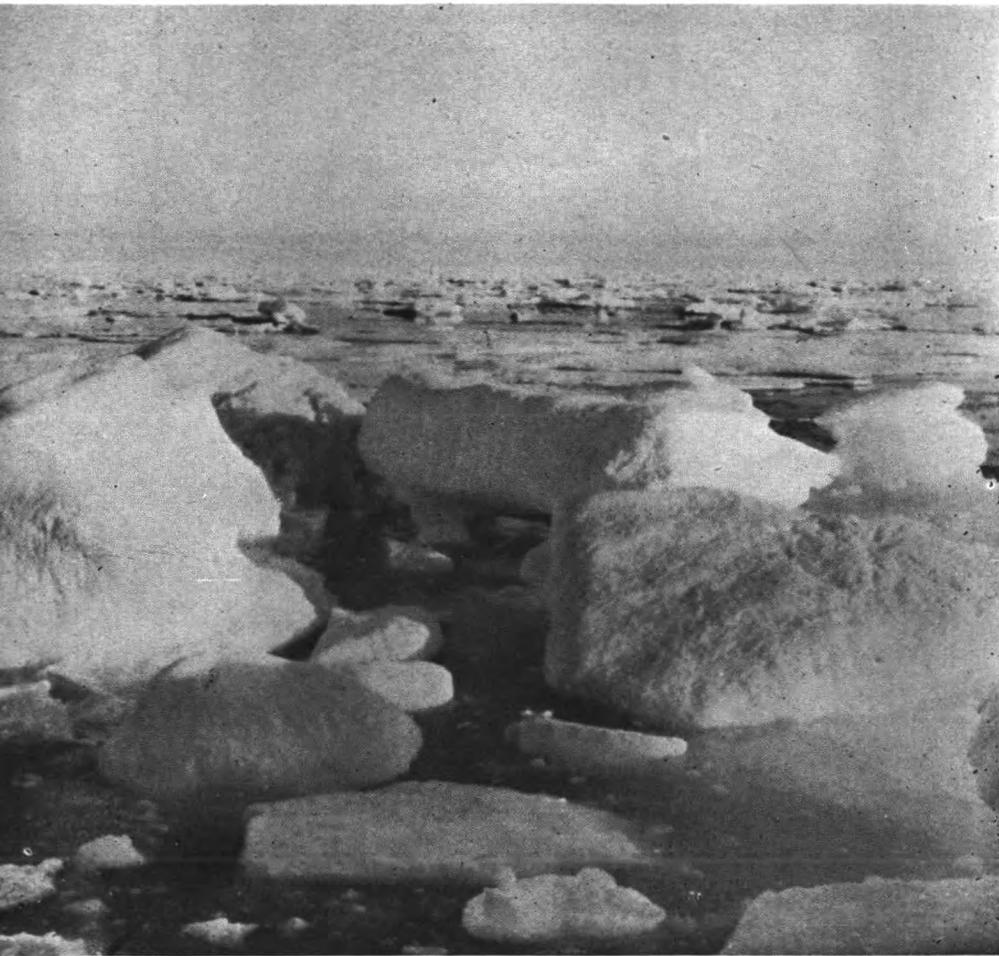


Fig. 10. Close-up of typical pack ice encountered.

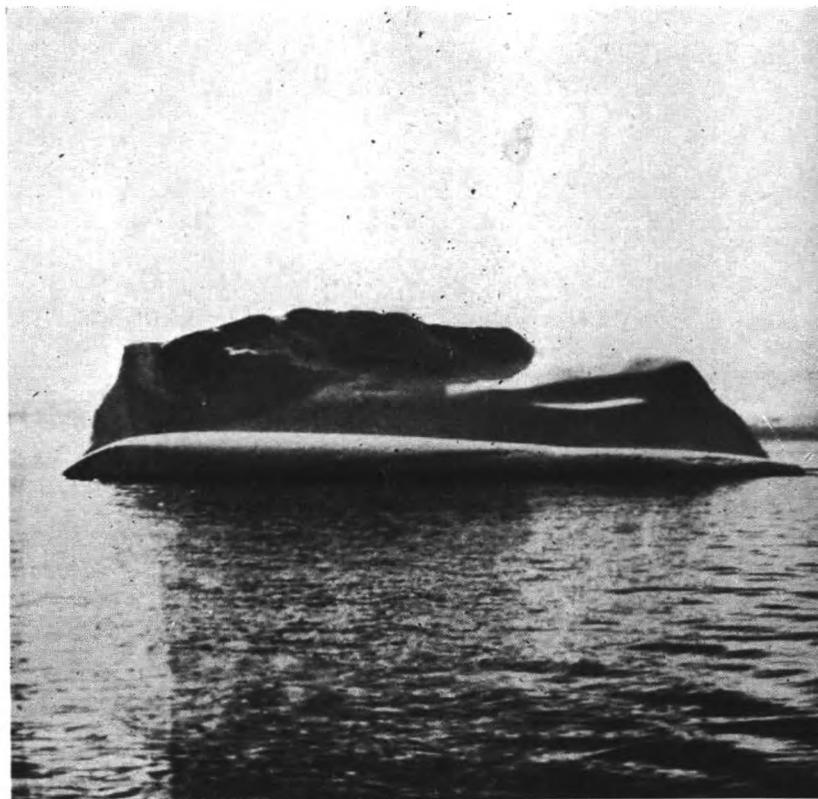


Fig. 11. Large berg, 130 ft high by 530 ft base, readily detected by radar.

(dbm) for measuring receiver sensitivity, a thermistor bridge for monitoring power output and a wavemeter. The installation in the chart house is shown in Fig. 2.

The radar aerial was mounted 5 ft forward of the mast at an average height throughout the voyage of 65 ft above the waterline; at this height the mast was 18 in. in diameter and produced a stern shadow sector on the P.P.I., the mast subtending an angle of 17° at the scanner. This prevented a useful series of measurements being carried out on bergs abaft the beam, since these bergs would enter the shadow sector at comparatively short ranges.

The Type 268 radar is inferior to modern British radars in respect of range and bearing discrimination, having a pulse length of $0.75 \mu\text{sec}$ and aerial side lobes only 12 db below the main beam. The Type 268 was, however, very suitable for range/amplitude measurements since the maximum range performance was comparable to modern British marine radars. Table 1 shows the characteristics of Type 268 and of a standard British radar in common use.

Table 1

CHARACTERISTICS	TYPE 268	A BRITISH RADAR
Power output	27 kW	7 kW
Aerial beamwidth to half-power		
(a) horizontal	2.5°	1.7°
(b) vertical	20°	26°
Aerial aperture	30 in. \times $6\frac{1}{2}$ in.	48 in. \times 3 in.
Aerial gain (measured)	500	700
I.F. bandwidth	5 Mc/s	10 Mc/s
Pulse length	$0.75 \mu\text{sec}$	$0.2 \mu\text{sec}$
P.R.F.	500 p.p.s.	1000 p.p.s.
Receiver sensitivity	87 dbm	92.5 dbm
Wavelength	3 cm	3 cm

A comparison of these characteristics shows that the calculated maximum range performance of the two equipments is practically identical.

In view of the fact that the standard ship's radar had to be used with the scanner continuously rotating, it was decided to carry out measurements on the P.P.I. rather than on an "A"-type scan. The method adopted consisted firstly of adjusting the brilliance of the P.P.I. in such a manner that the receiver noise was just painting with the receiver gain control at maximum. To measure the amplitude of an echo, it was necessary to reduce the receiver gain until the echo was just painting for 50% of the time. The amplitude of the echo in decibels above the receiver noise level was then represented by the amount of attenuation introduced into the receiver. The gain control was calibrated by injecting a known signal into the receiver from a pulsed r.f. signal generator (TS-13-AP) of sufficient amplitude just to paint on the P.P.I. for various gain control settings. An accurate indication of the setting of the gain control was displayed on the meter measuring the voltage across the gain control, and the calibration of the gain control was checked periodically.

In view of the fact that the ship had a tight schedule of work and could not therefore alter course to allow measurements to be carried out on all ice formations sighted, measurements, with a few exceptions, had to be restricted to those formations lying on the ship's track.

Range/amplitude measurements were carried out on 51 different ice formations, varying between small ice floes and growlers to large bergs up to 180 ft high, though more were sighted. Nearly all these measurements were carried out under

calm sea conditions, and on only three days was ice encountered in rough sea conditions, with sea clutter extending out to between 3,000 and 4,000 yd. During these three days four growlers were sighted visually which passed close to the ship but which were not detected by the radar. Three of those are shown in Figs. 4, 5 and 6, and it will be noticed that all have smoothly rounded surfaces, which would account for their poor echoing properties. As they were undetected by the radar it was not possible to get a measurement of their size by the normal method, which consisted of measuring the range of the ice from the ship by radar together with the angle subtended by the ice by means of a sextant. An estimate of the size of the growler shown in Fig. 6 by means of the running-fix method of establishing range was 8 ft high by 27 ft wide by 16 ft long, and an estimate of the volume above the water is 500 cu. ft. Since the volume of ice visible above the surface is between 0.1 and 0.2 of its total volume, depending upon the age of the ice, the total weight of this growler would be somewhere between 60 and 140 tons. This growler is, therefore, a fairly large piece of ice quite capable of inflicting damage to a merchant ship if hit at speed.

The fact that these particular pieces of ice were not detected by Type 268 radar does not mean that they would not have been detected on modern British radars, which have better range and bearing discrimination. This improvement in discrimination, together with the provision of swept gain in the radar receiver, increases the probability of detecting targets in sea clutter for the following reason. Sea clutter echoes are returns from the steep wavefronts in an area illuminated by the radar beam at a given range. The area of the growler is usually small compared with the area of sea illuminated by the radar beam and any measure which tends to decrease this discrepancy will make the echo from the growler increase relatively to the echo from the sea surface. Nevertheless, the echo amplitude of the growler must be greater than that of the sea clutter, in order for it to be detected with certainty.

It was fortunate that the majority of measurements were carried out in calm seas, since it was possible to carry out measurements on pieces of ice which would otherwise have been undetected by the radar. By plotting the range/amplitude curves of these pieces of ice and comparing them with the range/amplitude curves of sea clutter measured elsewhere, it is not possible to say whether these pieces of ice would have been detected by British radars using swept gain correctly adjusted for the state of the sea.

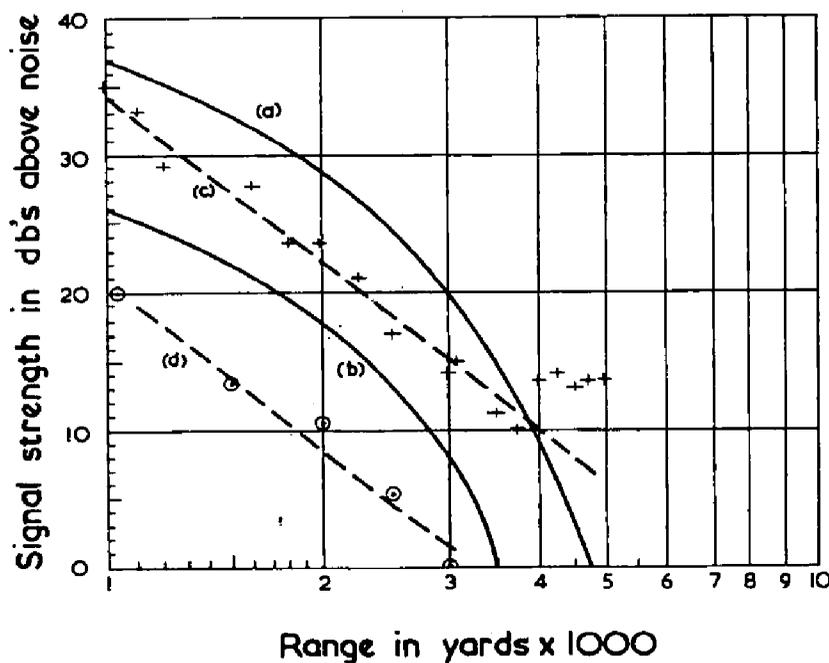


Fig. 12

Diagram illustrating the detection ranges for two typical ice formations in two representative states of sea clutter.

- (a) Sea clutter in English Channel.
- (b) Sea clutter in Hudson Strait.
- (c) Piece of ice 17 ft high by 84 ft base.
- (d) Growler 5 ft high by 30 ft base.

Fig. 12 shows the range/amplitude curves of clutter for two representative states of sea (a) and (b), with clutter extending to 4,800 yd and 3,500 yd respectively. Curve (a) was plotted from measurements carried out in the English Channel on a British radar and curve (b) was plotted from measurements carried out in the Hudson Strait on Type 268. (No significance should be attached to the fact that sea clutter in the Hudson Strait with Type 268 extends only to 3,500 yd compared with 4,800 yd for the British radar in the English Channel. This is merely a function of the sea states experienced, and the curves might well have been interchanged for other sea conditions.) The dotted line (c) represents the mean of the measurements carried out on a piece of ice 17 ft high by 84 ft wide assuming a fourth power relationship between amplitude and range, and the dotted line (d) represents the means of the measurements on a growler 5 ft high by 30 ft wide.

It will be seen that the echo amplitude of the larger piece of ice (c) is less than that of the sea clutter (a) at ranges below 4,000 yd, and it would not therefore be detected even on the higher discrimination British radars and with correctly adjusted swept gain, at ranges below 4,000 yd. The growler (d) would not be detected at all in the conditions shown.

The weight of the piece of ice (c) would be approximately 1,000 to 2,000 tons and the weight of the growler (d) would be approximately 100 to 200 tons. These figures of weight must be taken as very approximate since the overall contour of the ice above water is not known. The figures are based on the projected areas of the ice formations as taken from the photographs and the measured heights and widths, but assuming a length of 10 ft in each case. They do, however, represent the weight of ice that could easily be encountered having the same projected area which would give approximately the same amplitude of radar echo.

In examining the curves of all the ice on which measurements were taken and comparing them with the sea clutter curve (a) shown in Fig. 12, the following table shows the sizes of ice that:

- (i) would not have been detected on existing radars; and
- (ii) would have been detected outside the maximum range of the clutter but would have been lost on entering the clutter region.

Table 2. Detectability of ice when sea clutter extends to 4,800 yd

SIZE OF ICE	
(i) Would not be detected at all (Height × width of ice formation)	(ii) Would be detected outside clutter but would be lost in clutter region (Height × width of ice formation)
2 ft × 6 ft	Heavy floes of pack ice 5 ft × 90 ft 8 ft × 50 ft 9 ft × 27 ft 9 ft × 150 ft 10 ft × 53 ft 11 ft × 95 ft 14 ft × 130 ft 17 ft × 70 ft 20 ft × 50 ft 20 ft × 87 ft 35 ft × 140 ft
5 ft × 7 ft	
5 ft × 19 ft	
5 ft × 18 ft	
7 ft × 23 ft	
8 ft × 20 ft	
10 ft × 10 ft	
10 ft × 90 ft	

The piece of ice 35 ft × 140 ft shown in column (ii) was smoothly rounded and would weigh at least 3,500 tons.

The average range of detection of growlers was between 5,000 and 6,000 yd. Large icebergs between 50 and 200 ft high, similar to that shown in Fig. 11, gave

good strong echoes and were detected at ranges up to 20 miles. These types of berg do not represent a danger to radar-fitted ships, since they can easily be detected through the strongest clutter, provided swept gain is applied to the radar receiver. With the exception of the four growlers mentioned earlier which were lost in sea clutter, all bergs and growlers that were sighted, and which approached to within two miles of the ship, were detected on the radar.

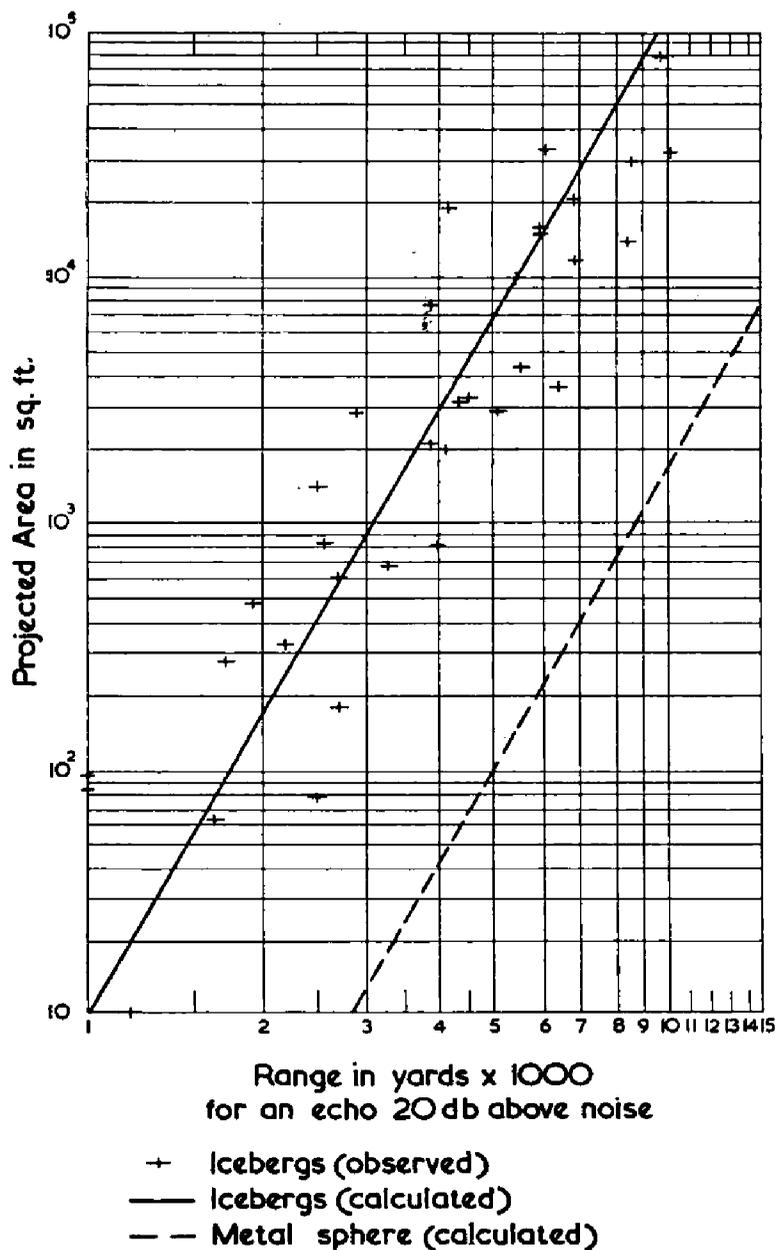


Fig. 13. Diagram illustrating the poor radar response given by floating ice.

In order to illustrate the poor response from floating ice, the projected area of each berg as taken from the photographs has been plotted against the range at which the berg gave an echo 20 db above receiver noise (Fig. 13). The radar range when 20 db above receiver noise was chosen because on the majority of range/amplitude curves the 20 db point lay on the fourth-power line.

In Fig. 13 the solid line represents the best fit obtained by the method of least squares and assuming a fourth-power law. Without assuming a law the line of best fit follows approximately a 3.2 power law. The dotted line represents the calculated fourth-power law of projected area against range (for an echo 20 db above receiver noise level) of a metal sphere when observed on a Type 268 radar. A comparison of these two lines shows that in order to receive the same echo amplitude as from a metal sphere at any given range, an iceberg, as a general case, has to have between 60 and 70 times the projected area of the metal sphere.

Very little experience was gained in navigation through icefields since only one icefield was entered. The *N. B. McLean* being a stoutly-built ice-breaker was able to cut its way through the field without having to find leads through the ice. Some lanes were crossed, however, and these lanes were clearly visible on the P.P.I., as shown in Fig. 7. The lane, however, appears to be wider than it is in fact, since smaller pieces of ice on the fringes of the lane are not detected at ranges of two to three miles, but appear only when the range is reduced to one to two miles. The type of ice encountered in this field was broken hummocked ice as shown in Fig. 10, and the range of detection of this type of ice was approximately 6,000 yd. The

detection of this type of ice should not present a problem in rough sea as a sharp line across the clutter will show the position of the edge of the icefield. No sea clutter was encountered after having entered the icefield although sea clutter was present outside the ice, and even a heavy swell was considerably damped by the ice.

Once in a field of tight pack ice the radar picture is similar to the picture when in an area of sea clutter as will be seen in Fig. 9, but it is assumed that a merchant ship would only enter an icefield through a lane, in which case the lane would show through the ice clutter.

The poor sidelobe performance of the Type 268 radar in the *N. B. McLean* made it difficult to distinguish narrow leads through the ice, but leads of 500 yd wide were easily detected out to a range of 5,000 to 6,000 yd. We were informed by the ship's officers, who have a wide experience of working in ice, that a merchant ship master would not commit himself to entering an icefield where the lane was less than half a cable wide for fear of being beset. Radars built to the British Ministry of Transport specification would detect leads in the ice one cable wide at a range of 6,000 yd. As previously stated, the only experience on this trip was of hummocked ice, which gave a fair radar echo, and the observations made above would not apply to smooth field ice.

When navigating through leads in the icefield the fringes of the lead close to the ship showed more clearly when the P.P.I. was used with an expanded centre. It must be appreciated, however, that the Type 268 radar has a minimum range scale of 6,000 yd and a screen of 5 in. diameter. On a modern radar with a 2,000 yd range scale and 9 to 12 in. diameter screen it would probably not be necessary to use an expanded P.P.I. centre since ships are unlikely to be in leads less than one cable wide. Differentiation of the received signals also helped to show leads more clearly but, with the better discrimination of modern radars, differentiation may not be of any advantage.

The radar proved useful as a check on the charts when these were incomplete. Although a 1952 Canadian chart was used it was found by the radar that the coastline of Coats Island, which lies on one side of the track of grain ships *en route* for Port Churchill, bore little resemblance to the provisional shape indicated by a broken line on the chart. A series of P.P.I. photographs were taken of the stretch of coast north of the navigational light at Carys Swans Nest on Coats Island, and a large uncharted headland was discovered on the NW coast of the island below Bencas Island. The chart showed 28 fathoms of water at the position where this headland was found to exist. It was later found that this area had been photographically surveyed from the air by the Royal Canadian Air Force. The coastline seen on the radar agrees with the coastline as shown on the photographic survey. The discrepancy has been brought to the attention of the Hydrographer of the Navy.

Conclusions

1. Radar is an invaluable aid to ships navigating in bad visibility in ice-infested waters, provided it is used wisely and the limitations of the radar are known.

2. From the comparatively small sample of ice that was measured on this pilot investigation it is indicated:

- (a) That in a calm sea, such as usually accompanies fog, ice formations of all types should be detected from large bergs at 15 to 20 miles down to small growlers at two miles. On this investigation, no instance occurred of bergs or growlers large enough to endanger shipping, being sighted visually and approaching within two miles of the ship without being detected by radar in a calm sea. Growlers protruding up to 10 ft out of the sea and weighing several hundred tons are, however, not likely to be detected at ranges exceeding three miles. For a ship travelling at 15 kt this represents a warning period of only 12 min and it is advisable, therefore, that a continuous radar watch be kept when navigating in waters where ice is to be expected.

- (b) That under conditions of rough sea and bad visibility it is unsafe to rely upon the radar when sea clutter extends to beyond one mile. Under these conditions growlers, large enough to cause damage to a ship, may not be detected.
 - (c) That fields of tight pack ice composed of hummocked ice should be detected under all sea conditions out to ranges of approximately three miles, and, on modern British marine radars, leads through the ice over one cable wide should be easily identified out to slightly less than three miles.
3. While the possibility cannot be discounted that atmospheric conditions may be such as seriously to reduce detection ranges in some areas or circumstances in which ice is found, no positive indications of this were discovered in this investigation.
4. In view of the irregular shape of the ice formations encountered, no conclusion has been reached on the effect of slope on the detection range.

Recommendations

1. Since present-day radars do not provide a complete answer to the detection of ice the following suggestions are made to improve the detection of ice in sea clutter:

- (a) For existing marine radars great care should be taken by installation engineers in the setting up of the law of the swept gain device.
 - (b) Consideration should be given to the provision in marine radars of automatic anti-clutter devices such as automatic swept gain or logarithmic amplification followed by differentiation.
 - (c) In order to reduce the intensity of the sea-clutter echo in relation to the ice echo, it is suggested that considerably higher discrimination in both range and bearing should be aimed at than is given by existing marine radars. By this means the area of sea illuminated at any range would be reduced, thereby increasing the intensity of the ice echo relative to the sea clutter.
 - (d) It has been suggested that correlation of sea-clutter echoes between successive traces could be destroyed without affecting target echoes, by changes of radar frequency on successive pulses. This method should be investigated but at first sight it appears to be complicated and expensive.
2. In order to obtain information on a larger sample of ice it is suggested that the investigation be continued in an area where more ice is encountered, such as the Davis Strait. Measurements might also be carried out in areas in which ice is encountered in relatively warm waters, e.g. on the Great Bank of Newfoundland, to obtain further information on the effect of atmospheric conditions on detection ranges. Measurements should be carried out on a radar of modern type having considerably better discrimination.

Southern Ice Reports

During the year 1953

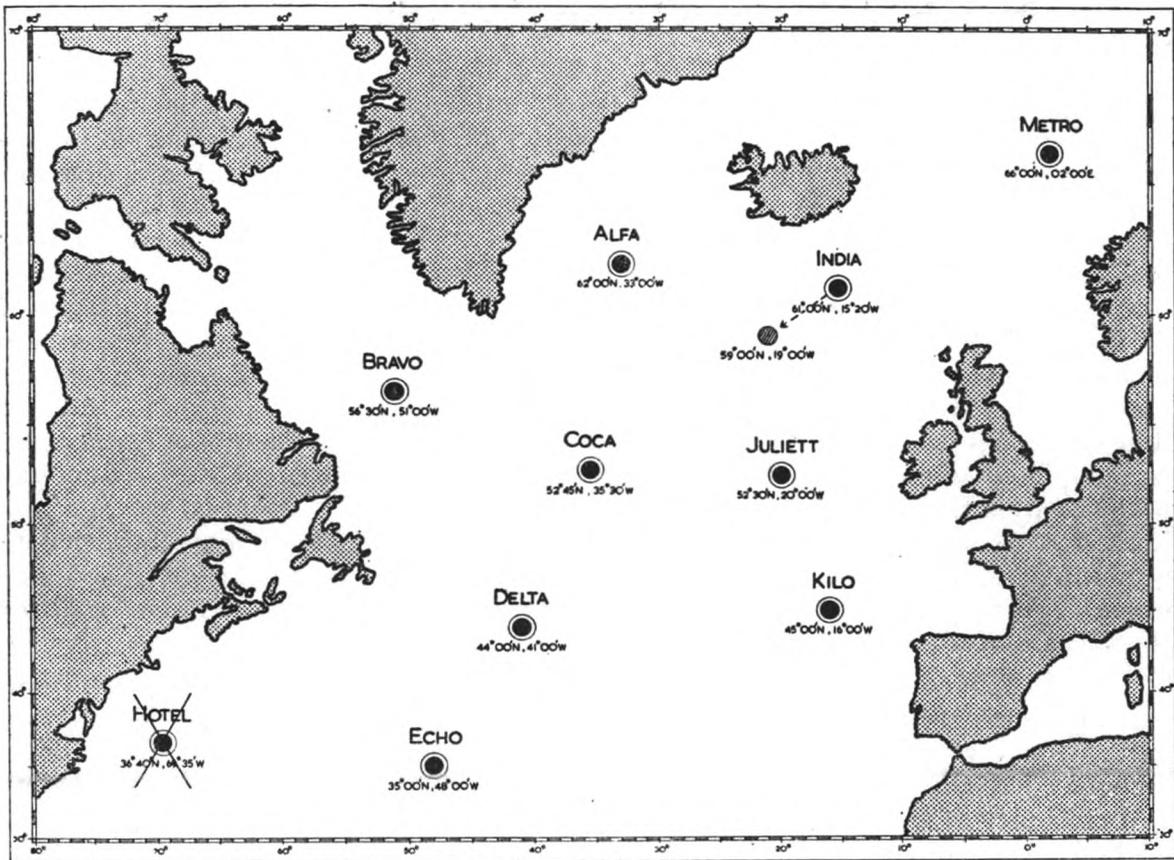
July, August and September, no ice reports received. Reports of ice for these months for 1952 will be found in *The Marine Observer*, Vol. XXIII, No. 161, page 188.

North Atlantic Ocean Weather Stations

The Fourth North Atlantic Ocean Station Conference held under the auspices of the International Civil Aviation Organisation opened in Paris on 9th February and concluded on 25th February. This was a full-scale technical and financial conference and it took place as the result of a recommendation made by the Third Conference (the terms of reference of which were restricted to financial matters) which was held at Brighton in June, 1953. At the Third Conference it became obvious that owing to financial considerations some reduction in the network would be inevitable, but the limited terms of reference of that conference prevented any technical discussion, which was an essential preliminary to any modification to the network, and it was for this reason that the Fourth Conference took place. The statement issued by the United States Authorities in October, 1953, that they contemplated withdrawing all their vessels from the scheme, even though it was followed by a later statement (in December, 1953) that they would co-operate in a limited network, combined with the need of all the participating countries to economise, and the consequent difficulties of finding the finance necessary for manning sufficient stations on the European side, did not seem to augur well for the success of the Conference.

As it happened, it can be said with justification that international goodwill and a ready spirit of compromise prevailed, with the result that a very satisfactory agreement was signed. All the national authorities present at the Conference recognised the meteorological importance of this network not only for the safety and efficiency of transatlantic aviation but also for meteorological research and for general meteorological purposes. There was general agreement among those present that for technical reasons it was important that the network should be reduced as little as possible, bearing in mind the necessity for economy and the number of ships available for manning the network. It was clearly shown in the technical discussions that, due to the complex meteorological situation in the North Atlantic, as soon as one station was removed from the network the consequent displacement of other stations which became necessary tended to destroy the balance of the network as a whole. After considerable discussion it was agreed that, as it was obvious for financial reasons that some reduction in the network was essential, the elimination of Station H (situated between Bermuda and New York) would cause the least harmful effect upon the network, but that it was extremely desirable that the remainder of the network should remain as it was.

After taking into account the number of Atlantic crossings of aircraft belonging to the various states and taking into consideration non-aeronautical benefits also, an agreement was reached whereby Europe would operate the "eastern" chain of stations A, I, J, K and M, while the United States and Canada would between them operate the "western" stations B, C, D and E (see map, page 164). Non-aeronautical benefits are simply those benefits which are derived from the network by other interests than civil aviation. Although past conferences had been unable to devise any method of taking these into account, and although no precise method of evaluating them has yet been developed, the Paris Conference agreed that they should be given weight in distributing responsibilities among states even though only a rough and ready assessment could be made. It was agreed that the ratio of aeronautical to non-aeronautical benefits derived from the network could be assessed in the ratio of 80 to 20 and that the aggregate non-aeronautical benefits for the U.S.A. and Canada, as against those for European States, would be in the proportion of one to three, with the realisation that the weather tends to move from west to east across the Atlantic and that Europe, therefore, tends to benefit more from certain sections of the network than does North America. In making this assessment it was agreed that benefits to meteorological research should not be taken into account as it benefited all countries. Nor should benefits to shipping be considered owing



Changes in positions of North Atlantic Ocean weather stations coming into force in July, 1954.

to the international nature of shipping and the fact that ships contribute so much voluntary meteorological information.

A major consideration was the number of vessels available to man the network, and it soon became obvious that the maximum number of vessels which Europe could provide and yet keep within reasonable financial bounds was 10 (France 2, Netherlands 2, Norway and Sweden combined 2 and United Kingdom 4).

After a somewhat lengthy discussion by the European operating countries, an ingenious "rotation" scheme was developed (by Dr. Bleeker of the Netherlands) and accepted by the countries concerned whereby stations A, I, J, K and M could be operated by the available 10 European vessels. The United States and Canada at the same time agreed that they would operate the remaining stations B, C, D and E with 11 vessels. A generous gesture was made here by the North American operators agreeing to undertake somewhat more than their calculated responsibility. This arrangement meant, nevertheless, a heavy task for the European operators, because the five "European" stations had previously been operated by a total of 12 vessels (10 European and 2 United States). However, the adoption of the "Bleeker schedule", although it will mean some increase in operating costs for all European operators, does enable the European States to discharge their task in the new scheme without going to the considerable expense of bringing additional vessels into service.

Under the new agreement it is the responsibility of the operating countries to provide vessels as follows: U.S.A. and Canada combined, 11; Netherlands, 2; Norway and Sweden combined, 2; France, 2; and United Kingdom, 4. Belgium, Denmark, Israel, Italy and Switzerland agreed to make substantial cash contributions, which will be shared among the European operating countries. Iceland and Spain were not immediately in a position to adhere to the prescribed new agreement, but there is every reason to hope that they will adhere before long, as cash contributors. Ireland agreed to contribute a token payment of £1,000. As a

result of this, the United Kingdom continues to operate her four vessels but receives a substantial cash payment. After taking into account the cost of the greater extent to which the United Kingdom vessels will need to be operated, the eventual net cost of the new agreement to the British taxpayer will be about £30,000 less than before.

The new agreement comes into force when the present one expires at 0001 G.M.T. on 1st July, 1954, and lasts for two years, after which it may be extended automatically from year to year in the absence of twelve months' notice of objection by states of specified responsibility.

For the operation of the "European" stations during the first six months of the new agreement, the two Norwegian vessels will occupy station A, the Netherlands vessels station M, the United Kingdom vessels stations I and J and the French vessels will remain at station K. At the completion of the first six months the Norwegian vessels will return to station M and the French, British and Netherlands vessels will occupy stations A, I, J and K in rotation. The exception to this "rotation" scheme is that whenever a French vessel would be assigned to duty at station I at the same time as a British vessel at station K the two vessels will switch round so that the British vessel goes to station I and the French vessel at station K. Under this arrangement station A is obviously the most difficult to operate, and this will be occupied by each of the 8 vessels concerned (4 British, 2 Netherlands and 2 French in strict rotation). Thus in a year 4 British vessels will do 8 voyages at station A and 4 voyages at station K. Owing to their small size and limited fuel capacity, whenever a British vessel occupies stations A or K they will need to re-fuel at Reykjavik or Milford Haven respectively, both outward and homeward bound. In order to carry out the rotation scheme effectively, and provide sufficient time in harbour at the end of each voyage to undergo repairs, give leave, etc., each vessel will need to spend 24 days on station in future instead of 21 days as at present. The average time in harbour at the end of each voyage will be about 16 days. It was decided that the meteorological programme of the network was already satisfactory and that no changes should take place. Some minor changes were approved by the Conference concerning air/sea rescue equipment and communication arrangements between the weather ships and aircraft in flight, and the international aspect of the oceanographical programme of the network was somewhat modified.

The Chairman of the Conference was Dr. Dekker (Netherlands), who is Chairman of the Netherlands Weather Ship Committee and had also been Chairman of the Third N.A.O.S. Conference at Brighton. Dr. Sutton, Director of the British Meteorological Office, was elected Chairman of the Financial Committee, and Captain Meaux (France), who supervises the operation of the French weather ships, Chairman of the Technical Committee.

From the British viewpoint it can be stated that the new agreement is not unsatisfactory. A reasonable network of observations both at the surface and in the upper atmosphere is essential in the North Atlantic if we are to provide satisfactory meteorological information for transatlantic aircraft leaving United Kingdom airfields, and such a network is extremely valuable from the viewpoint of general forecasting and for meteorological research in this country. Such a network, comprising nine ocean weather stations as well as the selected ships which trade across this ocean, has been achieved at the expense of some greater effort on the part of the weather ships themselves. On the other hand, owing to the greater cash contributions provided by non-operating countries, the cost of British participation should be £30,000 a year less than at present. From the operational viewpoint, and particularly for those who serve aboard the weather ships, the longer distance the ships will have to go at times to man the stations and the somewhat longer time they will have to spend at sea each voyage, combined with the shorter aggregate time in harbour, will raise some problems and cause some inconvenience; but it does not seem that any of these problems are insoluble.

This new agreement is necessarily somewhat more complicated than its predecessors, but it does provide a rather striking example of international co-operation on a businesslike and practical basis which contributes not only to the safety of air navigation but to the whole cause of meteorological science.

C. E. N. F.

New B.B.C. Weather Bulletins

As has been stated in the Editorial (page 118), the B.B.C. have revised the times and arrangements of their weather bulletins; the following table gives a list of the times of broadcasts and the information given at each time. This came into force on 11th April, 1954.

TIME OF BROADCAST ¹	SERVICE	CONTENT	PERIOD OF VALIDITY
0655 (except Sundays)	Home	Warnings General forecast Outlook District forecasts Shipping forecasts	Today until midnight As announced Today until midnight For next 24 hours
0755	Home	Same as 0655	Same as 0655
0915 (Sundays)	Home	Same as 0655	Same as 0655
1255	Home	Warnings Shipping forecasts General forecast Outlook	For next 24 hours Till dawn tomorrow As announced
1755	Appropriate regions Home	Regional forecasts Warnings Shipping forecasts General forecast Outlook	Till dawn tomorrow For next 24 hours Till 6 p.m. tomorrow As announced
2100	Appropriate regions Home	Regional forecasts General forecast ²	Till 6 p.m. tomorrow For tomorrow
2303	Home	Weather commentary General forecast	For tomorrow
2350	Light	Gale warnings General synopsis ³ Shipping forecasts	For next 24 hours

New North Atlantic Areas to be used in Forecasts for Shipping

From time to time complaints have been received from masters of ships trading across the North Atlantic that the areas used for forecasts in the Atlantic Weather Bulletin do not bear any relation to the main shipping tracks. Ships bound from Fastnet and Bishop Rock for North American ports sail almost along 50°N (as far out as 40°W), which is the boundary between the North-West and North-East Sections on the one hand and the South-West and South-East Sections on the other. Forecasts for these sections might differ considerably and masters have frequently been uncertain as to which to follow.

To get over this difficulty a new section has been introduced, called the Central Section, which covers the area 5° north and south of 50°N. Ships on the above-mentioned routes will now pass along almost the centre of this section, so no

¹ The Light Programme is interrupted at any time during the hours of broadcasting for the announcement of gale warnings.

² The general forecast at 2100 is not necessarily broadcast in the precise form in which it is supplied, since it is subject to editing by the B.B.C. for inclusion as a news item.

³ The general synopsis at 2350 is a brief statement of the existing synoptic situation over, and in the vicinity of, the British Isles.

uncertainty will arise about alternative forecasts. This arrangement will come into force on 1st August, 1954.

The old and new areas are shown in Tables 1 and 2. Maps of the revised areas will be published as amendments to the *Admiralty List of Radio Signals*, Vol. III, Part A, and to the *Marine Observer's Guide*.

Table 1. Names of North Atlantic areas used in Atlantic Weather Bulletin up to 31st July, 1954

	40°-27½°W	27½°-15°W
65° to 50°N	NORTH-WEST SECTION	NORTH-EAST SECTION
50° to 35°N	SOUTH WEST SECTION	SOUTH EAST SECTION

Table 2. Names of North Atlantic areas to be used in Atlantic Weather Bulletin from 1st August, 1954

	Names of sections when not sub-divided	Names of sections when sub-divided into west and east	
	40°-15°W	40°-27½°W	27½°-15°W
65° to 55°N	NORTHERN SECTION	WEST NORTHERN SECTION	EAST NORTHERN SECTION
55° to 45°N	CENTRAL SECTION	WEST CENTRAL SECTION	EAST CENTRAL SECTION
45° to 35°N	SOUTHERN SECTION	WEST SOUTHERN SECTION	EAST SOUTHERN SECTION

SOUTH AFRICAN WEATHER BUREAU

Co-operation from British Ships

We have received a letter from Dr. T. Schumann, Director of the South African Weather Bureau, about the co-operation between the Weather Bureau and British ships. An extract from the letter is as follows:

“The co-operation of British selected ships during 1952 with Met Pretoria has once again been very satisfactory, and Excellent Awards have been made to the selected ships *Actaeon*, *Athlone Castle*, *Arawa*, *Bransfield*, *Dominion Monarch*, *Powell*, *Pretoria Castle*, *Southern Garden*, *Southern Harvester* and *Thule*. Excellent Awards were also presented to the non-selected ships *British Seafarer*, *Doric* and *Ixion*.

“By an arrangement between the Director, British West African Meteorological Services, and the Director of the South African Weather Bureau, British selected ships are free to report either to Met Pretoria or to British West African stations when between the Equator and 15°S.”

We should like to congratulate the British ships that have gained these Excellent Awards.

Book Reviews

The Viking Ships. By A. W. Brogger and H. Shetelig. 9½ in. × 6½ in. pp. 250. Dreyers Forlag, Oslo, 1953. 25s.

In May, 1893, a ship of remarkable design and build made the passage from Marstein, near Bergen, Norway, to Newfoundland in 28 days. She was the exact copy of a ship which had been found during the excavation of a burial mound at Gokstad, near Stavangerfjord, some 13 years before, and estimated to have lain there, as the tomb of a king, since A.D. 900.

To sail a ship of 76 ft in length, 17½ ft beam and 2 ft 9½ in. draft westbound across the North Atlantic at that time of the year might well be considered a hazardous undertaking even were she to conform with the highest requirement of modern classification, but with supreme faith in the craftsmanship and seamanship of his predecessors of 1,000 years before, at the end of the passage her captain said: "The fact is that the finest merchant ships of our day, those regarded as the best sailors, have practically the same type of bottom as the Viking ships. One is tempted to say that the construction of the ship equals the work of our modern shipyards in every respect, especially when the relatively primitive tools of that time are taken into account."

The Viking Ships is an authoritative work on these early Norwegian ships which made so much history and roamed the seas from the Arctic to North America. The authors, who are professors of archaeology at the Universities of Oslo and Bergen respectively, have devoted a lifetime of research to the subject, and from numerous excavations of burial mounds and the study of Stone Age rock carvings have built up a picture not only of the ships as they were, but of the people who built them, sailed them and were buried in them. For the ships were not only a means of transportation, they reflect also the home life of the people, their religion, warfare and their arts and crafts.

This is a fascinating subject, for the student of naval architecture and social history rather than for the seaman, but the background to it all is the eternal problem of beating the weather. In the rock carvings something can be seen of the Vikings' efforts to surmount this problem, the development of the prow and stern, and the building up of a freeboard in their earliest type of skin boats. It was many generations before they overcame their somewhat natural reluctance to build a ship of more than one section, for fear of its not being watertight, but the later "long-ships" and deep-sea ships were clinker built and Atlantic passages such as the above named that they are known to have performed has proved their sea kindliness.

This book is the English edition of a Norwegian work and the translation has been excellently done. The illustrations and plans enable the reader to appreciate the wonderful art of the Viking shipbuilders and the devotion with which the authors have pursued their subject.

L. B. P.

The Conway. By John Masefield. 8½ in. × 5¼ in. pp. viii + 323. W. Heinemann, London. New Edition, 1953. 25s.

The wreck of the training ship *Conway* in the Menai Strait in April, 1953, meant not only the loss of an historic wooden ship but the closing of a rather glorious chapter in the annals of nautical training. It so happened that as this second edition of Mr. Masefield's history of the *Conway* was about to go to press, the news came that "the ship of our memory and affection is now no more". This edition therefore contains the complete history of the two wooden vessels which in turn provided a school afloat for a total of some 10,000 "would-be" mariners during 94 years (1859-1953). Written by an author of such repute this book may rightly be said to be a fitting memorial to the ships concerned. The accomplishments of "Conway boys" during the years, and the esteem in which the ship has always

been held in shipping circles, are evidence that the plans made by the Education Committee of the M.M.S.A., when they established their first school frigate *Conway* in 1859, were well laid. Mr. Masefield tells us that there was a 26-gun ship-sloop *Conway* in the Navy List from 1814 to 1825. The first *Conway* to do duty as the training ship was the second ship of this name in the Navy List and was classed as a "Jackass" frigate of 26 guns; she was loaned by the Admiralty and the first term opened in August, 1859. In 1876 she was replaced by the 92-gun line-of-battle *Nile*, who was duly renamed *Conway*, and nobly did she do her duty for the next 77 years; she was laid down in 1827 and was launched in 1839, and was therefore afloat for 114 years.

The author succeeds in bringing before the reader not only a remarkable panorama of life aboard these ships in their career as training ships, but also an interesting account of their earlier history as ships of the Royal Navy, and includes fascinating details of their construction and their behaviour at sea. Much of the book consists of extracts from letters and personal reminiscences of boys who were trained in the *Conway*—Mr. Masefield was himself a "*Conway* boy". Any "*Old Conway*" reading this book can scarcely fail to have nostalgic feelings for the old ship, as his memory is thus so vividly taken back to such items as the joys of being a "new chum", Saturday morning deck work, boxing and cinema shows in the hold and the wild rush to "lash up and stow". Time and time again the reader has brought home to him the important part of the "training to be a seaman" that was provided by the inevitable boat work—duty cutters crew and work in the motor boats and water boat—associated with life aboard a training ship afloat, as well as the admirable opportunities available for sailing in the ships' dinghies.

Meteorology finds its place in the book where reference is made to the meteorological log kept by the cadets aboard, and to the (by no means unusual) occasions when in heavy weather and spring tides ships at anchor drifted on to the *Conway* and did damage to her. There is a detailed account of a hurricane in the North Atlantic (lat. 46°N, long. 39°W) in the year 1859 in which she was involved as the *Nile*; her logbook recorded a wsw wind of force 12 blowing for about six hours, but apart from losing most of her canvas and some of her boats she appears to have suffered only superficial damage. Although fitted with a screw propeller, it does not seem to have been used on this occasion—her captain apparently preferred to handle her under sail. Her best day's run under sail alone was recorded as 251 miles, and under sail and steam combined her best was only 227 miles. Her maximum speed under steam alone was 7 kt.

The book contains some interesting illustrations of the *Conway* both as a man-of-war and as a training ship.

C. E. N. F.

With deep regret we announce the sudden death of
COMMANDER J. HENNESSY, M.B.E., R.D., R.N.R., Deputy
Marine Superintendent of the Meteorological Office,
which took place at Sidcup, Kent, on 22nd May, 1954.
An Obituary Notice will appear in the October, 1954,
number of *The Marine Observer*.

Personalities

OBITUARY.—We regret to record the death after a brief period of retirement of CAPTAIN R. N. STUART, V.C., D.S.O., R.D., R.N.R. Ronald Neil Stuart, of Scottish descent, was a Liverpool man whose ancestors had for generations followed the sea. He commenced his career in sail as an apprentice in the Liverpool barque *Kirkhill*, being shipwrecked when she struck a rock near the Falkland Islands and quickly foundered. Later the ship in which he was serving was blown ashore during a hurricane off the coast of Florida.

He joined the service of the Allan Line as a junior officer in 1910, then at the outbreak of the 1914–18 War he was mobilised and served as Lieutenant, R.N.R. His war career was most distinguished, but he is best remembered for his association with the late Admiral Gordon Campbell in "Mystery Ships", during which time he was awarded the V.C.

During the war the Allan Line ships were taken over by the Canadian Pacific, which company retained all the Allan personnel. Stuart returned in 1919 as First Officer, being appointed to his first command, the cargo ship *Brandon*, in 1928. From 1929 to 1934 he commanded the *Duchess of York*, running on a regular weekly service from Liverpool to Canada with three other similar "Duchesses". Captain Stuart was one of the pioneers of routine weather charting and forecasting at sea, a duty of the junior officer of the watch being to keep the large blackboard chart of the North Atlantic Ocean in the chartroom fully plotted with the latest weather bulletin. From practical use made of the information thus regularly available, Captain Stuart's ship became a notable passage-maker. In 1934 he was promoted to command the company's flagship *Empress of Britain*.

Always keenly interested in marine meteorology, Captain Stuart was a member of the corps of Voluntary Marine Observers since 1926, during which time he contributed a total of 53 logbooks, of which 25 were classified "Excellent".

In 1936 he was appointed Superintendent at Montreal, in 1937 General Superintendent in the United Kingdom and finally, in 1938, he became General Manager, which position he retained until his retirement at the end of 1951.

M. C.

RETIREMENT.—CAPTAIN T. W. McALLEN retired in December, 1953, after 53 years at sea. Captain McAllen commenced his sea career at the age of 12, and joined the Union Castle Line in 1915 as a junior officer in the *Hansa*. He served in many vessels throughout his service, and passing through the usual grades was promoted to his first command, the *Athlone Castle*, in 1940.

During the war years Captain McAllen subsequently commanded the *Llanstephan Castle*, and the *Dromore Castle* which was mined and sunk in the North Sea, fortunately without loss of life. Later he was in command of the *Llangibby Castle*, in which 100,000 troops were transported across the Channel from D-Day until the end of the war in Europe.

Returning to the peace-time duties of carrying passengers to the Cape ports, Captain McAllen commanded the *Dunnottar Castle*, *Carnarvon Castle*, *Warwick Castle* and finally the *Edinburgh Castle*, which he joined for her maiden voyage in 1948. In 1950 he became Commodore of the Union Castle fleet in that vessel, in which he remained until his retirement.

During his 38 years' service with the Union Castle Line, Captain McAllen served on many ships carrying out voluntary observing for the Meteorological Office, and since 1927 a total of 23 logbooks have been received bearing his name. In 1952 and 1953 he was the recipient of Excellent Awards for voluntary meteorological work done aboard the *Edinburgh Castle*.

We wish him health and happiness in his retirement.

J. R. R.

ODE TO "WEATHER VANCOUVER"

(The following verse was received from the Controller, Canadian Meteorological Division. It constitutes the reply by Mr. Ainsworth, 3rd Officer of T.E.V. *Mapledell*, to a letter asking him to report the temperature to the nearest 0.2°F.)

*You boffins meteorological,
Are really awful smart.
You let us know when winds may blow,
And snow or rain may start.
Your facts depend on figures
Gleaned o'er the cruel sea
By blokes in ocean weather ships
And simple souls like me.*

*We raise a wetted finger
To see whence comes the breeze,
And sniff the air or feel our toes
To find when things may freeze.
Thermometers tell when things are warm
And tea is fit to brew,
But must be read to half degrees,
And better to point two.
It's best to use a microscope
The jolly thing's so small,
And when it's dark and raining
It can't be seen at all.
That cunning little decimal
Must really mean a lot,
But microscope and callipers
We simply haven't got.*

RECRUITMENT OF SELECTED SHIPS AT VANCOUVER

At the Conference of the International Meteorological Organisation at Washington in 1947 it was agreed that each maritime country should recruit as many ships of its own nationality as possible to ensure an adequate number of voluntary observing ships to cover all oceans. The fact that there are today over 2,400 observing ships of all nationalities shows how amply this agreement has been carried out.

The countries which own large merchant fleets are, under this scheme, obviously expected to recruit a relatively large number of ships; thus the United Kingdom has 500 selected ships. The cost of supplying all these ships with instruments is quite considerable, and there is obviously a limit to the number of such ships which any country can afford to recruit. Countries which have a large seaboard and a small merchant navy need under this scheme to rely almost entirely upon reports from the shipping of other countries for meteorological information from the oceans.

The Canadian merchant fleet is a relatively small one, and the Canadian Meteorological Division is very anxious to obtain additional meteorological reports from the Pacific Ocean. With a view of trying to fill in large gaps containing no ship reports on this vast expanse of water, the Controller, Mr. Andrew Thomson, recently wrote to the Marine Branch suggesting that his Port Meteorological Officer at Vancouver should be permitted to recruit certain ships of British nationality which have not already been recruited by the Marine Branch of the British Meteorological Office. This arrangement is in accordance with the general principles of the Selected Ship Scheme and in particular with the terms of the Conference of Empire Meteorologists (1946).

This proposal has been agreed to and will come into operation immediately.

The Port Meteorological Officer at Vancouver, and also those at Halifax and St. John, will recruit only those British ships which call regularly at Canadian ports, and whose masters and officers are willing to take part in this work on behalf of the Canadian authorities. The Port Meteorological Officers will, at the same time, obtain the consent of the owners or agents of the vessels. The Canadian Meteorological Division will be entirely responsible for equipping these ships with meteorological instruments, instructions, logbooks, etc.

It is perhaps relevant to mention that the New Zealand and South African Meteorological Services have also made special arrangements for "recruiting" merchant ships which are not selected ships, to send radio weather messages preferably in code, whenever possible. None of these ships is supplied with instruments, so they would normally only send the first four groups of the international code for ships' weather reports, F.M. 23.

These are some of the ways whereby countries can tend to "help themselves" in order to fill in the gaps in the ocean areas in which merchant shipping is relatively sparse and where there are necessarily rather few selected ships.

C. E. N. F.

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

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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 1, Second Floor, Adelaide House, London Bridge, London, E.C.4. (Telephone: Mincing Lane 8232.)

Bristol Channel.—Mr. J. C. Matheson, Port Meteorological Officer, 2 Bute Crescent, Cardiff. (Telephone: Cardiff 21423.)

Southampton.—Captain J. R. Radley, Port Meteorological Officer, 50 Berth, Old Docks, Southampton. (Telephone: Southampton 24295.)

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

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 upon Tyne. (Telephone: Newcastle 23203.)

Fleet Lists (GREAT BRITAIN)

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.

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>Accra</i> ..	GJSW	19.3.54	W. Munt	J. F. Murphy, R. Munro, J. Bellamy	J. Stuart	Elder Dempster Lines, Ltd.
<i>Afghanistan</i> ..	GNYB	6.1.54	R. Connacher	N. H. Crawford, W. E. Thomas, C. J. Farren	W. H. Major	F. C. Strick & Co., Ltd.
<i>Ajana</i> ..	GKVV	13.2.54	F. W. Mould	H. A. McGill, T. Hastings, H. E. Keeble	L. Kidd	Trinder Anderson & Co.
<i>Ajax</i> ..	GJXM	16.2.54	S. C. Llewellyn	A. R. Davidson, A. R. Worthington, J. B. Swindells	A. E. Holman	A. Holt & Co.
<i>Akarooa</i> ..	GMLP	5.11.53	J. W. Hart	G. H. Lewis, G. B. Broome, A. R. Stephenson	J. Reynolds	Shaw, Savill & Albion Co., Ltd.
<i>Albistan</i> ..	MABT	15.10.53	E. E. Dunn	M. Fleming, R. J. Kane, E. C. Cross	J. Peel	F. C. Strick & Co., Ltd.
<i>Alcantara</i> ..	GLQR	8.2.54	H. H. Treeweeks	N. C. Kerr, G. Chamberlain, F. E. Fairly	R. Hammond	Royal Mail Lines, Ltd.
<i>Alsatia</i> ..	MABL	27.10.53	J. Chapman, R.D., R.N.R.	D. A. Davies, B. V. Mercer, —, McClymont	D. Grainger	Cunard Steamship Co., Ltd.
<i>Amakura</i> ..	MCPN	19.6.53	S. Armitage	D. Andrew, F. Sanchez, J. H. Donaldson	E. Ash	Booker Bros. McConnell & Co., Ltd.
<i>Andes</i> ..	GQCV	14.11.53	H. D. Hooper, O.B.E.	R. R. L. Williams, D. Stratton, P. J. Foster, G. Gelson	W. Smith	Royal Mail Lines, Ltd.
<i>Andria</i> ..	GDWM	9.7.53	A. G. Cuthill	J. Cosnett, P. A. James, J. A. B. Munro	J. B. Allan	Cunard Steamship Co., Ltd.
<i>Apapa</i> ..	MACE	9.3.54	A. G. Baptiste	H. A. Ross, J. C. Watson, R. C. Abbott	G. I. Gilling	Elder Dempster Lines, Ltd.
<i>Arabia</i> ..	GLKF	26.2.54	W. B. Tanner, R.D., R.N.R.	I. A. M. Watt, Q. K. Paul, R. J. F. Nightingale	T. Sandham	Cunard Steamship Co., Ltd.
<i>Arabistan</i> ..	GCKK	9.3.54	J. E. Cooke	R. Ellingham, D. Calvert, J. Edmondson	A. Nicholson	F. C. Strick & Co., Ltd.
<i>Araby</i> ..	GMZL	1.12.53	F. J. Swallow	J. Merson, P. Sykes, B. McKisack	A. Whittaker	Royal Mail Lines, Ltd.
<i>Arakaka</i> ..	GDEV	25.3.54	T. W. Jones	J. L. Anczykowski, E. F. Boyd, W. H. Lane	J. Fraser	Booker Bros. McConnell & Co., Ltd.
<i>Arawa</i> ..	GSMN	8.12.53	W. G. West	K. Billinghurst, O. Thomas, D. James, B. Irwin	P. W. Booth	Shaw, Savill & Albion Co., Ltd.
<i>Argentina Star</i> ..	GTKF	2.10.53	E. R. Pearce, O.B.E.	J. Botwood, F. Blake, P. Franklyn	D. Jacob	Blue Star Line, Ltd.
<i>Ariguani</i> ..	GMBL	18.3.54	J. Kinsley	J. L. Taylor, C. Mullings, E. R. Williams	W. J. Read	Elders & Fyffes, Ltd.
<i>Arundel Castle</i> ..	GCZL	2.4.54	D. D. MacKenzie	C. Markham, P. J. Stead, K. M. Dunning	E. Pitt, D.S.C.	Union Castle Mail S.S. Co., Ltd.

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Ascania</i>	GKNJ	7.12.53	D. M. MacLean, D.S.C., R.D., R.N.R.	J. S. Roe, J. K. Finlay, N. M. Johnson	H. M. Milligan	Cunard Steamship Co., Ltd.
<i>Ashburton</i>	GNJN	26.3.54	C. Parry	C. Rawlinson, J. P. McRink, R. Smellie	D. Bordessa	Trinder Anderson & Co.
<i>Asia</i>	GLJV	10.2.54	F. E. Patchett	D. Steff, D. Howells, A. M. Jones, C. R. Bishop	J. Marshall	Cunard Steamship Co., Ltd.
<i>Assyria</i>	GGKX	16.3.54	J. G. Bradley, R.D., R.N.R.	D. T. Neck, J. Mortimer, J. Gornali, P. Tinne	B. A. Long	Cunard Steamship Co., Ltd.
<i>Asturias</i>	GLQS	17.9.53	W. H. Grimshaw	J. Anderson, A. H. Acaason, J. Salt, A. J. Heather	R. T. Farrell	Royal Mail Lines, Ltd.
<i>Athens</i>	GBLS	24.3.54	H. C. Smith	J. O. Williams, J. G. Beck, A. Newman, G. B. Broom	H. S. Knight	Shaw, Savill & Albion Co., Ltd.
<i>Athlone Castle</i>	GYTK	12.2.54	C. C. Page	G. Wood, P. Birch, D. V. Trevarrow	G. H. Summers	Union Castle Mail S.S. Co., Ltd.
<i>Aureol</i>	GMGI	26.11.53	J. J. Smith	D. Howe, —, Hopton, D. Dunn	F. W. J. Bloomfield	Elder Dempster Lines, Ltd.
<i>Auricula</i>	GKPV	22.2.54	J. H. J. Hamling, O.B.E.	D. C. Howard, T. B. Kelly, R. Kiddle	G. H. S. Jordan	Messrs. Shell Tankers, Ltd.
<i>Australia Star</i>	GYCS	30.3.54	R. White, D.S.C.	J. C. Harris, J. A. Holloway, F. Agnew	L. Cooper	Blue Star Line, Ltd.
<i>Australind</i>	GJKF	24.2.54	R. Willcocks	H. R. Coates, P. Mitchell, R. Jeans	C. D. Oghourne	Trinder Anderson & Co.
<i>Avistone</i>	GHSV	30.1.54	A. A. Roche	K. Heaps, J. H. S. Logie, C. P. W. White	L. R. Bradley	Purvis Shipping Co., Ltd.
<i>Avonstone</i>	MAWG	16.2.54	F. Moorcraft	E. B. Fitzpatrick, W. Lewis, A. Booth	L. H. Howes	Dene Shipping Co., Ltd.
<i>Avonmoor</i>	GFGL		F. F. Gilbert	K. B. Jewell, G. Sharpe, K. Arthur	K. J. O'Connor	Walter Runciman & Co., Ltd.
<i>Balanbia</i>	GBNM	12.12.53	I. A. Phillips	B. Thorne, J. J. Rutter, M. Boyd	J. Davis	Royal Mail Lines, Ltd.
<i>Balaena</i>	GLDG		P. Uirik	R. Christoffersen, —, Bentzen, A. Andersen		Hector Whaling, Ltd.
<i>Baron Elphinstone</i>	GCCD	29.7.53	A. Campbell	L. T. McElliott, —, Anderson, R. S. Beat	— Podmore	H. Hogarth & Sons
<i>Baron Fairlie</i>	GLCY	13.3.54	T. R. Reid	A. E. Stainthorpe, J. Gordon, J. Roberts	J. Cagney	H. Hogarth & Sons
<i>Baron Mactay</i>	GKXW	2.12.53	D. MacGregor	E. Jones, C. R. Roy, M. L. McLaren	W. Bennett	H. Hogarth & Sons
<i>Baron Murray</i>	GIFB	10.3.54	J. Pearson	J. Budka, J. Forsyth, M. MacNeil	B. Keheley	H. Hogarth & Sons
<i>Baron Renfrew</i>	GYDR	12.1.54	P. Dunsire	G. D. Johnston, R. Potter, J. Somerville	M. Barry	H. Hogarth & Sons
<i>Bassano</i>	GNXK	16.6.53	B. Waldie	B. Wright, F. Barnes, G. Lawson	A. Leary	Ellerman's Wilson Line, Ltd.
<i>Beaverburn</i>	MAGB	8.12.53	J. Soame	W. P. Embleton, W. Holmes, R. M. Stewart	G. Adamson	Canadian Pacific S.S., Ltd.
<i>Beaverford</i>	MQJG	21.4.53	W. R. Thorburn	J. Mayes, R. N. Stewart, P. C. Lovell	T. Herriots	Canadian Pacific S.S., Ltd.
<i>Beaverghen</i>	GBCP	22.2.54	E. F. Aikman	N. Saddington, D. E. Rae, M. Tenger	W. H. Pettit	Canadian Pacific S.S., Ltd.
<i>Beaverlake</i>	GBCQ	5.2.54	N. W. Duck, D.S.C., R.D., R.N.R.	C. Hutchinson, G. Palmer, J. Whaling, M. Scott	A. E. S. Thompson	Canadian Pacific S.S., Ltd.
<i>Beaverlodge</i>	MAGJ	22.12.53	W. J. P. Roberts	R. N. Walker, W. Holmes, J. Brookes	E. R. Le Gear	Canadian Pacific S.S., Ltd.
<i>Bellerophon</i>	GGCM	4.1.54	A. R. McDavid	J. D. Lott, J. Webb, M. Bell	J. C. Wilson	A. Holt & Co., Ltd.
<i>Benary</i>	GCZZ	8.12.53	T. Sutherland	J. Main, N. Mackie, T. Fyffe	R. Dixon	W. Thomson & Co.
<i>Bennevis</i>	MAGG	9.5.53	R. L. Chalmers	A. McKenzie, G. S. Cairns, J. B. Forrest	F. F. G. Hayes	W. Thomson & Co.
<i>Bennamoch</i>	GDDZ	2.12.53	J. C. Allan	A. Syme, G. Hogg, D. Cochrane	E. Carruthers	W. Thomson & Co.
<i>Berwayvis</i>	MYPW	21.1.54	R. L. Arkley	E. Bicknell, W. C. S. Spencer, D. Anderson	A. Watt	W. Thomson & Co.
<i>Biscoe</i>	GDCW	18.3.54	D. J. McKinnon	C. G. Stiff, D. M. Hannah, B. Mullian, A. Wilkinson, A. Naismith, J. Jago	D. J. MacKinnon	Hector Whaling, Ltd.
<i>Bramfield</i>	GDRK	29.4.53	M. Paulsen	A. G. Giblin	— Salvesen	Hector Whaling, Ltd.
<i>Brasil Star</i>	GTLF	19.9.53	G. E. Barnard	J. Slesor, R. G. Taylor, B. Abbott	P. McConnell	Blue Star Line, Ltd.
<i>Bravo</i>	GLDZ	8.12.53	J. Gough	R. E. Abbott, C. Everingham, R. Lomax	R. Newton	Ellerman's Wilson Line, Ltd.
<i>Brisbane Star</i>	GZCJ	8.2.54	S. Foulkes	M. Hayes, D. Van der Merwe, D. J. Harris	J. M. O'Hare	Blue Star Line, Ltd.
<i>Bristol City</i>	GUAY	22.1.54	K. Harris	N. Childs, W. H. Stoodley, F. Gilmore	A. V. Chappel	Charles Hill & Sons

<i>Britannic</i>	..	GDXF	14.12.53	J. W. Caunce, R.D., R.N.R.	M. J. Dodds, W. McDougall, K. T. Jones	J. Kidson ..	Cunard Steamship Co., Ltd.
<i>British Consul</i>	..	GCXT	4.3.54	G. MacKillican ..	A. C. Williams, J. G. Thompson, A. C. Brown	T. MacPherson ..	British Tanker Co., Ltd.
<i>British Endeavour</i>	..	GFCN	18.1.54	J. N. Williams ..	A. W. Henderson, R. E. Chalkin, W. Disson	H. Thompson ..	British Tanker Co., Ltd.
<i>British Escort</i>	..	GCRD	24.10.53	W. S. Tully ..	K. May, A. Martin-Pitt, J. MacKay	J. McLellan ..	British Tanker Co., Ltd.
<i>British General</i>	..	GCDJ	5.2.54	S. Watson ..	J. L. Gillan, R. J. Nener, S. C. Davies	J. Dibble ..	British Tanker Co., Ltd.
<i>British Marquis</i>	..	GWVL	7.1.54	D. P. Williams ..	E. M. Dunn, D. MacKinnon, M. J. Goulding	R. T. Rowse ..	British Tanker Co., Ltd.
<i>British Patience</i>	..	GUFF	9.3.54	N. Leybourne, D.S.C.	A. Longden, L. Ashburn, B. Granfield	W. H. Ball ..	British Tanker Co., Ltd.
<i>British Piper</i>	..	GDDN	22.10.53	J. Mason ..	P. R. Newton, R. Bell, F. M. Fowles	J. Sheen ..	British Tanker Co., Ltd.
<i>British Power</i>	..	GZGG	14.7.53	B. R. Dockwrey ..	J. Baird, J. H. Morgan, P. Alderton	M. Strathern ..	British Tanker Co., Ltd.
<i>British Resource</i>	..	GFCD	18.1.54	B. M. Naylor ..	G. A. B. King, L. G. Bukendon, J. H. Easdown	P. Wragg ..	British Tanker Co., Ltd.
<i>British Swordfish</i>	..	GCOV	3.3.54	A. J. Lawson ..	G. Symons, M. B. Roles, C. Herbert	I. R. Reilly ..	British Tanker Co., Ltd.
<i>Brittany</i>	..	GMZS	3.11.53	C. C. Dingle ..	G. S. Varney, J. L. Holt, J. M. Jones	R. O. Jones ..	Royal Mail Lines, Ltd.
<i>Brochleymoor</i>	..	GDWP	15.10.53	F. Bradfield ..	M. Cox, A. H. Brown, R. W. Webb	P. O'Leary ..	Walter Runciman & Co., Ltd.
<i>Cairnaton</i>	..	GPJN	21.9.53	G. H. Percy ..	A. R. Fairley, J. Sutherland, T. Walker	R. Drake ..	Cairns, Noble & Co.
<i>Cairnithu</i>	..	GPBB	26.9.53	J. W. Scott ..	D. Aitchison, J. Hogg, J. Barton	T. W. Lawson ..	Cairns, Noble & Co.
<i>Cairnesk</i>	..	GMKR	6.7.53	G. R. Norvell ..	L. Edwards, G. Pattison, A. C. Ryder	W. Greaves ..	Cairns, Noble & Co.
<i>Cairnswat</i>	..	GNZZ	4.6.53	J. G. Foster ..	I. Gault, J. E. Potter, N. Shell, A. R. Fairley	E. Johnston ..	Cairns, Noble & Co.
<i>Calchas</i>	..	GMSS	8.12.53	D. Jones ..	J. Main, J. Chapman, R. Naylor	T. King ..	A. Holt & Co.
<i>Caledonia</i>	..	GCKR	23.7.53	D. Blair ..	D. Lamont, J. George, D. F. Storey, J. Moncrieff	P. Graham ..	Anchor Line, Ltd.
<i>Canton</i>	..	GDDT	28.12.53	J. C. W. Last, O.B.E.	A. K. Ewing, G. Howe, D. Johnstone, F. Ewell	J. Murphy ..	P. & O. Steam Navigation Co.
<i>Cape Clear</i>	..	GCKN	19.3.54	P. St. C. Willett ..	J. S. Taylor, D. Cameron, G. Barker	D. Harley ..	Lyle Shipping Co., Ltd.
<i>Cape Grafton</i>	..	MAIF	3.12.53	T. Taylor ..	—, Hunter, E. M. Rebane, C. MacMillan	P. E. Coston ..	Lyle Shipping Co., Ltd.
<i>Cape St. Mary</i>	..		17.12.51	J. A. Robson ..			West African Fisheries Research Institute.
<i>Capetown Castle</i>	..	GKGM	15.3.54	J. Trayner ..	J. White, A. Barnes, J. McCarthy	P. P. Williams ..	Union Castle Mail S.S. Co., Ltd.
<i>Captain Cook</i>	..	GLBX	25.3.54	—, Bankier ..	J. L. Downie, A. Maclean, N. Dalziel, I. McLundie	L. W. Hooper ..	Donaldson Bros. & Black, Ltd.
<i>Carnarvon Castle</i>	..	GJSL	14.12.53	W. S. Byles, R.D., R.N.R.	P. A. Torrrens, M. Rich, J. P. Baines	H. G. Liggins ..	Union Castle Mail S.S. Co., Ltd.
<i>Caronia</i>	..	GYKS	6.11.53	R. G. Thelwell, O.B.E., R.D., R.N.R.	P. J. Multen, J. S. Roe, P. A. Bush, H. Hurlley	G. Parsons ..	Cunard Steamship Co., Ltd.
<i>Carthage</i>	..	GRNX	30.1.54	K. A. H. Cummins ..	G. W. John, J. W. Slee, D. A. Hansing, A. J. Arrowsmith	D. O'Leary ..	P. & O. Steam Navigation Co.
<i>Caslon</i>	..	MCIR	22.2.54	I. M. Cherry ..	R. C. Scroggins, W. Coull, R. R. Rawlins	M. D. Johnson ..	Runciman (London), Ltd.
<i>Cavina</i>	..	GKJV	24.11.53	T. H. Bull ..	I. F. Adams, G. Heywood, W. Thompson	S. Humphrey ..	Elders & Fyffes, Ltd.
<i>Caxton</i>	..	GCDX	2.11.53	J. G. Wilson ..	R. L. Goodfellow, W. M. Hendry, B. A. King	W. Edmunds ..	Runciman (London), Ltd.
<i>Ceramic</i>	..	GFLM	16.12.53	F. A. Smith ..	P. Johnson, R. Frisby, W. Scott, P. Marsland	M. Palmer ..	Shaw, Savill & Albion Co., Ltd.
<i>Chantala</i>	..	GQMR	21.12.53	H. F. Collinson ..	W. M. Courts, S. A. Turk, W. R. Popplewell, M. C. Packham	A. E. Leader ..	British India Steam Nav. Co., Ltd.
<i>Chepman</i>	..	GFVR	17.9.53	G. Blacklock ..	J. S. Glen, J. Peck, E. Peers	B. Braithwaite ..	Runciman (London), Ltd.
<i>Cheshire</i>	..	GLXV	13.2.54	N. F. Fitch ..	J. J. Mullins, J. J. Butterworth, N. Kurd	C. Beyer ..	Bibby Bros. & Co.
<i>Chindwara</i>	..	GFRT	26.2.54	B. A. Rogers, D.S.C., R.D., R.N.R.	F. G. Christie, A. S. Bolles, H. B. Chambers, B. Hendricksen	F. O'Dea ..	British India Steam Nav. Co., Ltd.
<i>Cilicia</i>	..	GDGL	4.3.54	J. L. Gibson ..	J. Watson, —, Ramage, H. P. Woodburn, H. M. McFarlane	C. Pennington ..	Anchor Line, Ltd.
<i>Cingalese Prince</i>	..	GFRC	22.1.54	B. R. Simons ..	A. Farrar-Hare, P. Norwood, A. McMath	G. Coffey ..	Prince Line, Ltd.
<i>City of Barcelona</i>	..	GTRK	3.2.53	W. A. Owen ..	P. G. Pope, A. M. Oxberry, D. B. Williams	J. Sheridan ..	Ellerman Lines, Ltd.

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
City of Birmingham	GZLR	7.12.53	W. S. Doidge	A. K. Earl, H. M. Farquhar, J. Caffyn	P. Hannon	Ellerman Lines, Ltd.
City of Brisbane	GDLM	5.12.53	E. G. Chapman	D. McIntosh, J. Grinnell, W. H. Wilson, B. D. Diggle	H. B. Smith	Ellerman Lines, Ltd.
City of Bristol	GCPN	30.12.53	E. M. Robertson	T. Irvine, G. Francis, D. Townson, D. Lewis	K. Davison	Ellerman Lines, Ltd.
City of Cape Town	GBBQ	16.11.53	J. Blewett	R. Stenhouse, L. Boundy, D. Campbell	J. T. James	Ellerman Lines, Ltd.
City of Carlisle	GBJK	2.2.54	R. McKay	M. Lambie, H. F. Roper, J. Henderson	M. W. Hartson	Ellerman Lines, Ltd.
City of Chester	MAFN	10.3.53	F. L. Stewart	I. G. Lumley, E. G. A. Smith, E. Kay	A. R. Childe	Ellerman Lines, Ltd.
City of Delhi	GLBW	24.10.53	W. Lowe	J. J. Strong, W. Johnson	F. Cullen	Ellerman Lines, Ltd.
City of Derby	GFWC	5.1.54	F. W. Woods	T. M. Dickson, R. Clark, J. McLeod	J. O'Donoghue	Ellerman Lines, Ltd.
City of Dieppe	GSVQ	20.1.54	G. J. Law, O.B.E.	M. J. Bird, A. B. Bowman, I. B. Taylor	S. G. Denning	Ellerman Lines, Ltd.
City of Durham	GBJM	28.9.53	T. G. Mathias	A. G. Hine, D. Wardlaw, R. White	P. B. Healy	Ellerman Lines, Ltd.
City of Edinburgh	GNGC	18.3.54	I. W. Wotherspoon	T. Innes		Ellerman Lines, Ltd.
City of Evansville	GJNF		T. L. Vaughan	M. J. Thomas, J. B. Hutcheon, C. Heywood	H. W. Gleisner	Ellerman Lines, Ltd.
City of Johannesburg	GBKW	4.5.53	R. J. Ricketts	R. Halcrow, J. Somerville, D. M. Macdonald	A. R. Henderson	Ellerman Lines, Ltd.
City of Kharطوم	GBZC	19.10.53	J. L. Robertson	I. Butcher, N. Paskin, R. Walker	J. Carroll	Ellerman Lines, Ltd.
City of Khios	GKVB	1.1.54	W. Dick	J. A. Parsons, R. J. Thubron, F. C. Bowen	J. A. Dunlop	Ellerman Lines, Ltd.
City of Lichfield	GKXL	30.12.53	G. R. Jackson	I. Butcher, D. Quinn, A. A. Smith	E. M. Grover	Ellerman Lines, Ltd.
City of Little	GSLN	2.9.53	H. Mackie	F. W. More, D. Wright, G. H. Watkins	— Brosman	Ellerman Lines, Ltd.
City of Lyons	GMCN	28.9.53	I. S. Mackie	J. B. Jones, A. Ledger, R. P. Wakefield	G. Cockburn	Ellerman Lines, Ltd.
City of New York	GLYQ	9.3.54	T. F. Labey	W. F. P. Cannell, A. Burnett, A. Forrest	T. Gaffney	Hall Line, Ltd.
City of Paris	GFQM	22.3.54	T. H. Speakman	F. B. Stewart, N. M. Fletcher, K. J. K. Harrow	F. C. Sterry	Ellerman Lines, Ltd.
City of Pretoria	GBLN	17.7.53	A. G. Freeman	J. A. Buchanan, C. Grant, P. W. Clarke, J. R. Hughes	K. G. Arthur	Ellerman & Bucknall S.S. Co., Ltd.
City of Swansea	GBZT	23.1.54	F. J. H. T. Vizer	I. G. Lumley, R. E. Parry, F. Gurney	R. G. Bell	Ellerman Lines, Ltd.
City of Sydney	GSFM	10.3.54	G. F. Sumpton	R. K. Heyward, L. G. Powell, J. Waddleton	T. Roberts	Ellerman Lines, Ltd.
Clan Brodie	GKPD	30.1.54	B. Vernon-Browne	A. Crawford, A. B. Forster, O. Barnsley	V. S. Slewin	Cayzer Irvine & Co., Ltd.
Clan Buchanan	GKNN	10.2.54	J. A. Forster	R. Roswill, A. H. Thompson, P. C. W. Hoblyn	J. Brown	Cayzer Irvine & Co., Ltd.
Clan Campbell	GDZK	4.2.54	H. C. Simpson, O.B.E.	I. S. Cumming, G. Gibson, A. Mair	R. F. Cole	Cayzer Irvine & Co., Ltd.
Clan Chaitan	GFYX	4.12.53	J. McCrone	W. S. Clark, N. Wallace, R. Campbell	E. J. Shillabeer	Cayzer Irvine & Co., Ltd.
Clan Chisholm	GFYB	4.3.54	V. W. Green	A. T. Young, J. Wilkie, A. Lightly	H. G. P. Macnamara	Cayzer Irvine & Co., Ltd.
Clan Davidson	MAWU	23.3.54	I. A. Watkinson	B. W. Hollman, P. Philip, W. W. S. Arnott	P. K. McCann	Cayzer Irvine & Co., Ltd.
Clan Forbes	GFGB	10.11.53	I. C. Scott	D. Godfrey, B. C. Peat, T. M. Graham	J. M. Humphries	Cayzer Irvine & Co., Ltd.
Clan Macaulay	GZCS	1.1.54	F. H. S. Petherbridge	K. Kerr, J. Baxter, G. Potter, K. G. R. Swift	W. H. Saville	Cayzer Irvine & Co., Ltd.
Clan MacDonald	GCPG	9.3.54	A. J. Hogg	E. A. Cameron, G. S. Gann, R. Gray, D. Toons	G. Martyn	Cayzer Irvine & Co., Ltd.
Clan MacDougall	GFBO	19.3.54	P. MacMillan	E. L. Besley, G. R. Thomas, J. Duncan, G. Dennison	C. E. C. Crew	Cayzer Irvine & Co., Ltd.
Clan MacKinnon	GKLY	8.10.53	B. Jonks	E. W. Thomas, J. Currie, L. Harvey	A. Halcrow	Cayzer Irvine & Co., Ltd.
Clan MacLaren	GSSC	12.8.53	A. G. McPherson	F. R. Usher, S. K. Young, C. Marshall	R. Moore	Cayzer Irvine & Co., Ltd.
Clan MacLennan	GSWX	21.10.53	H. Whitehead	J. W. Bennet, J. H. Bevan, M. R. Learner	W. G. Peddie	Cayzer Irvine & Co., Ltd.
Clan Macrae	MAHP	22.2.54	W. Woodruffe	J. H. Marshall, G. Mitchell, — Myhill	N. Dalzell	Cayzer Irvine & Co., Ltd.
Clan MacTavish	GUBB	24.12.53	E. Gough, O.B.E.	J. N. Peace, I. M. Shearer, A. G. Allison	W. Elmers	Cayzer Irvine & Co., Ltd.
Clan Shaw	GBYW	26.10.53	F. J. E. Houghton	G. G. Greenfield, A. M. Kennedy, E. M. Phelps, D. Hindle	G. H. Hudd	Cayzer Irvine & Co., Ltd.

<i>Clan Sutherland</i>	GFWZ	23.12.53	F. H. Turton	W. T. Maltman, T. R. Halliday, T. Connolly	W. Gay	Cayzer Irvine & Co., Ltd.
<i>Clan Urquhart</i>	GFBK	22.3.54	T. W. Inman, O.B.E.	L. S. Jones, A. A. Elston, M. C. MacGabe, G. Donnison	T. D. Sullivan	Cayzer Irvine & Co., Ltd.
<i>Clearpool</i>	MAHQ	4.1.54	J. H. Atkinson	L. Anderson, C. Dunn, J. B. Dodds	T. Roy	Sir R. Ropner & Co., Ltd.
<i>Clydebank</i>	GKLM	26.11.52	F. Hale	D. Halliday, L. Wigham, P. Grainger	G. Murphy	Andrew Weir & Co., Ltd.
<i>Comdesa</i>	MAHU	23.11.53	F. W. Kent	M. Gilmour, R. Tinnmouth, A. Millie	J. Bishop	Furness-Houlder Argentine Lines, Ltd.
<i>Consuelo</i>	CGGQ	5.2.54	G. Goodman	P. Willingham, F. Martin, J. Ledger	V. Ferrand	Ellerman's Wilson Line, Ltd.
<i>Corfu</i>	GRNW	22.2.54	E. F. Ferraby	R. W. Elenor, P. A. Wiseman, J. B. Latham	F. J. Arthurs	P. & O. Steam Navigation Co.
<i>Corinthic</i>	GZYL	30.12.53	A. C. Jones	H. Falkner, D. H. Clarke, D. Aberdeen, J. Wooller	L. Waterhouse	Shaw, Savill & Albion Co., Ltd.
<i>Corrales</i>	GSIL	9.2.54	F. T. Barber	T. Gibbins, E. Whitehouse, H. Mackinnon	J. B. Jardine	Elders & Fyffes, Ltd.
<i>Corrientes</i>	GFPT	26.2.54	K. MacLeod	J. F. Pringle, G. Waddell, C. Connelly	N. W. Wilding	Donaldson Bros. & Black, Ltd.
<i>Craftsman</i>	GPZT	16.1.54	T. B. Littlechild	F. R. Robnson, C. B. Thomson, E. J. Cassell	P. B. Healy	T. & J. Harrison, Ltd.
<i>Crofter</i>	MNGX	5.11.53	S. Diamond	M. A. Patterson, D. M. E. Ferreira, G. Harvey	G. T. Lyell	T. & J. Harrison, Ltd.
<i>Cumberland</i>	GPPY	8.10.53	J. S. Oxnard	J. A. L. Cosh, I. Davidson, O. Springgett, F. Green	G. S. Ross	Federal Steam Navigation Co., Ltd.
<i>Cuzco</i>	GKPF	28.7.53	R. D. S. Eckford	M. J. Eardley, G. Pattison, A. Jestico	A. Evans	Pacific Steam Navigation Co.
<i>Daleby</i>	MFBV	9.12.53	F. D. Lloyd	R. A. Vans, P. Robinson, C. T. V. Rixham	M. R. Carney	Ropner Shipping Co., Ltd.
<i>Dallas City</i>	GOLS	26.2.54	D. W. Boutcher	W. N. Andrew, H. J. Buck, R. L. Hunter	R. R. Caldwell	Sir William Ropner Smith & Sons, Ltd.
<i>Darro</i>	MAID	1.1.54	T. Powell	D. B. Cairns, L. Earle, —, Sutton	P. Edge	Royal Mail Lines, Ltd.
<i>Debrett</i>	GRPR	18.3.54	J. Legg	W. L. Murphy, D. H. Llewelyn, M. Murphy	J. Powell	Lampport & Holt Line, Ltd.
<i>Deerpool</i>	GKDY	16.2.54	C. H. Churchill	K. Marshall, D. Cuthbertson, E. M. Stewart, R. E. Gatiss	A. Owen	Sir R. Ropner & Co., Ltd.
<i>Defoe</i>	GNWF	25.7.53	E. L. Jermyn	J. W. Pratt, J. W. Cwore, J. A. Russell	J. Brown	Lampport & Holt Line, Ltd.
<i>Delane</i>	MINW	26.2.54	A. Pennice	T. Tyson, D. S. Leicester, R. E. Wildgoose	A. Peloe	Lampport & Holt Line, Ltd.
<i>Delius</i>	GZSY	19.3.54	A. W. Mitchell	I. B. Owen, H. Smith, D. S. Sapp	S. Bolderston	Lampport & Holt Line, Ltd.
<i>Delphic</i>	MBLQ	17.11.53	C. L. Carroll, D.S.C., R.D., R.N.R.	K. Billinghamurst, G. Kaye, A. Thompson	A. Morris	Shaw, Savill & Albion Co., Ltd.
<i>Desecado</i>	MAIH	16.1.54	R. C. S. Woolley, R.D., R.N.R.	C. D. Robinson, C. Ratcliff, M. Bennett	P. Murray	Royal Mail Lines, Ltd.
<i>Devis</i>	GFKT	26.2.52	W. Gillespie	L. Smith, W. A. Ansdell, G. Tunnicliffe	B. Thompson	Lampport & Holt Line, Ltd.
<i>Devon</i>	GDRF	5.2.54	R. G. Hollingdale	D. Layard, E. Cooper, T. Partridge, A. Rollinson	E. Caley	Federal Steam Navigation Co., Ltd.
<i>Devonshire</i>	GTVV	14.4.53	A. Beharrel	G. F. Risley, W. Hudson, A. MacPherson	A. E. Mallett	Bibby Bros. & Co.
<i>Ditwara</i>	GYQV	9.2.54	M. C. Williams	T. Barnett, E. C. Plowman, D. Watson, I. K. Bowerman	S. J. Taylor, M.B.E.	British India Steam Nav. Co., Ltd.
<i>Discovery II</i>	GWVM		H. O. L'Estrange, D.S.C., R.D., R.N.R.	G. Selby-Smith, J. Sumner, J. Norrington		National Institute of Oceanography
<i>Dominion Monarch</i>	GRGG	2.2.54	B. Forbes Moffatt	G. Perry, K. Murry-Brown, K. Lindop, K. Brown, M. Estill	F. V. Harford	Shaw, Savill & Albion Co., Ltd.
<i>Dorset</i>	GZFQ	12.11.53	A. E. Williams	B. D. Allen, M. Blake, B. Foster	J. Tomlinson	Federal Steam Navigation Co., Ltd.
<i>Dryden</i>	GQGT	30.11.53	W. J. M. Ankers	J. R. Chatterton, K. J. McGuire, R. P. Willis	K. Jones	Lampport & Holt Line, Ltd.
<i>Drina</i>	MAIL	2.3.54	E. N. Giller, M.B.E.	F. J. Swallow, B. Copland, R. B. Hill, R. Brockbank	D. Franklin	Royal Mail Lines, Ltd.
<i>Duke of Athens</i>	GMYs	10.12.53	T. Walton	K. Tucker, J. Cullen, D. Montague	—, Dennis	Trent Maritime Co., Ltd.
<i>Dunedin Star</i>	GKKT	2.11.53	J. D. W. Davis	J. Greenwood, L. N. Franklin, J. B. Kirkham	R. Read	Blue Star Line, Ltd.
<i>Dunera</i>	GBBR	23.10.53	A. A. Kay	J. M. B. Wells, C. R. S. Monk, F. Hills, J. A. Stanton	T. F. Holden	British India Steam Nav. Co., Ltd.

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Dunkery Beacon</i>	GUFS	22.5.53	A. C. E. Green	Richardson, G. Atkinson	G. Delahoy	Phs. Van Ommeren (London), Ltd.
<i>Durango</i>	MAIM	1.3.54	H. Wright	R. Luke, B. Sugden, —, Chatterly	H. Davies	Royal Mail Lines, Ltd.
<i>Durban Castle</i>	GPGP	20.11.53	J. A. Sowden	D. Robson, A. Deal, —, Partiger, G. Beaumont, E. Holden	D. Drover	Union Castle Mail S.S. Co., Ltd.
<i>Durenda</i>	GFSL	16.11.53	—, Jefferson	J. Stringfellow, A. S. Collins, J. Hannah, D. Brockbank	L. W. Bell	British India Steam Nav. Co., Ltd.
<i>Durham</i>	GWVK	9.3.54	C. D. Bennett	J. Scott, C. G. Watterson, C. M. Banks	T. M. Jones	Federal Steam Navigation Co., Ltd.
<i>Eastbank</i>	GFKR	18.12.53	C. S. Holbrook	—, Horsburgh, —, Mackenzie, F. H. Fay	A. J. Durn	Andrew Weir & Co., Ltd.
<i>Edenfield</i>	GFIF	1.12.53	—, Muir	J. Spencer, J. Smallwood, B. R. Oliver	M. J. Wilson	Hunting & Son, Ltd.
<i>Edinburgh Castle</i>	GOHN	9.1.54	H. A. Deller	R. Watt, W. Stockley, A. Fulton	J. Hodgson	Union Castle Mail S.S. Co., Ltd.
<i>Egizia</i>	GJZD	26.2.54	D. Morrison, O.B.E.	H. C. Toms, J. Wright, H. Keenan, J. MacLarty	N. Fail	Anchor Line, Ltd.
<i>Elyssa</i>	GJZK	30.3.54	D. Barclay	J. A. Scrimgeour, W. Thomson, —, Hallam, G. Murdock	W. Hier	Anchor Line, Ltd.
<i>Empire Clyde</i>	GDXS	2.12.53	A. C. Johnston	M. N. Elrington, J. F. Bannister, R. A. Game, J. Vale	D. Thompson	Anchor Line, Ltd.
<i>Empire Fowey</i>	GMFW	17.2.54	W. T. C. Lethbridge	D. B. Watt, R. P. Jones, W. Cameron	P. Moloney	P. & O. Steam Navigation Co.
<i>Empire Halladale</i>	GPVQ	2.3.54	R. Blake	J. Martin, B. Sugden, E. Long, A. McKelvie	D. Robson	Anchor Line, Ltd.
<i>Empire Ken</i>	GKZJ	16.1.54	C. E. Mason	N. Lawson, J. Charlesworth, D. R. Carroll	E. Winslow	Royal Mail Lines, Ltd.
<i>Empire Orwell</i>	GRCB	16.1.54	C. K. Blake, O.B.E.	W. A. H. Robertson, R. C. Cameron, A. V. Watt	A. C. Shippam	Orient Steam Navigation Co., Ltd.
<i>Empire Star</i>	GCDP	22.3.54	F. N. Johnson, M.B.E.	A. M. Brockwell, C. D. Mason, J. W. Abbott	D. Matheson	Blue Star Line, Ltd.
<i>Empire Viceroy</i>	MAJN	6.4.51	J. B. S. Bland	W. E. Ligertwood, C. Beck, D. Walker	W. Clarke	Pandelis Shipping Co., Ltd.
<i>Empress of Australia</i>	GOMQ	18.3.54	J. P. Dobson, R.D., R.N.R.	G. C. Geddes, W. E. Ligertwood, W. Williams, R. A. Jones, D. J. Roberts	J. Butterworth	Canadian Pacific S.S., Ltd.
<i>Empress of France</i>	GNTV	9.3.54	S. W. Keay, O.B.E.	C. R. Worthington, R. A. Jones, M. Dunkerley	E. Murphy	Canadian Pacific S.S., Ltd.
<i>Empress of Scotland</i>	GMLV	6.11.53	C. E. Duggan, R.D., R.N.R.	R. W. Gibby, L. Graham, —, White	W. Campbell	Canadian Pacific S.S., Ltd.
<i>English Star</i>	MFSS	7.12.53	L. Vernon, M.B.E.	D. Brodie, J. Blake, P. Johnson	F. Hill	Blue Star Line, Ltd.
<i>Enton</i>	GNLF	7.1.54	R. F. Hellings	M. D. Johnstone, J. Scott, M. Thornton, D. Standing	E. Ingham	Birt, Potter & Hughes
<i>Esperance Bay</i>	GSMP	12.3.54	L. H. Edmeads	R. H. Atkinson, I. Park, J. G. Street	H. H. Lyon	Shaw, Savill & Albion Co., Ltd.
<i>Essequibo</i>	GKPK	2.11.53	T. W. F. Bolland	E. Whislay, E. E. Atkinson, D. A. Owen	P. Snaith	Royal Mail Lines, Ltd.
<i>Essex Trader</i>	GCMS	24.3.54	D. G. Evans	I. Baskerville, H. Hood, D. W. Lee	M. O'Riordan	Trader Navigation Co., Ltd.
<i>Esso Bedford</i>	GGIL	21.12.53	H. Shears	K. MacKenzie, J. B. Elliot, J. P. O'Sullivan	T. Milne	Esso Transportation Co., Ltd.
<i>Esso Edinburgh</i>	GCOM	24.2.54	D. J. Davies	E. A. Allchin, R. Clent, D. Dunning	J. Otley	Esso Transportation Co., Ltd.
<i>Esso Glasgow</i>	GTXC	21.12.53	J. E. Wilson	D. J. Evans, S. F. Nicholson, T. P. Coco	A. Moloney	Esso Transportation Co., Ltd.
<i>Esso Manchester</i>	GWCD	15.3.54	J. L. Harris	H. K. Stevens, —, Bain, —, Scott	J. Ferrie	Esso Transportation Co., Ltd.
<i>Esso Plymouth</i>	GYZX	16.3.54	D. L. Pugsley, O.B.E.	D. Barclay, J. Robertson, A. MacAdam	A. W. Hutchinson	Esso Transportation Co., Ltd.
<i>Etrivebank</i>	GDMK	1.12.52	R. J. Warne	L. Henshal, R. H. Baldwin, M. Wilkes	V. I. Davies	Andrew Weir & Co., Ltd.
<i>Eucadia</i>	GIZL	20.10.53	W. MacVicar, M.B.E.	J. Heald, E. J. Maxwell, G. McCormick	D. Sprout	Anchor Line, Ltd.
<i>Eumaeus</i>	MRWT	25.3.54	H. Large	R. A. Maxwell, J. McCormick, J. McCaulay	J. M. Watson	A. Holt & Co.
<i>Explorer</i>	GYJX	12.3.54	W. S. Eustace	C. Pringle, F. J. Leicester, F. McIntyre	T. O'Looney	T. & J. Harrison, Ltd.
<i>Factor</i>	GPZV	23.9.53	E. B. Stephens	J. B. Campbell, J. A. Davies, R. H. Arnott	J. G. Timmons	G. Heyn & Sons, Ltd.
<i>Fanad Head</i>	GNOQ	6.1.54	J. Alexander		W. Mildred	Pacific Steam Navigation Co.
<i>Flamenco</i>	GCBV	9.12.53	A. G. Litherland		L. A. Riccoboni	Pacific Steam Navigation Co.
<i>Franconia</i>	GBRQ	15.12.53	W. M. Stewart, O.B.E.		J. Crosbie	Cunard Steamship Co., Ltd.

<i>Fremantle Star</i>	..	MQFT	17.2.53	C. R. Horton, D.S.C.	..	J. C. Farmer, J. R. Merrills, H. O. T. Fuller, G. Westrip, P. Bevan	R. Gell	Blue Star Line, Ltd.
<i>Fresno City</i>	..	GBYD	27.8.53	D. L. Beynon	..	J. S. Randall, I. C. Hughes, D. James	J. M. Robson	Sir William Reardon Smith & Sons, Ltd.
<i>Geologist</i>	..	GJMR	7.10.53	A. E. Jackson	..	R. H. Williams, A. G. Nicholson, J. Bean	J. Kelly	T. & J. Harrison, Ltd.
<i>Georgic</i>	..	GRLJ	2.11.53	G. H. Morris	..	J. Easton, O. Elsom, N. J. Ridge	G. Hill	Cunard Steamship Co., Ltd.
<i>Glenartney</i>	..	GBLG	22.2.54	H. Readshaw	..	R. R. Taylor, — Dunlop, — Davies, C. H. Hamilton	A. G. Foster	Glen Line, Ltd.
<i>Glenbank</i>	..	GKLC	24.9.53	J. W. Greig	..	F. B. Rodgers, D. C. Broome, A. F. Wigham	G. Ricard	Andrew Weir & Co., Ltd.
<i>Glenorchy</i>	..	GBLL	1.1.54	R. Hanney	..	J. C. R. Taylor, J. C. Ray, W. R. Willis, J. P. J. Shorrocks	R. Bradshaw	Glen Line, Ltd.
<i>Gloucester</i>	..	MANK	22.12.53	J. E. Bury	..	D. C. Blackman, N. I. Collett, R. S. Haies, M. Field	R. Oliver	Federal Steam Nav. Co., Ltd.
<i>Golfito</i>	..	GBYL	20.1.54	S. A. Sapsworth	..	J. Grancliff, S. Griffith, W. Young	J. Griffiths	Elders & Fyffes, Ltd.
<i>Gothic</i>	..	MAUQ	22.8.53	Sir D. Aitchison, K.C.V.O.	..	I. K. McIntosh, H. Riding, M. Robinson	W. Roberts	Shaw, Savill & Albion Co., Ltd.
<i>Gracia</i>	..	MANN	18.3.54	J. McInnes	..	N. Eadie, J. Hunter, J. Johnson	W. Duguid	Donaldson Bros. & Black, Ltd.
<i>Grang</i>	..	MFDS	20.5.53	S. Glynn-Woods	..	G. Nish, B. Cawson, D. Owen	E. Taylor	Idwal Williams & Co., Ltd.
<i>Granford</i>	..	MOGC	26.11.53	E. C. J. Morgan	..	H. J. Garrett, J. McAllister, R. Rawlinson	H. Arnold	Goulandris Bros., Ltd.
<i>Great City</i>	..	GBYS	18.3.54	T. S. Dixon	..	D. C. Griffith-Jones, E. A. Ticker, J. Evans	L. Mills	Sir William Reardon Smith & Sons, Ltd.
<i>Haparangi</i>	..	GJYX	26.3.54	D. Chadwick	..	A. W. S. Cripps, S. Bridgeford, B. Gulson, A. Anson	E. Graham	New Zealand Shipping Co., Ltd.
<i>Harpalycus</i>	..	GYNB	27.3.54	J. Wharton, D.S.C., M.B.E.	..	B. O'Sullivan, J. G. Neilson, L. W. Haggren	N. Cockayne	J. & C. Harrison, Ltd.
<i>Hartington</i>	..	GFCZ	27.2.53	G. Jones, M.B.E.	..	J. C. Castle, W. R. Vickers, G. D. Judd	H. T. Hamer	J. & C. Harrison, Ltd.
<i>Hauraki</i>	..	GJLV	11.2.54	H. C. R. Dell	..	A. J. Rawson, L. A. Bowen-West, D. L. Turner, A. Rollinson	C. Robinson	New Zealand Shipping Co., Ltd.
<i>Heitima</i>	..	GKBC	24.2.54	S. Thomson	..	E. S. M. Brown, W. Lloyd, D. S. Evans	L. Curtin	Anglo-Saxon Petroleum Co., Ltd.
<i>Herdman</i>	..	GPZC	9.3.54	T. E. Steele	..	H. C. Arden, C. Penston, O. G. Lynch	J. J. Blake	T. & J. Harrison, Ltd.
<i>Herefordshire</i>	..	GQFG	7.1.54	G. W. Dobson, R.D., R.N.R.	..	J. F. Beckett, J. W. MacKinley, J. W. Hale	A. G. Johnson	Bibby Bros & Co.
<i>Herford</i>	..	GKNW	10.3.54	E. A. Burton	..	J. C. Waller, J. Laidlaw, D. Moran, P. R. B. Manson	T. M. Ready	Federal Steam Nav. Co., Ltd.
<i>Highland Brigade</i>	..	GJKN	22.3.54	J. Smith, R.D., R.N.R.	..	J. T. Jones, H. G. N. Lloyd	T. Desborough	Royal Mail Lines, Ltd.
<i>Highland Chieftain</i>	..	GCTV	20.8.53	W. H. Grimshaw, O.B.E.	..	C. Cowley, A. Whittle, C. Oxborough	W. Rollason	Royal Mail Lines, Ltd.
<i>Highland Monarch</i>	..	GMZF	9.12.53	D. R. Miller	..	F. J. O'Keefe, J. Evans, W. B. Baxter	F. Dunk	Royal Mail Lines, Ltd.
<i>Highland Princess</i>	..	GFMN	15.2.54	S. J. G. Hill	..	P. T. Shephard, P. Campbell, R. Greenall, J. S. Wisden	F. Goodall	Royal Mail Lines, Ltd.
<i>Hilary</i>	..	GQVM	11.7.53	J. H. Stoker	..	R. T. King, G. Calvert, D. J. Taylor	A. Newcombe	Booth S.S. Co., Ltd.
<i>Hildebrand</i>	..	GKTK	20.1.54	J. Whayman, D.S.C., R.D., R.N.R.	..	T. W. McMullan, G. Davis, G. W. Walker	D. Douglas	Booth S.S. Co., Ltd.
<i>Himalaya</i>	..	MCDY	24.11.53	D. G. H. O. Baillie	..	G. B. Thom, I. M. Donkin, J. Rayment, J. Clark, J. M. Bower	J. F. Clark	P. & O. Steam Navigation Co.
<i>Hinakura</i>	..	GDVS	9.3.54	N. L. Warren	..	J. H. Burn, J. D. Hellings, T. W. Lane, S. W. Lambrick	G. Miller	New Zealand Shipping Co., Ltd.
<i>Hororata</i>	..	MANZ	30.12.53	E. H. Hopkins	..	C. Mason, B. Meads, K. Fields, J. Waller	T. Green	New Zealand Shipping Co., Ltd.
<i>Huntingdon</i>	..	GFCT	1.12.53	P. S. Calcutt	..	G. R. Caulfield, J. M. James, O. P. Harrington, B. J. Stephens	A. G. Wallace	Federal Steam Nav. Co., Ltd.
<i>Hurumii</i>	..	GJZF	8.6.53	H. C. R. Dell	..	G. Cauldwell, H. Sladen, D. Gaskell, L. Ewens	A. H. Sandilands	New Zealand Shipping Co., Ltd.
<i>Hyrcania</i>	..	MADE	22.3.54	A. V. Jones	..	J. Wilson, W. J. Knox	D. James	Baltic Trading Co., Ltd.
<i>Imperial Star</i>	..	GIAC	30.1.54	H. N. Clarke	..	C. P. Davy, G. H. Kellock, D. Smaller	A. N. Henderson	Blue Star Line, Ltd.
<i>Inshovien Head</i>	..	MAOC	22.2.54	T. Winstanley	..	S. Thompson, A. Fee, W. Cooper	A. E. Adams	C. Heyn & Sons, Ltd.
<i>Interpreter</i>	..	GPZY	22.5.53	R. A. Lorrain	..	F. Meakin, B. W. Jones, R. F. Hart	J. Watt	T. & J. Harrison, Ltd.
<i>Inverbank</i>	..	GKML	23.7.53	G. E. M. Jenkins	..	D. Bennett, P. N. Etherington, J. Aldiss	D. Murphy	Andrew Weir & Co., Ltd.
<i>Yamataca Producer</i>	..	VPLM	29.11.52	G. E. M. Jenkins	..	I. McKay, T. A. Kidd, T. B. Bird, R. Pearce	E. Brown	Kaye Son & Co., Ltd.

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Jersey City</i> ..	GIGA	17.10.52	T. Dodds ..	S. Gallagher, E. Prior, C. Davidson ..	L. Butcher ..	Sir William Reardon Smith & Sons, Ltd.
<i>Jessmore</i> ..	MAOF	16.3.54	G. Cook ..	S. N. Coe, P. Roberts, D. M. Harper ..	P. Wade ..	Furness Withy & Co., Ltd.
<i>John Hiscoe</i> ..	VPNE	18.6.53	W. Johnston ..	P. Brown, H. Preece, N. Brown ..	R. Lenton ..	Government of the Falkland Islands
<i>John Holt</i> ..	GNFD	10.12.53	W. R. Atkinson ..	R. J. Griffiths, A. D. Farrell, M. G. Benz ..	J. H. Sheary ..	Guinea Gulf Line, Ltd.
<i>Kaikoura</i> ..	GZPZ	11.2.52	N. Frazer ..	C. T. Marchant, J. Hunter ..	J. Laval ..	Trinder Anderson & Co.
<i>Kaipara</i> ..	GZPY	26.11.53	E. J. Ridout ..	J. Lenfestey, A. Smith, —, Bryce ..	— Brown ..	Trinder Anderson & Co.
<i>Kaituna</i> ..	GQGG	4.1.54	J. F. Wood ..	J. F. Munden, T. Wilson, J. Eames ..	P. Wilson ..	Trinder Anderson & Co.
<i>Kentworth Castle</i> ..	MQLP	30.1.54	A. C. M. Black ..	P. M. Bolton, G. Hatcher, E. Bennett, J. Cutcliffe ..	J. S. Godfrey ..	Union Castle Mail S.S. Co., Ltd.
<i>Kent</i> ..	GPDC	19.11.53	P. P. O. Harrison ..	B. Whelan, T. Bennett, H. Rowland, B. Smith ..	T. G. Terrell ..	Federal Steam Nav. Co., Ltd.
<i>Kenuta</i> ..	GCBW	21.10.53	T. J. Naylor ..	W. Washington, G. E. Turner, A. B. Powell ..	J. Murray ..	Pacific Steam Navigation Co.
<i>King Robert</i> ..	MAON	25.11.53	G. Craze ..	M. Whiteley, G. Boyle, J. P. Daniel ..	M. Kenny ..	King Line, Ltd.
<i>King William</i> ..	GNVF	12.12.53	A. C. E. Davies ..	C. M. G. Hunter, G. Russ, D. W. Henderson ..	C. Marsh ..	F. C. Strick & Co., Ltd.
<i>Kohistan</i> ..	GSPZ	30.1.54	A. N. Henderson ..	— Parry, G. Grindrod, K. E. Grodzicki ..	— West ..	Henderson & Co.
<i>Koyan</i> ..	GKST	7.1.54	W. McIntosh ..	R. S. Brown, G. M. Robertson, R. W. Reddie ..	A. N. Gilbert ..	Lampport & Holt Line, Ltd.
<i>Lalande</i> ..	GNFL	9.9.53	I. Byrne, O.B.E. ..	J. C. Egan, J. T. Lowe, C. Rowntree ..	E. Saul ..	Turnbull Martin & Co., Ltd.
<i>Lanarkshire</i> ..	GCTC	27.11.53	R. Lindsay ..	A. D. Haydon, G. Spiller, R. J. Bews, D. Edmons ..	H. Mann ..	Bibby Bros. & Co.
<i>Lancashire</i> ..	GLZC	16.2.54	A. M. Williamson ..	J. W. Walde, D. C. Montieith, D. Hine, R. Pitts ..	C. S. Talbot ..	Houlder Bros. & Co., Ltd.
<i>Langton Grange</i> ..	MAOT	18.2.54	J. R. Faulkner ..	M. H. L. Jenkins, P. Healy, K. Walker ..	J. Brosnan ..	Lampport & Holt Line, Ltd.
<i>Lassell</i> ..	GFND	3.2.54	J. King ..	D. G. Boothroyd, A. Coriotti, E. Minshull ..	G. Robinson ..	Anglo-Saxon Petroleum Co., Ltd.
<i>Latia</i> ..	GLCF	2.10.53	G. C. Hunt ..	A. B. Calvert, A. J. King, W. A. Clark, J. D. Westley ..	P. McBride ..	Donaldson Bros. & Black, Ltd.
<i>Laurentia</i> ..	GNDY	13.3.54	A. Bankier ..	T. Scott, W. F. Joyce, J. McCully ..	D. Murray ..	Andrew Weir & Co., Ltd.
<i>Leverbank</i> ..	GLPZ	30.6.52	A. T. Stansfield ..	F. G. Howard, A. Dorkins, J. Scobbie ..	J. Simpson ..	T. & J. Harrison, Ltd.
<i>Lingvist</i> ..	GQBC	30.1.54	W. Weatherall ..	I. M. Richie, C. S. Hoam, J. Gibson ..	H. Sparkes ..	Ellerman's Wilson Line, Ltd.
<i>Livorno</i> ..	GPWF	4.7.53	W. White ..	A. Telfer, G. Gabrielson, S. Mitchell ..	G. Martin ..	Crest Shipping Co., Ltd.
<i>Lloydcrest</i> ..	MAOY	22.8.53	L. Barwell ..	A. Burrell, J. Beckensale, G. Bridges ..	J. Rowe ..	Royal Mail Lines, Ltd.
<i>Loch Avon</i> ..	GMZI	6.8.53	H. E. Sang ..	G. S. Varney, J. F. Scates, A. Howard-Tripp ..	M. Littlejohn ..	Royal Mail Lines, Ltd.
<i>Loch Garth</i> ..	GMZY	21.12.53	T. W. Stevens, R.D., R.N.R. ..	D. Hatton, P. F. R. Hawkey, A. R. Evans, —, Surridge ..	J. Greenhaugh ..	Royal Mail Lines, Ltd.
<i>Loch Ryan</i> ..	MAOZ	24.3.54	H. V. Todd, R.D., R.N.R. ..	R. L. Collins, J. Cox, C. C. Walker ..	L. Francis ..	London Overseas Freighters, Ltd.
<i>London Pride</i> ..	GKTJ	26.10.53	A. W. Wilson ..	J. A. G. Lewis, G. G. Put, H. C. Colquhoun ..	J. P. Deegan ..	Anglo-Saxon Petroleum Co., Ltd.
<i>Lotorium</i> ..	GBLP	18.3.54	W. S. Atkinson ..	D. Martin, J. Behrsing, I. H. Potts ..	L. Barnett ..	T. & J. Brocklebank, Ltd.
<i>Macharda</i> ..	GKKF	26.2.54	T. C. Eddy ..	J. A. MacLaren, W. E. Kirkbride, R. Main ..	G. Stone ..	T. & J. Brocklebank, Ltd.
<i>Magdagar</i> ..	GBJX	21.12.53	A. Hill, O.B.E. ..	P. Slade, R. E. Roberts, D. A. Keller, F. Blight ..	C. W. Jacobs ..	T. & J. Brocklebank, Ltd.
<i>Mahenada</i> ..	GOFM	19.1.54	H. C. Kinley ..	D. L. Deslandes, W. Coles, A. Davis, J. D. Peers ..	T. Williams ..	T. & J. Brocklebank, Ltd.
<i>Mahout</i> ..	GDZN	18.6.53	W. Gibson ..	G. D. Symonds, J. Lyle, D. M. Wolfenden ..	P. Y. Wright ..	T. & J. Brocklebank, Ltd.
<i>Maister</i> ..	GZSV	18.3.54	A. Bain ..	J. S. Emberton, D. A. M. O'Byrne, I. J. Stewart ..	R. Burton ..	T. & J. Brocklebank, Ltd.

<i>Malsud</i>	..	GSCP	1. 1. 54	L. F. Dodson	..	D. G. Wild, J. Redden, P. Briscoe	..	W. Curry	..	T. & J. Brocklebank, Ltd.
<i>Madhar</i>	..	GSCL	21. 4. 53	I. G. Nuttall	..	R. V. K. Robbins, C. Hicks, T. Heffernan	..	A. Halstead	..	T. & J. Brocklebank, Ltd.
<i>Makaha</i>	..	GOFN	26. 2. 54	H. Simpson	..	J. A. Kerbyson, E. Watkins, G. F. Kay	..	A. Weston	..	T. & J. Brocklebank, Ltd.
<i>Malancha</i>	..	GZRD	23. 9. 53	S. Broughton	..	J. C. Pears, J. Saxty, P. Marsden	..	J. Berry	..	Houlder Bros. & Co., Ltd.
<i>Malmesbury</i>	..	MAQE	12. 1. 54	E. W. Howell	..	J. C. Woodridge, R. Hedger, N. J. Roberts	..	— Huyton	..	Manchester Liners, Ltd.
<i>Manchester City</i>	..	GBBP	29. 10. 53	E. W. Eapley	..	T. Hancock, A. Cookson, — Benacrough	..	W. R. Mildren	..	Manchester Liners, Ltd.
<i>Manchester Explorer</i>	..	GNBK	13. 4. 53	J. L. McLaren	..	G. B. Hannaford, T. H. Lynn, J. Bone	..	A. Broadbent	..	Manchester Liners, Ltd.
<i>Manchester Merchant</i>	..	MGZQ	13. 5. 53	E. W. Raper	..	J. A. Rushworth, D. S. Millard, J. Illingworth	..	J. Buchanan	..	Manchester Liners, Ltd.
<i>Manchester Pioneer</i>	..	GNVG	17. 9. 53	A. Starmier	..	G. R. Clayton, L. Taylor, G. A. Cowell	..	M. Doran	..	Manchester Liners, Ltd.
<i>Manchester Port</i>	..	GYNF	9. 3. 54	M. E. Bewley	..	J. E. Askew, P. A. Litherland, J. Tangeman	..	S. F. Woodward	..	Manchester Liners, Ltd.
<i>Manchester Progress</i>	..	GPGD	2. 3. 54	H. Hancock	..	J. M. Clarke, D. C. Woodall, D. G. Thomas	..	W. B. MacPherson	..	Manchester Liners, Ltd.
<i>Manchester Prospector</i>	..	GQKV	16. 2. 54	F. Lewis	..	H. G. Rowlands, J. E. Jones, G. R. Davies	..	J. Reid	..	Manchester Liners, Ltd.
<i>Manchester Regiment</i>	..	GBRD	23. 10. 53	F. L. Osborne	..	D. Morton, A. H. Varley, P. N. Fielding	..	W. Critchley	..	Manchester Liners, Ltd.
<i>Manchester Shipper</i>	..	MAPC	18. 3. 54	W. Hine, R.D., R.N.R.	..	J. L. McCarnay, L. C. Taylor, P. Cullen	..	P. B. McNab	..	Manchester Liners, Ltd.
<i>Manchester Spinner</i>	..	GNVB	20. 10. 53	F. D. Struss, O.B.E., D.S.C.	..	G. R. Thompson, H. W. Barber, P. Cresswell	..	J. F. Fitzgerald	..	Manchester Liners, Ltd.
<i>Manchester Trader</i>	..	GMWG	11. 2. 54	F. Downing	..	R. H. Wills, C. Gray, J. R. Cooper	..	K. Fawcett	..	T. & J. Brocklebank, Ltd.
<i>Mandator</i>	..	GRNY	6. 1. 54	G. A. Jackson, M.B.E.	..	R. Dover, B. Hodges, P. Macc, R. Daly	..	A. Varmen	..	Elders & Fyffes, Ltd.
<i>Manistee</i>	..	GRXC	3. 2. 54	J. Kingsley, R.D., R.N.R.	..	A. Smith, F. Carr, A. Ingraham	..	G. Williams	..	Andrew Weir & Co., Ltd.
<i>Marabank</i>	..	GCCP	5. 10. 53	I. S. Robertson	..	F. Smith, G. Mitchell, W. J. Hooley	..	D. Howick	..	Ellerman's Wilson Line, Ltd.
<i>Marengo</i>	..	GLFW	16. 3. 54	A. E. Prentice	..	A. Hames, N. Tipple, J. E. Jones	..	D. C. Brown	..	Kaye, Son & Co., Ltd.
<i>Margay</i>	..	GFFO	18. 1. 54	J. B. Newman	..	D. D. Barlow, D. M. Morris, J. S. Munro	..	B. J. Guy	..	T. & J. Brocklebank, Ltd.
<i>Markhor</i>	..	GTFZ	22. 2. 54	H. Fossebrook	..	J. M. Coles, D. Moore, R. Holland	..	J. Manderson	..	Kaye, Son & Co., Ltd.
<i>Maritida</i>	..	GTTG	23. 1. 54	H. Bunn	..	K. Brown, H. Bovil, T. Boyd	..	E. Boyce	..	Shaw, Savill & Albion Co., Ltd.
<i>Marista</i>	..	GNQT	8. 1. 54	R. G. James, R.D., R.N.R.	..	J. P. Miller, J. Talbot, J. F. Mason	..	G. Caddy	..	T. & J. Brocklebank, Ltd.
<i>Mataroa</i>	..	GCSV	27. 1. 53	R. Humble	..	W. J. Milne, O. Pritchard, D. Groves, C. Pennington	..	A. C. Knight	..	Elders & Fyffes, Ltd.
<i>Matheran</i>	..	GOFQ	30. 1. 54	W. J. Dodd	..	R. H. Evans, D. N. Boon, P. H. Morgan, R. B. Freke	..	A. Cannock	..	Cunard Steamship Co., Ltd.
<i>Matina</i>	..	GSZX	14. 9. 53	A. B. Fasting, R.D., R.N.R.	..	R. Jones, A. Leyland, J. P. Martin, P. King	..	F. J. S. Alcock	..	Cunard Steamship Co., Ltd.
<i>Mauretania</i>	..	GTTM	2. 10. 53	F. G. Watts, R.D., R.N.R.	..	T. P. Jones, T. Grindrod, D. McManus, G. D. Thornton	..	F. Evans	..	Blue Star Line, Ltd.
<i>Media</i>	..	GSWR	28. 11. 53	C. Aldridge	..	D. Ormer, D. Murray, R. Taylor	..	D. B. Stewart	..	Federal Steam Nav. Co., Ltd.
<i>Melbourne Star</i>	..	GDFZ	27. 3. 54	N. A. Thomas	..	E. W. D. Reed, P. Jeanes, W. Dan, E. D. Jones	..	N. R. Iden	..	Cable & Wireless, Ltd.
<i>Middlesex</i>	..	MPBK	7. 4. 53	A. J. Gales	..	J. S. Deane, A. Miller, J. H. Killick	..	T. Tilly	..	H.M. Postmaster General
<i>Mirror</i>	..	GDFL	23. 2. 54	I. P. F. Betson	..	I. J. L. Lang, P. V. Flynn, W. Richardson	..	D. N. Todd	..	Frank C. Strick & Co., Ltd.
<i>Monarch</i>	..	GBDF	23. 12. 53	T. H. Farrar, O.B.E.	..	S. L. R. Simpson, F. Bowley, W. Mackenzie	..	F. McGuiness	..	Andrew Weir & Co., Ltd.
<i>Muristan</i>	..	MABB	15. 5. 53	L. F. Holden	..	C. T. Lewis, A. Tavendale, A. Szimczak	..	T. R. Roberts	..	Blue Star Line, Ltd.
<i>Myrtlebank</i>	..	GLQB	9. 3. 54	J. B. Kennedy	..	K. S. Mann, G. C. Jones, B. G. Knights	..	H. Roberts	..	Anglo-Saxon Petroleum Co., Ltd.
<i>Napier Star</i>	..	MAPN	17. 11. 53	J. M. Davidson	..	R. A. Mastin, R. Timmuth, — Blackburn	..	H. Matthews	..	A. Holt & Co.
<i>Natcaina</i>	..	GIGH	7. 1. 54	K. D. Anderson	..	B. A. Hood, D. S. Moreby, M. L. Miller	..	T. Jenkins, M.B.E.	..	Shaw, Savill & Albion Co., Ltd.
<i>Nestor</i>	..	GNZG	10. 2. 54	K. D. G. Fisher	..	J. Dalby, J. H. Yarwood, W. Siddall	..	A. Ewart	..	Charles Hill & Sons, Ltd.
<i>New Australia</i>	..	GZKD	22. 10. 53	F. R. Neil	..	A. N. Couch, G. Rogers, D. A. Braid	..	T. Cahill	..	Blue Star Line, Ltd.
<i>New York City</i>	..	MATR	8. 10. 53	W. H. Bowie	..	A. G. Hickling, J. Hewson, S. Tompsett	..	W. L. Stone	..	Furness Withy & Co., Ltd.
<i>New Zealand Star</i>	..	GYOR	24. 3. 54	C. H. Kenyon	..	W. J. Brown, P. Wayne, R. I. Heys	..	J. Clarke	..	Federal Steam Nav. Co., Ltd.
<i>Newfoundland</i>	..	GNMC	9. 11. 53	E. G. Jones	..	A. Uden, H. Gates, B. H. White	..	W. J. Brock	..	Furness Withy & Co., Ltd.
<i>Nordic</i>	..	GDJC	13. 3. 54	L. W. Fulcher	..	L. Bridges, R. H. Burton, P. Fletcher, R. J. Bass	..	H. Robinson	..	T. & J. Harrison, Ltd.
<i>Nottingham</i>	..	GCNC	24. 10. 53	J. E. Wilson, O.B.E.	..	J. H. Williams, C. Hollinshead, A. R. Smith	..		..
<i>Nova Scotia</i>	..	GNNK	23. 9. 53	R. H. Longster	..	J. F. Adams, R. H. Douglas, D. W. Baxendale	..		..
<i>Novelist</i>	..	GMLG			..		..		..

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Obuasi</i>	GMLQ		R. A. Roberts	—, Oliver, —, Fisher, —, Murphy, —, Logan	R. S. Moss	Elder Dempster Lines, Ltd.
<i>Orari</i>	GJKX	19.11.53	J. R. M. Ramsey	C. S. Single, A. Stokoe, M. Blake, P. Holloway	W. H. Jones	New Zealand Shipping Co., Ltd.
<i>Orcades</i>	MABA	21.10.53	N. W. Smith	E. Picles, V. Webster, J. A. Benjamin	F. Miller	Orient Steam Nav. Co., Ltd.
<i>Oregon Star</i>	MAPH	13.2.54	D. J. Stratta	P. Trehearne, I. Waller, P. Davies	J. Corrigan	Blue Star Line, Ltd.
<i>Orion</i>	GYKL	15.3.54	I. E. G. Goldsworthy, R.D., R.N.R.	R. Mattingley, P. Watts, P. O. Anthony	R. Freeman	Orient Steam Nav. Co., Ltd.
<i>Oronsay</i>	GCNB	11.6.53	A. C. G. Hawker, O.B.E., R.D., R.N.R.	C. Walker, R. D. Cookman, D. Hays	R. Oakley	Orient Steam Nav. Co., Ltd.
<i>Orontes</i>	GBXM	8.10.53	T. L. Shurrock, O.B.E.	K. Wood, J. W. Jackson, M. Champneys, A. J. Field, G. K. Harrison	A. Quinton	Orient Steam Nav. Co., Ltd.
<i>Orsonia</i>	GNDL		N. A. Whinfield	K. E. Howard, M. Champneys, B. D. Campbell, G. Woods	P. Parish	Orient Steam Nav. Co., Ltd.
<i>Otahi</i>	GPBV	23.9.53	A. Hocken	W. A. French, A. Faulkner, E. Leech	R. Heath	Orient Steam Nav. Co., Ltd.
<i>Otranto</i>	GFKV	25.11.53	A. E. Coles, R.D., R.N.R.	E. J. Dilnutt, W. McGuffin, J. Charlesworth	G. Seaton	New Zealand Shipping Co., Ltd.
<i>Pacific Fortune</i>	GBFM	2.12.53	F. H. Perry	S. Barlow, M. I. Brown, T. Monkton	I. R. Thomas	Orient Steam Nav. Co., Ltd.
<i>Pacific Liberty</i>	GDFQ	20.8.53	W. F. Swann	R. Clothier, J. Tye, P. R. Farthing	D. Hall	Furness Withy & Co., Ltd.
<i>Pacific Nomad</i>	GCRZ	17.6.53	R. E. Holland	D. Marton, A. R. Dyason, E. H. Gregson	G. Barling	Furness Withy & Co., Ltd.
<i>Pacific Northwest</i>	GQCP		F. H. Perry	D. Fuller, J. Sims, N. Land, D. M. Lloyd	L. Jennings	Furness Withy & Co., Ltd.
<i>Pacific Reliance</i>	GMIK	20.1.54	P. F. Owens	V. C. Jackson, A. H. Linden, A. Voss	G. Burke	Furness Withy & Co., Ltd.
<i>Pacific Stronghold</i>	GNSQ	20.1.54	A. H. Cooke	P. R. Cable, E. Hall, D. J. Mander	F. O'Shea	Furness Withy & Co., Ltd.
<i>Pacific Unity</i>	GUAN	19.2.54	E. A. Kemp	A. E. B. Chalmers, A. Hodges, J. T. Sheffield	R. Haskayne	Royal Mail Lines, Ltd.
<i>Pacurac</i>	GCNX	2.4.54	J. Purvess	J. Wright, H. G. Penny, G. K. Evans	R. D. Cole	New Zealand Shipping Co., Ltd.
<i>Pampas</i>	GCDL	3.12.53	H. Davies	K. Harper, F. M. Dickinson, D. Smith	M. Hookway	New Zealand Shipping Co., Ltd.
<i>Papamui</i>	GDJW	14.1.54	D. A. G. Dickens, Lt., R.N.R.	J. R. Gair, A. Hibble, W. Nesbit	L. Carter	Royal Mail Lines, Ltd.
<i>Paparua</i>	GBCZ	21.9.53	D. Brittain	G. McCathie, J. Reid, R. A. Wilson	P. Goulden	Blue Star Line, Ltd.
<i>Paraguay</i>	MAOS	26.10.53	W. S. Thomas	J. Connell, C. H. Whightman, D. P. Byrne	I. MacDonald	Royal Mail Lines, Ltd.
<i>Paraguay Star</i>	GTNC	1.4.53	D. R. Macfarlane, D.S.O., O.B.E.	R. H. Jones, I. W. Hay, W. Sturrock	A. Thompson	Royal Mail Lines, Ltd.
<i>Parado</i>	GMNZ	28.9.53	W. Williams	R. J. Balnd, S. D. Gibson, J. T. Duff	G. Soames	P. & O. Steam Navigation Co.
<i>Parina</i>	GCLQ	8.10.53	G. S. Grant, R.D., R.N.R.	I. E. Flood, M. Wardle, M. Thompson	F. Markham	Cunard Steamship Co., Ltd.
<i>Paringa</i>	MMBD	25.11.53	E. J. Kerridge	M. R. Prowse, J. M. Jones, G. I. H. Greaves, P. W. G. Everatt	F. Groves	P. & O. Steam Navigation Co.
<i>Parthia</i>	GSWQ	20.1.54	J. D. Armstrong, D.S.C., R.D., R.N.R.	J. C. Nicholson, W. Smith, M. W. Roberts	J. Pattie	Turnbull Martin & Co., Ltd.
<i>Perim</i>	GCOB	10.11.53	L. Porter	A. F. Petrie, C. B. Thompson, M. W. Thomas	C. N. Dickson	F. Evans
<i>Perthshire</i>	GYWK	15.3.54	T. N. Soane	P. A. Smith, R. A. G. Simmons, I. C. Leung	G. Bartsam	General Steam Nav. Co., Ltd.
<i>Petula</i>	MFQM		F. Evans	C. N. Dickson, R. E. Sharma	W. C. Doyle	T. & J. Harrison, Ltd.
<i>Phiomel</i>	GYPV	27.3.54	H. M. Selmer	A. J. Allan, J. Everitt, J. Flett	P. McHugh	Royal Mail Lines, Ltd.
<i>Philosopher</i>	MAOV	27.8.53	C. C. Heaton	G. Smith, —, Cowley, R. Patmore	A. MacInnes	New Zealand Shipping Co., Ltd.
<i>Pilcomayo</i>	GBZX	27.10.53	F. A. C. Thacker	R. J. Turner, P. C. Davies, J. Arnott		
<i>Pipitiki</i>	GDRQ	16.10.53	K. Barnett, R.D., R.N.R.	P. Moulton, W. Sewell, A. Britain, G. Hudson		

<i>Polar Maid</i> ..	MAOX	20.4.53	W. Spence ..	J. B. Kerr, D. McLean, P. Forsyth	J. Williams ..	Chr. Salvesen & Co.
<i>Port Adelaide</i> ..	MCCG	8.12.53	C. R. Townshend ..	C. A. Hann, C. Milne, M. Armstrong	O. Livermore ..	Port Line, Ltd.
<i>Port Auckland</i> ..	GWRB	21.11.53	J. G. Lewis, O.B.E.	E. E. Chapman, W. V. Lusted, B. Collier	J. Skinner ..	Port Line, Ltd.
<i>Port Brisbane</i> ..	GWRC	26.3.54	F. W. Bailey, M.B.E.	K. W. Jayne, A. D. Braithwaite, G. Ballinger	..	..
<i>Port Hobart</i> ..	GKGC	8.10.53	P. S. Ball ..	J. F. Lester, G. Ballinger, J. Leschery	D. Don ..	Port Line, Ltd.
<i>Port Jackson</i> ..	GZKR	2.2.54	G. G. Langford ..	E. E. Willis, J. A. Newbury, G. R. Cooke	P. Byrnes ..	Port Line, Ltd.
<i>Port Lincoln</i> ..	GFZK	24.3.54	J. L. Porter ..	P. R. Jones, T. Stowell, J. Farmer	G. Sharmar ..	Port Line, Ltd.
<i>Port Macquarie</i> ..	MAQY	21.12.53	L. J. Skalles ..	C. Armstrong, K. Nichol, B. C. Crabb	G. Roberts ..	Port Line, Ltd.
<i>Port Napier</i> ..	GPKD	9.2.54	D. G. H. Bradley ..	G. L. Danton, A. D. James, L. J. Brown	W. H. Pettitt ..	Port Line, Ltd.
<i>Port Phillip</i> ..	MAOZ	24.10.53	L. Copeland ..	J. Sharp, J. F. O'Dowd, R. Finch	T. Hargraves ..	Port Line, Ltd.
<i>Port Pirie</i> ..	GLVQ	24.9.53	P. H. Pedrick ..	D. Burgess, R. McKee, M. Twomey, — Dingle	B. McGovern ..	Port Line, Ltd.
<i>Port Townsville</i> ..	MGCV	22.3.54	E. W. R. Young ..	R. C. W. Marr, J. R. King, J. P. Hatchley	W. Sharkey ..	Port Line, Ltd.
<i>Port Victor</i> ..	MSWK	23.1.54	E. T. N. Lawrey ..	W. Duthie, E. Stewart, P. J. Hannan	P. Byrne ..	Port Line, Ltd.
<i>Port Vindex</i> ..	MAUW	28.12.53	E. E. Roswell ..	A. J. Starke, K. W. Allen, J. C. Naylor	D. McNeil ..	Port Line, Ltd.
<i>Port Wellington</i> ..	GDNJ	13.11.53	E. J. Syvret ..	D. Clarke, A. J. Hawkins, G. G. Mooney, T. Woodfield	R. Crompton ..	Port Line, Ltd.
<i>Port Wyndham</i> ..	GYCW	7.1.54	D. F. Morgan ..	R. G. Forbes, C. P. Williams, W. Young, A. Wardell	J. B. French ..	Port Line, Ltd.
<i>Potaro</i> ..	GNLJ	26.2.54	W. Tennent ..	J. P. L. Thornhill, J. Postill, D. H. McCree	J. N. Coutts ..	Port Line, Ltd.
<i>Powell</i> ..	GKJL	31.7.53	D. Cornwell ..	J. S. Hepinstall, — Baker	F. Lawrence ..	Royal Mail Lines, Ltd.
<i>Pretoria Castle</i> ..	GOAE	30.3.54	G. H. Mayhew ..	J. B. Langley, G. Dodds, M. Llewellyn	A. G. Cope ..	Hector Whaling, Ltd.
<i>Princess Waimai</i> ..	OJNS	..	Dr. B. M. Cwilong ..	D. Mulville, J. Gizowski	J. Gilbert ..	Union Castle Mail S.S. Co., Ltd.
<i>Prospector</i> ..	GJMS	27.6.53	H. T. Wells ..	R. Maycox, A. Creer, G. L. Beecroft	P. G. Weston ..	Dr. B. M. Cwilong
<i>Radley</i> ..	GZZG	16.11.53	H. W. White, O.B.E.	N. F. Lloyd, H. Blair, T. A. Gill	A. Wilkinson ..	T. & J. Harrison, Ltd.
<i>Rakata</i> ..	GFGW	7.10.53	C. J. Cordran, R.D., R.N.R.	J. Hannah, M. Heron, I. Christall, J. Evans	P. Broome ..	Stephens, Sutton, Ltd.
<i>Ramore Head</i> ..	MAXX	15.6.53	R. A. Ferguson ..	D. Graig, E. G. Davey, R. Harris	F. Murrant ..	New Zealand Shipping Co., Ltd.
<i>Rangitane</i> ..	GDBV	3.12.53	T. L. Maltby ..	D. Burdett, J. Newing, D. Cooper, P. Egan	E. Saunders ..	G. Heyn & Sons, Ltd.
<i>Rangitata</i> ..	GSZN	28.11.53	G. Kinnell, O.B.E.	J. Masson, G. Pool, F. Green, P. Bower, D. Webster	J. Grant ..	New Zealand Shipping Co., Ltd.
<i>Rangitiki</i> ..	GSXW	15.2.54	R. G. Rees ..	A. J. Young, N. D. Selwood, R. Michael, I. Excell	D. Charter ..	New Zealand Shipping Co., Ltd.
<i>Rangitoto</i> ..	GLMV	23.2.54	C. R. Pilcher, O.B.E.	A. Finch, P. Lay, K. Mayhew, B. Anstey	G. A. Parker ..	New Zealand Shipping Co., Ltd.
<i>Rathlin Head</i> ..	GRDB	16.3.54	M. Kennedy ..	R. J. Crawford, C. E. Pringle, J. Craig	E. Heywood ..	G. Heyn & Sons, Ltd.
<i>Regent Hawk</i> ..	GMND	13.11.53	R. Armstrong ..	H. R. Swift, T. M. Hemmingway, L. W. Walker	R. W. Jones ..	Regent Petroleum Tankship Co., Ltd.
<i>Reina del Pacifico</i> ..	GMPS	23.10.53	J. Whitehouse ..	R. T. Riley, R. Potts, A. Maclean, — Wilkinson	J. Butler ..	Pacific Steam Navigation Co.
<i>Retriever</i> ..	MRYW	..	C. C. R. Evans ..	W. T. Goodall, G. H. C. Reynolds, K. Matheson, J. K. Cook	J. Grant ..	Cable & Wireless, Ltd.
<i>Rhoads</i> ..	GQNC	3.11.53	J. Burns ..	G. Leith, J. C. Pratt, C. Dale	M. H. Mann ..	Bolton Steam Shipping Co., Ltd.
<i>Rhodesta Star</i> ..	GUAX	8.6.53	F. Hambridge ..	J. Hutton, P. Thornton, J. Jenkins	W. Roe ..	Blue Star Line, Ltd.
<i>Ritatio</i> ..	GBLV	10.12.53	H. Greenhill ..	A. M. England, J. A. Pettinger, R. Cudbertson	C. V. Child ..	Ellerman's Wilson Line, Ltd.
<i>Richmond Castle</i> ..	GCSP	13.4.53	A. E. F. Payne ..	P. Eckford, R. K. Highley, I. Francis	— Burnett ..	Union Castle Mail S.S. Co., Ltd.
<i>Ripplingham Grange</i> ..	GIGP	13.3.54	R. Owen ..	G. Spong, C. Whiteley, P. Hector	J. Waddell ..	Houlder Bros. & Co., Ltd.
<i>Rochester Castle</i> ..	GZQF	24.2.54	D. W. Sowden, R.D., R.N.R.	P. M. Pollard, J. Mattocks, D. A. Bird	A. J. Smith ..	Union Castle Mail S.S. Co., Ltd.
<i>Roanagh Head</i> ..	GNTN	25.3.54	E. W. Black, O.B.E.	T. M. Hamill, A. F. James, F. Best	B. P. Lewis ..	G. Heyn & Sons, Ltd.
<i>Roslin Castle</i> ..	GYJZ	25.2.53	C. E. Lorrains ..	E. Hull, R. Fancourt, I. McPherson	G. Rowlinson ..	Union Castle Mail S.S. Co., Ltd.
<i>Roxburgh Castle</i> ..	GDFI	4.2.54	J. P. Aplin ..	J. M. Archbold, J. Jones, K. Williams	G. Hilton ..	Union Castle Mail S.S. Co., Ltd.
<i>Royal Star</i> ..	GBGS	18.7.52	W. Swift ..	D. Arnold, J. Pascoe, J. M. Archbold	J. Welsh ..	Union Castle Mail S.S. Co., Ltd.
<i>Rutahine</i> ..	MARI	15.3.54	A. H. Dare ..	M. G. Tonkin, D. Mallinger	J. Stewart ..	Blue Star Line, Ltd.
	GKSY	28.12.53	B. Evans ..	J. B. Evans, J. F. J. Mason, B. Whybrow, D. Thomas	J. Heath ..	New Zealand Shipping Co., Ltd.

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Runic</i>	GGCS	22.9.53	S. Sendall	F. P. Attwood, J. Wyles, W. Hutchison, K. F. Brown	A. McMurray	Shaw, Savill & Albion Co., Ltd.
<i>Sacramento</i>	GKCN	18.3.54	J. Robinson, M.B.E.	G. F. Reed, E. R. Baker, T. Fugill	H. L. Hall	Ellerman's Wilson Line, Ltd.
<i>Salamanca</i>	GLSG	22.12.53	P. L. Hockey	E. J. Pepper, G. R. Dewsnap, R. B. Bryant	B. E. Bewley	Pacific Steam Nav. Co.
<i>Salaverry</i>	GBLQ	5.11.53	A. Lyall	A. C. Gordon, D. I. Jones, T. Wilcockson	A. T. Shawcross	Pacific Steam Nav. Co.
<i>Salinas</i>	GLLK	22.1.54	D. W. Hutchison	G. McC. Hunter, R. K. Thomas, P. Whittaker	H. Roderick	Pacific Steam Nav. Co.
<i>Salween</i>	GFFN	25.2.54	H. V. V. Poole	T. F. Fields, J. A. Morgan, H. McNaught, R. Larsen	J. Brown	P. Henderson & Co.
<i>Samanco</i>	MARQ	20.1.54	P. H. Ray	H. T. Cunliffe, R. G. Pass, P. Duguid	H. Smith	Pacific Steam Nav. Co.
<i>Samaria</i>	GJCF	18.3.54	W. T. Fitzgerald, R.D., R.N.R.	N. M. Douglass, N. B. Cox, M. Sheppard	E. Bishop	Cunard Steamship Co., Ltd.
<i>San Adolfo</i>	GYKK	7.4.54	I. H. Gay	E. Kemp, T. Bowlerwell, J. F. Buck	C. Maguire	Eagle Oil & Shipping Co., Ltd.
<i>San Cirilo</i>	GZMR	18.3.54	E. J. Osbourne	J. D. Bary, W. Richardson, M. J. Weston	C. O'Keefe	Eagle Oil & Shipping Co., Ltd.
<i>San Felix</i>	GFJZ	6.11.52	A. P. Shaw	B. V. Orange, R. Auric, J. Batey	A. McGillivray	Eagle Oil & Shipping Co., Ltd.
<i>San Velino</i>	GCNY	16.11.53	L. Mays	G. I. Hughes, T. J. Magee, P. Kirton	P. Scanlan	Eagle Oil & Shipping Co., Ltd.
<i>San Veronica</i>	MASQ	29.10.53	C. Summers	K. Bramley, I. N. Cocker, P. Hay-Smith	P. M. Mately	Eagle Oil & Shipping Co., Ltd.
<i>San Vulfrano</i>	MASR	25.3.54	H. W. Fortnam	I. F. Boon, F. D. Smith, D. J. Powell	M. N. Hynes	Eagle Oil & Shipping Co., Ltd.
<i>Sansu</i>	GOQN	16.1.54	J. A. Cleator	R. L. Black, S. M. Gardner, A. Morton	J. Barrie	Elder Dempster Lines, Ltd.
<i>Santander</i>	GBNR	22.12.53	G. H. Rice	W. J. Campbell, A. Lang, D. Houghton	W. Williams	Pacific Steam Nav. Co.
<i>Sarmento</i>	MARW	18.3.54	J. Williams	F. Nuttall, C. Taylor, W. Jenkins	M. O'Regan	Pacific Steam Nav. Co.
<i>Saxon Star</i>	MARX	13.1.54	R. J. C. McDonald	J. King, E. Dyer, J. Calabrese	S. Gordon	Blue Star Line, Ltd.
<i>Scythia</i>	GDYP	9.3.54	D. M. Mactellar, R.D., R.N.R.	J. Nicholson, T. Ridley, J. B. Clemenson, — Swinerton	S. W. Brown	Cunard Steamship Co., Ltd.
<i>Selector</i>	MARZ	10.3.54	R. L. Williams	G. B. Stock, J. A. Edwards, E. Ashdown	C. O'Callaghan	T. & J. Harrison, Ltd.
<i>Settler</i>	GTFX	26.10.53	R. F. Phillips	R. J. Turnbull, F. J. Bowley, I. Mitchell	B. W. Evans	T. & J. Harrison, Ltd.
<i>Shielbank</i>	GDPZ	28.9.53	D. A. Reid	G. A. D. Govan, D. Campbell, S. F. Bowditch	W. H. Edginton	Andrew Weir & Co., Ltd.
<i>Silveroak</i>	GCQR	16.1.54	I. H. Leask	M. H. F. Smith, M. J. Perry, P. Seymore	E. Connolly	Silver Line, Ltd.
<i>Sneaton</i>	GDBS	16.1.54	W. Armstrong	E. Wilson, M. Turton, W. R. Atkinson	J. Nicholson	Headlam & Son
<i>Socotra</i>	MASC	26.3.54	L. H. Howard, R.D., R.N.R.	P. Hayward, C. J. S. Morris, R.N.R., D. M. Reynolds	R. Mathew	P. & O. Steam Nav. Co.
<i>Somerset</i>	GJMN	2.4.54	W. J. T. Stevens	R. Holdsworth, D. Swyres, D. Fanthum	T. Mason	Federal Steam Nav. Co., Ltd.
<i>South Africa Star</i>	GUAU	23.2.54	R. M. T. Jones	T. V. Anderson, F. P. McGuckin, E. J. T. Boorne	A. Sibbald	Blue Star Line, Ltd.
<i>Southern Atlantic</i>	GBLY	7.7.53	J. O. Bowie	J. Sinclair, D. A. Watt, D. Frejzendorf	P. Curson	Chr. Salvesen & Co.
<i>Southern Collins</i>	MASE	7.5.53	J. W. Ross	S. McGillivray, S. Sutherland, A. Smith, W. Sinclair	J. Johnson	Chr. Salvesen & Co.
<i>Southern Garden</i>	MASF	5.5.53	W. I. Swanson	A. Anderson, M. Scott, H. Solesburg, J. Kerr	J. Christie	Chr. Salvesen & Co.
<i>Southern Harvester</i>	GFZJ	5.5.53	T. Strandskog	J. Thomson, J. Maclean, R. Glasgow	A. Turnbull	Chr. Salvesen & Co.
<i>Southern Opal</i>	MASG	20.5.53	A. F. Baikie	F. J. Hanson, A. Haikness, J. Holtan	C. Houston	Chr. Salvesen & Co.
<i>Southern Venture</i>	GNNM	14.5.53	H. Myhre	R. M. Johnston, J. Pawlowicz, S. R. Richards	J. MacMorran	Chr. Salvesen & Co.
<i>Sovac</i>	GDDV	26.3.53	H. W. Wilcox	W. Tinkler, W. E. Hinde, J. Johnson	R. M. Hughes	Stanfuel Supply Co.
<i>Specialist</i>	GCTF	9.12.53	D. Wolstenholme	J. Reid	F. Hickey	T. & J. Harrison, Ltd.
<i>Springfiord</i>	GOKQ	18.1.49	T. R. Mackie	J. A. Kelway, H. Burgess, P. Daley	A. Guy	Springwell Shipping Co., Ltd.
<i>Stirling Castle</i>	GYPX	23.1.54	J. F. Oakley		W. Brown	Union Castle Mail S.S. Co., Ltd.

<i>Stirlingshire</i>	GCQD	2.12.53	E. W. Jenkins	..	E. Prothero, W. A. Cuthill, C. D. de F. Hedges	N. J. Braddon	Turnbull Martin & Co., Ltd.
<i>Strathaird</i>	GRSX	24.3.54	H. A. Mallett	..	K. W. Farr, J. C. Jenkins, C. J. Latham, R. A. Peters	H. A. M. Jardine	P. & O. Steam Nav. Co.
<i>Stratheden</i>	GDGT	26.2.54	R. G. Freeman	..	A. Barrett, D. E. Aikman, G. E. Harris	A. Horne	P. & O. Steam Nav. Co.
<i>Strathmore</i>	GYMS	10.2.54	C. F. Halliday	..	D. O. Williams, J. M. S. Beaumont, T. C. Tilden-Smith, A. Barnett	J. P. Carey	P. & O. Steam Nav. Co.
<i>Strathnaver</i>	GRPZ	12.3.53	C. E. Pollitt	..	D. J. Knight, D. Upton, J. Woollien	W. Miller	P. & O. Steam Nav. Co.
<i>Struan</i>	MASI	28.5.53	W. Scott	..	J. Clark, J. Lough, J. D. Pollack	J. Edmund	Chr. Salvesen & Co.
<i>Sunrover</i>	MSLB	25.7.53	A. MacLellan	..	T. Horne, J. Boyter, D. McBain, M. Birchall	J. Davison	Clunies Shipping Co., Ltd.
<i>Suffolk</i>	GOQS	6.6.53	R. Dell	..	J. Nocton, P. Field, D. Mitchell	H. Hate	Federal Steam Nav. Co., Ltd.
<i>Sussex</i>	MAEF	4.2.53	F. Loughheed	..	B. A. Smith, J. Wittchell, D. Crabtree, J. Newsham	L. Carter	Federal Steam Nav. Co., Ltd.
<i>Sussex Trader</i>	GNQC	2.3.54	H. Young	..	T. E. Thistleton, H. P. Ellison, B. Molinowski	G. S. Davies	Trader Navigation Co., Ltd.
<i>Sydney Star</i>	MKSM	23.1.54	G. L. Evans	..	F. E. Thomas, G. Stanley, G. M. Pearson	W. A. Wade	Blue Star Line, Ltd.
<i>Tabaristan</i>	GZDR	24.10.53	W. J. Ellis	..	W. T. W. Rutherford, G. L. Andrews, R. Goudie	H. J. Roberts	Frank C. Strick & Co., Ltd.
<i>Tagelus</i>	GBMG	2.2.54	T. W. Green	..	D. H. White, E. R. Phillips, A. F. Morrison	P. Brennan	Anglo-Saxon Petroleum Co., Ltd.
<i>Tamaroa</i>	GFWX	5.4.54	T. H. Davies	..	W. W. Newport, E. Greenhaigh, I. P. N. Cameron, —, Hayes	D. MacCrae	Shaw, Savill & Albion Co., Ltd.
<i>Tamele</i>	GCBF	3.2.54	I. McNaie	..	R. S. Elliott, —, McKean, E. Wild	A. Allen	Elder Dempster Lines, Ltd.
<i>Tarkua</i>	MASU	22.5.53	W. Rowlands	..	J. Sanderson, D. Howe, —, Christie, —, Calway	V. R. Ferrand	Blue Star Line, Ltd.
<i>Tasmania Star</i>	GKPC	16.12.53	T. F. Macdonald, O.B.E.	..	K. Kelly, I. Haldane, R. Bayley	W. T. Elliott	Ellerman's Wilson Line, Ltd.
<i>Tasso</i>	GLMR	11.6.53	H. Hill	..	J. Mitchell, G. Gash, J. Wetherstone	W. Gleaser	Anglo-Saxon Petroleum Co., Ltd.
<i>Tectus</i>	GBMJ	5.10.53	N. Clarke	..	C. V. Robson, D. C. Hamlin, E. K. Donnelly	B. Richards	Anglo-Saxon Petroleum Co., Ltd.
<i>Tekeo</i>	GIFO	30.12.53	I. Budgett	..	A. Mash, J. Milner, B. Pusey	D. Brandham	New Zealand Shipping Co., Ltd.
<i>Telemachus</i>	GBLB	6.1.54	W. J. Moore, D.S.C., R.D., R.N.R.	..	N. H. F. Welden, P. Hopper, J. Jones	J. C. Noble	A. Holt & Co.
<i>Temple Mead</i>	MAHZ	16.12.53	R. W. Chislett	..	A. M. Brockwell, D. J. P. Weate, H. S. Beste	D. Keating	Lambert Bros., Ltd.
<i>Tenagodus</i>	GDLZ	22.2.54	R. F. Garrod	..	F. I. Bodger, J. F. Gristwood, E. D. Nicholson	E. Hutchinson	Anglo-Saxon Petroleum Co., Ltd.
<i>Teutot</i>	MASX	11.12.53	G. B. Medlycott	..	T. Milner, W. M. Wheatley, A. E. Crebbin	G. Talbot	Royal Mail Lines, Ltd.
<i>Thalamus</i>	GDSV	23.3.54	R. Chandler, M.B.E.	..	E. W. Hughes, M. Fraser, P. J. Cornish	E. Makin	Anglo-Saxon Petroleum Co., Ltd.
<i>Theliconus</i>	GBMT	14.12.53	G. N. Jenkins	..	S. F. Darroch, W. I. Simpson, H. F. Woolston	R. Eastes	Anglo-Saxon Petroleum Co., Ltd.
<i>Thule</i>	GCBL	13.5.53	S. Anderson	..	S. Farmer, R. Dovik	E. Bergan	Hector Whaling, Ltd.
<i>Timaru Star</i>	GKKM	21.1.54	H. W. McNeil	..	T. E. Harris, W. Pitcher, D. Sinclair, J. Maidment	G. Sangster	Blue Star Line, Ltd.
<i>Tinto</i>	GBYT	31.3.53	S. H. Bennett, M.B.E.	..	J. Collard, C. R. Tully, D. M. Smee	G. S. Dunn	Ellerman's Wilson Line, Ltd.
<i>Tongarivo</i>	GLFZ	11.2.53	J. D. Guyler	..	R. Lovridge, M. Forcer	G. S. James	New Zealand Shipping Co., Ltd.
<i>Torr Head</i>	GZPW	4.12.53	S. J. Stark	..	E. McIntosh, E. L. Seaton, R. Hunt	I. McKinnon	G. Heyn & Sons, Ltd.
<i>Tregenna</i>	GBPM	12.11.53	C. Lloyd Collings, O.B.E.	..	C. Spence, A. Millar, W. R. Elliot	G. Stocks	Hain S.S. Co., Ltd.
<i>Treleuan</i>	GBPQ	12.1.54	J. Cornish	..	A. Downs, H. Ray, —, Manby	S. M. Cregg	Hain S.S. Co., Ltd.
<i>Trelvon</i>	GBPP	5.1.54	T. Evans	..	L. Edwards, W. Carmichael	P. V. Cagney	Hain S.S. Co., Ltd.
<i>Treaylor</i>	GCKG	22.12.53	L. J. White	..	V. Wise, J. Healy, D. Cullum	S. Coldray	Hain S.S. Co., Ltd.
<i>Trevider</i>	MATG	27.2.54	F. G. Bolton	..	D. A. Lord, E. Spencer-Payne, J. Cayzer	P. Kennedy	Hain S.S. Co., Ltd.
<i>Tribesman</i>	GBNZ	24.11.53	W. P. Baker	..	E. Williams, D. Bloom, P. Moore	H. L. McKean	Anglo-Saxon Petroleum Co., Ltd.
<i>Tribulus</i>	GFJS	24.11.53	G. Robson	..	B. J. Vallette, P. G. Marking, E. L. Petherbridge	A. B. Miller	Shell Tanker, Ltd.
<i>Trochiscus</i>	GFKB	22.3.54	J. R. Petrie	..	J. M. Clouting, P. A. Thompson, E. Roberts, F. Botham		

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Tweed</i>	GBRP	9.2.54	T. Finch	R. I. Howlett, R. Box, G. S. Bonnar	W. Vaughan	Royal Mail Lines, Ltd.
<i>Twickenham</i>	GNDC	12.1.54	I. W. Jackson	A. E. Brown, S. E. Hooper, I. S. Murchison	J. P. Goddard	Watts, Watts & Co., Ltd.
<i>Umtali</i>	GYWB	10.8.53	F. E. J. O'Hea	W. Gibson, J. G. Jenn, J. H. Burcher	P. Hewett	Bullard, King & Co., Ltd.
<i>Umtata</i>	GDOF	30.12.53	D. L. Weston	R. Paterson, G. M. Cozens, J. Szablowski	S. Molloy	Bullard, King & Co., Ltd.
<i>Umsinto</i>	GIFQ	30.11.53	R. Harber	J. G. Campbell, J. H. Palmer, J. Aldous, J. E. Bicknell	C. V. James	Bullard, King & Co., Ltd.
<i>Vandalia</i>	GCRO	11.2.54	G. S. Evans	H. Dormer, A. D. Hunt, G. B. Bowyer	G. Stacey	Cunard Steamship Co., Ltd.
<i>Vardulia</i>	GCFW	30.10.53	A. N. Sargent, O.B.E., R.D., R.N.R.	D. Rostron, F. M. Diggle, — Given	M. Morris	Cunard Steamship Co., Ltd.
<i>Velletia</i>	MGGD	16.2.54	J. Thornton	H. H. Ward, R. Boyles, A. C. Macmillan	N. Abbott	Anglo-Saxon Petroleum Co., Ltd.
<i>Vestra</i>	MNMB	18.6.53	D. S. Archibald	H. M. Third, D. C. White, H. C. Cuner	D. C. White	I. T. Salvesen & Co.
<i>Volo</i>	GPCJ	30.3.53	A. Morrell	E. M. Jordan, H. Tognola, G. Wilkinson	— Halpin	Ellerman & Wilson Line, Ltd.
<i>Waipawa</i>	GWXQ	24.3.54	J. L. Stobbs, R.D., R.N.R.	R. J. McVittie, F. Sangster, C. Borthwick	J. Houghney	Shaw, Savill & Albion Co., Ltd.
<i>Warangi</i>	MATX	30.1.54	V. Vizer	I. S. McEwan, M. J. England, F. Snaith, A. M. McDougall	J. R. Hinds	Shaw, Savill & Albion Co., Ltd.
<i>Watoera</i>	GBJB	30.1.54	R. Grant	D. S. Knight, G. Main, B. Agnew	J. Downie	Shaw, Savill & Albion Co., Ltd.
<i>Waleis Bay</i>	GKBZ	4.8.53	R. E. Kenton	W. K. West, F. Davidson, I. MacLachlan	H. Wilson	Sir R. Ropner & Co., Ltd.
<i>Wanstead</i>	GFLS	28.7.53	J. D. Mackenzie	M. F. Diggins, J. Coogans, H. Anderson	K. F. Lax	Watts, Watts & Co., Ltd.
<i>Warkeworth</i>	MALF	17.9.53	N. Thompson, M.B.E.	H. Guntton, G. B. Bill, C. Harrow	G. B. Holyoake	R. S. Dalglish
<i>Warwick Castle</i>	GRRJ	25.10.52	L. H. Farrow	J. E. Rawlins, A. A. Freer, D. P. Beckett, J. A. George	R. C. Cullen	Union-Castle Mail S.S. Co., Ltd.
<i>Wendover</i>	GFML	14.11.53	W. Donald	J. Shearer, D. J. Vincent, J. Mudd, W. Bird	N. Ridley	Watts, Watts & Co., Ltd.
<i>Winchester Castle</i>	GTPZ	16.1.54	G. W. B. Lloyd	E. J. Harding, E. Mason, M. A. Bowyer	R. Brew	Union-Castle Mail S.S. Co., Ltd.
<i>Windson</i>	GPQG	15.12.53	D. V. Cameron	E. Pearce, A. Priestley, J. S. Murchison	R. Hands	Watts, Watts & Co., Ltd.
<i>Woodford</i>	GFMM	13.4.53	A. J. Cox	J. Whyte, R. Beaumont, J. Cormack	D. Carr	Bibby Bros. & Co.
<i>Worcestershire</i>	GFZM	24.3.54	F. C. Brooks	R. Weir, R. M. Bessant, G. W. Waugh	A. Jones	Bibby Bros. & Co.
<i>Yonta</i>	GLPN	10.3.54	S. Thomson	S. B. Hamilton, M. Szeperawicz, J. Brown	W. Allen	P. Henderson & Co.

Supplementary Ships

NAME OF VESSEL	CALL SIGN	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNERS/MANAGERS
<i>Alert</i> ..	GCBM	5.9.53	R. H. J. Wallis	R. M. Tuckwell, D. Cussor, O. A. Alford	W. Morrison	H.M. Postmaster General
<i>Ariel</i> ..	GMDY	28.10.53	C. M. G. Evans, M.B.E.	E. J. Evans, F. Gernett, —, Childs	—, Cunningham	H.M. Postmaster General
<i>Ballerby</i> ..	MOJF	15.1.54	J. McVean ..	A. G. Garland, A. Mitchell, A. W. Blackie	S. Kiernan ..	Ropner Shipping Co., Ltd.
<i>Blatirova</i> ..	GLLG			J. E. Halliday, P. McAlister, L. M. Henderson	E. Yard ..	Geo. Nisbet & Co.
<i>Cape Breton</i> ..	GLXG	2.2.53	J. Smith ..	—, Miller, W. R. Pilling, A. D. Chappell	V. Dalton ..	C. T. Bowring & Co., Ltd.
<i>Cape Howe</i> ..	GQYP	9.5.53	C. M. Mortimer ..	T. R. Baker, W. J. Clarke, M. Symon	J. McDonald	Lyle Shipping Co., Ltd.
<i>Circassia</i> ..	GZMD	28.9.53	J. McG. Brown ..	J. Ballantyne, A. McKendrick, R. L. Crawford, D. B. Watt	C. J. Ritchie	Anchor Line, Ltd.
<i>Clan Alpine</i> ..	GIFF	22.3.54	J. W. Charles-Aukland ..	O. T. Ross, M. P. R. Turner, R. W. I. Kenyon	R. G. Davies	Cayzer Irvine & Co., Ltd.
<i>Clan Lamont</i> ..	GTTD	27.3.54	J. E. Townrow ..	S. St. C. Shaw, N. F. Stewart, D. C. Steele, R. W. Bathgate	D. Munroe ..	Cayzer Irvine & Co., Ltd.
<i>Clan MacBrayne</i> ..	MAQA	9.4.53	J. P. Dunphy ..	G. W. Wilson, D. L. Muir, G. S. Gowans	W. Noonan ..	Shaw, Savill & Albion Co., Ltd.
<i>Coptic</i> ..	GSND	22.3.54	A. E. Smith, R.D., R.N.R.	C. A. Brodie, D. Campbelljohn, T. S. Hayward, A. Pugh	E. G. McKay	Walter Runciman & Co., Ltd.
<i>Dartmoor</i> ..	GFOT	22.3.54	J. O. Roberts ..	D. Allen, R. B. Crosby, D. Wilson	J. Phillips ..	Sir William Reardon Smith & Sons, Ltd.
<i>Devon City</i> ..	MBKL	14.12.53	S. Leebetter ..	D. Jones, A. Passmore, D. Baker	D. W. Ayliffe	Sir William Reardon Smith & Sons, Ltd.
<i>Eastern City</i> ..	GBRB	26.2.54	G. Harvey ..	W. D. Jones, A. H. Davies, T. C. Rooney	D. Button ..	Cable & Wireless, Ltd.
<i>Edward Wilshaw</i> ..	MBMP	3.2.54	H. Milne ..	R. Riddle, J. Reilly, J. Orr	J. Reardon ..	British India Steam Nav. Co., Ltd.
<i>Empire Trooper</i> ..	GLXJ	28.12.53	R. H. A. Bond, O.B.E.	H. Maude, F. Everett, D. Calvert, F. G. Hill	J. Sherston ..	Counties Ship Management Co., Ltd.
<i>Fry Hill</i> ..	MAKS		J. Campbell ..	J. Naisbitt, G. Morgan, C. Dalziel	J. Nisbet	Currie Line, Ltd.
<i>Greenland</i> ..	GCLJ	6.2.53	J. Milligan ..	—, Ross, G. Buist, J. Duguid	G. Rushon ..	J. & C. Harrison & Co., Ltd.
<i>Harpaton</i> ..	GFFX	13.5.53	A. R. Phelps ..	C. C. McCarthy, F. G. B. Pannett, A. P. Joel, R. Dwyer	N. Burnitt	West Hartlepool Steam Nav. Co.
<i>Hendonhall</i> ..	GRTX	23.2.54	H. W. Smith ..	J. Prefect, M. Proctor, J. Gay	D. Loyle ..	Hudson S.S. Co., Ltd.
<i>Hestons</i> ..	GUGJ	6.8.53	F. H. Thornton ..	P. M. Gouger, D. Sheppard, —, Lindsay	—, Francis	Hudson S.S. Co., Ltd.
<i>Hudson Deep</i> ..	MPCR	16.4.53	J. Gibbons, D.S.C.	M. Colquitt, K. R. Mackenzie, G. E. Nash	P. McGowan	Currie Line, Ltd.
<i>Hudson Firth</i> ..	GDKM		E. W. Pybus ..	M. R. Uminski, L. Thompson, K. W. Keithley	R. Ford	W. Runciman & Co., Ltd.
<i>Iceland</i> ..	GFFT	1.8.52	J. Hawk-Shaw ..	A. Smith, —, Piper, T. Archibald, D. Foster	J. E. Unsworth	British India Steam Nav. Co., Ltd.
<i>Kirriemoor</i> ..	GYJW	12.1.54	W. A. Watson ..	R. Ellingham, A. Jeffrey, —, Cuttriss	R. Plantsnget-Dacre	R. S. Dalgleish, Ltd.
<i>Leicestershire</i> ..	GDBL	11.12.53	T. J. A. Thomson	P. W. J. Crossley, J. W. Harwood, J. A. Robinson	F. Abrahams	Anglo-Saxon Petroleum Co., Ltd.
<i>Letchworth</i> ..	MAOV	30.1.54	W. F. Graves ..	T. L. Groves, R. H. Smith, B. Kahill	S. E. Jones ..	Anglo-Saxon Petroleum Co., Ltd.
<i>Linga</i> ..	GLCK	15.3.54	C. J. Hedges ..	R. M. Watt, F. H. Walton, P. Shawyer	T. Peake ..	Union Castle Mail S.S. Co., Ltd.
<i>Lingula</i> ..	GKDT	29.6.53	H. C. L. Phillips ..	R. F. Weller, M. Canning, C. B. Leggett	E. Mathias ..	Commercial Cable Co.
<i>Llangibby Castle</i> ..	GPLV		F. R. Pope, R.D., R.N.R.	A. M. Voss, S. Hagen, C. D. Attwood, W. R. Carr		
<i>Marie Louise Mackay</i> ..	GDNP	23.3.54	T. N. Heap ..	L. P. Dunny, W. D. Harper, L. R. Cook, M. Poyser		

<i>Markab</i>	..	GCVT	11.1.54	C. Christensen	..	F. Wilkins, H. Kurth, N. Velliadis	..	L. Bundoek	..	Phocean Ship Agency, Ltd.
<i>Marna</i>	..	MLPK	12.1.54	L. M. Smith	..	J. Carnie, J. M. Balfour	..	H. Woods	..	Chr. Salvesen & Co.
<i>Meta</i>	..	MPWB	..	A. D. McNab	..	N. Frazer, J. Henderson	..	M. Jones	..	Glen & Co., Ltd.
<i>Mulberry Hill</i>	..	MAKQ	12.12.53	R. S. Rouse	..	P. Sheils, R. Macklay, M. Anderson	..	T. Dunsire	..	Counties Ship Management Co., Ltd.
<i>Nicarua</i>	..	GIGJ	23.3.54	C. D. Michael	..	M. Moore, W. Estill, D. E. Belk	..	R. A. Alexander	..	P. & O. Steam Nav. Co.
<i>Northia</i>	..	GDQK	1.3.54	C. McKellar-Young	..	F. Ruddock, J. G. Wilson	..	J. W. Davis	..	Port Line, Ltd.
<i>Palatia</i>	..	MMBF	30.12.53	I. M. Sinclair	..	A. K. Langley, P. C. Reed, D. C. Barnett, D. L. Smith	..	R. A. Bennett	..	Anglo-Saxon Petroleum Co., Ltd.
<i>Port Dunedin</i>	..	GLCJ	13.11.53	L. W. Cady	..	D. J. Evans, G. Danson, J. V. Burgess	..	D. Humble	..	Anglo-Saxon Petroleum Co., Ltd.
<i>Port Fairy</i>	..	GSTP	4.3.54	C. A. Hodson	..	J. M. Evans, M. Caldwell, R. W. Leslie- Makeig	..	H. Doherty	..	Port Line, Ltd.
<i>Queen Maud</i>	..	MAIM	29.8.53	J. Adam	..	G. Pirie, D. Finlayson, P. Austin	..	O. R. Phillips	..	Thos. Dunlop & Sons, Ltd.
<i>Rembrandt</i>	..	GFPD	12.11.53	B. F. R. Thomas	..	J. Parsloe, J. S. Jackson, D. Brewer	..	J. MacGregor	..	Bolton Steam Shipping Co., Ltd.
<i>Rookwood</i>	..	GFSN	9.3.54	A. Dover	..	A. Broadwith, J. S. Thompson, F. Turnbull	..	A. Corliss	..	Wm. France, Fenwick & Co., Ltd.
<i>Royal Emblem</i>	..	GDSC	25.11.53	W. S. Dunn	..	R. Cooper, R. Storm, A. Cowling	..	H. Moore	..	Hall Bros.
<i>Runa</i>	..	GFSW	..	T. Henry	..	W. Taylor, L. Loose, J. Greenland	..	K. Cotching	..	Clydesdale Shipowners Co., Ltd.
<i>Sitio</i>	..	GSVC	..	S. F. Williams, M.B.E.	..	J. Squire, M. D. Evans, J. Campion	..	T. L. Gibb	..	Ellerman's Wilson Line, Ltd.
<i>Table Bay</i>	..	MFTV	18.2.54	H. Gentles	..	A. Macdonald, J. Parry, H. Hansen	..	H. Hicks	..	Lyle Shipping Co., Ltd.
<i>Tarantia</i>	..	GIGS	2.4.54	R. H. Harris	..	C. Boyle, T. L. Langlands, G. Davidson	..	A. J. Duggan	..	Anchor Line, Ltd.
<i>Thelma</i>	..	MBKK	..	T. A. W. Fairweather	..	J. D. McIntosh, J. McColl, D. Fairweather	..	D. H. Jones	..	Glen & Co., Ltd.
<i>Trelissick</i>	..	GBPR	1.9.53	D. I. Spencer	..	I. K. Lewis, L. J. Annett, I. G. Venables	..	J. F. Forrester	..	Hain Steamship Co., Ltd.
<i>Trevelyan</i>	..	MATE	13.1.54	H. Gravel	..	D. V. Tattoo, E. D. Stewart, M. Marchant	..	A. T. Battye	..	Hain Steamship Co., Ltd.
<i>Trevinice</i>	..	MATH	12.12.53	R. B. Oliver	..	D. K. Ball, E. F. Boyd, E. Sprunks	..	J. Nicoll	..	Hain S.S. Co., Ltd.
<i>Treworlas</i>	..	MATL	19.3.53	W. T. Evans	..	P. M. Sadler, L. Watson, A. Williams	..	W. Davitt	..	Chr. Salvesen & Co.
<i>Tromda</i>	..	MMLX	15.10.51	R. J. Sinclair	..	R. Angus, K. Chow	..	..	..	Ellerman's Wilson Line, Ltd.
<i>Truro</i>	..	GJTQ	..	W. White	..	A. Cameron, A. Gillis, R. Stevenson	..	..	..	Currie Line, Ltd.
<i>Woodland</i>	..	MTCT	17.5.52	R. Borthwick	..	G. R. Dyle, G. W. Cruickshank, J. Morgan	..	..	..	..

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>Amsterdam</i>	MFBP	C. R. Baxter, D.S.C. .. .	British Transport Commission
<i>Angelo</i>	GQFY	S. N. Stokes	Ellerman's Wilson Line, Ltd.
<i>Ariosto</i>	GKPW	W. C. Gill	Ellerman's Wilson Line, Ltd.
<i>Atlantic Coast</i>	GWSY	C. A. Hopkins	Coast Lines, Ltd.
<i>Barra Head</i>	MPOZ	W. Flett	A. F. Henry & MacGregor, Ltd.
<i>Beauly</i>	MLZK	J. McGugan	W. Sloan & Co.
<i>Belravock</i>	MKGV	T. Wallace	London & Edinburgh Shipping Co., Ltd.
<i>Belvina</i>	MLZF	W. Fisher	London & Edinburgh Shipping Co., Ltd.
<i>British Coast</i>	GWQX	R. E. Holt	Coast Lines, Ltd.
<i>British Scout</i>	GJKD	T. S. Rawlingson	British Tanker Co., Ltd.
<i>Brora</i>	MLVY	M. MacIver	William Sloan & Co.
<i>Caledonian Coast</i>	GKXF	J. Webber, M.B.E. .. .	Coast Lines, Ltd.
<i>Cambria</i>	GBKT	N. Lloyd-Williams .. .	British Transport Commission
<i>Cato</i>	GUAK	F. Dudgeon	Bristol Steam Nav. Co., Ltd.
<i>Clupea</i>	GOAJ	J. Jappy	Fishery Board for Scotland
<i>Corfen</i>	GDJX	F. S. Granger	Wm. Cory & Son, Ltd.
<i>Corfleet</i>	GWTD	A. G. Waller	Wm. Cory & Son, Ltd.
<i>Corfoss</i>	MAHX	J. C. Macbeth	Wm. Cory & Son, Ltd.
<i>Cormain</i>	MAHT	J. T. Collin	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	R. B. Armstrong	Wm. Cory & Son, Ltd.
<i>Cormull</i>	MAHS	E. R. W. Allen	Wm. Cory & Son, Ltd.
<i>Corncraze</i>	MJKL	W. S. Dunlop	Moss Hutchison Line, Ltd.
<i>Crane</i>	MMCS	B. Cooney	Moss Hutchison Line, Ltd.
<i>Drake</i>	MMYC	A. Ward	General Steam Nav. Co., Ltd.
<i>Duke of Argyll</i>	GNVX	A. E. Willmott, D.S.C., R.D., R.N.R.	British Transport Commission
<i>Duke of Lancaster</i>	GCPQ	J. Irwin	British Transport Commission
<i>Duke of Rothesay</i>	GNVL	H. Thompson	British Transport Commission
<i>Eildon</i>	MLZL	J. Little	G. Gibson & Co., Ltd.
<i>Empire Cedric</i>	GRSC	W. H. Laws, R.D., R.N.R.	Atlantic Steam Nav. Co., Ltd.
<i>Empire Doric</i>	MAVQ	W. Close	Atlantic Steam Nav. Co., Ltd.
<i>Empire Gaelic</i>	MAVR	H. T. Green	Atlantic Steam Nav. Co., Ltd.
<i>Explorer</i>	MRCZ	G. B. McLaren	Scottish Home Department
<i>Falcon</i>	MNXL	S. W. Develin	General Steam Nav. Co., Ltd.
<i>Golden Dawn</i>	MLZV	Lt. A. Adamson, M.B.E., R.D., R.N.R.	Lt. Adamson, M.B.E.
<i>Great Western</i>	GWRD	D. O. Griffiths	British Transport Commission
<i>Grebe</i>	MAEY	J. S. Lickis	General Steam Nav. Co., Ltd.
<i>Guernsey Coast</i>	MANS	H. Keilit	British Channel Islands Shipping Co., Ltd.
<i>Harrogate</i>	MNDP	W. Laverack	Wilson's & N.E. Railway Shipping Co., Ltd.
<i>Hibernia</i>	MBMT	W. E. Meade	British Transport Commission
<i>Hibernian Coast</i>	GKXC	G. H. Clark, M.B.E. .. .	Coast Lines, Ltd.
<i>Highwood</i>	MLQQ	J. Copeland	High Hook Shipping Co., Ltd.
<i>Horsa</i>	MPFJ	D. Dickson	Currie Line, Ltd.
<i>Isle of Guernsey</i>	GQYJ	F. Breudlay	British Transport Commission
<i>Isle of Jersey</i>	GRBQ	A. Light	British Transport Commission
<i>Isle of Sark</i>	GTSR	G. Pierce	British Transport Commission
<i>Jura</i>	MARU	L. J. Blanche	Admiral Shipping Co., Ltd.
<i>Kinnaird Head</i>	GCSQ	J. Grant	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. D. A. Koster .. .	Royal Air Force
<i>Melrose</i>	MCFD	J. Murray	Geo. Gibson & Co., Ltd.
<i>Melrose Abbey</i>	GSYW	J. Blackburn	Hull & Netherlands S.S. Co., Ltd.
<i>Meta</i>	MPWB	A. D. McNab	Clydesdale Shipowners Co., Ltd.
<i>Milo</i>	GQDP	H. E. Lawson	Bristol Steam Nav. Co., Ltd.
<i>Minna</i>	GKPS	T. Mather	Fishery Board for Scotland
<i>Moray Coast</i>	MKDL	J. Richardson	Coast Lines, Ltd.
<i>Narva</i>	GQFP	R. J. McNinch	Glen & Co. (Scottish Nav. Co., Ltd.)
<i>Ocean Coast</i>	GYMP	G. Mearns	Coast Lines, Ltd.
<i>Pluto</i>	GUAB	G. V. Barnes	Bristol Steam Nav. Co., Ltd.
<i>Peregrine</i>	GIGM	W. Lockhart	General Steam Nav. Co., Ltd.
<i>Princess Maud</i>	GWRT	R. A. H. Lord, D.S.C., R.D., R.N.R.	British Transport Commission
<i>Rattray Head</i>	GCBR	J. Graham	A. F. Henry & MacGregor, Ltd.
<i>Ringdove</i>	GRKK	E. C. Painter, D.S.C. .. .	General Steam Nav. Co., Ltd.
<i>Rora Head</i>	MKVB	A. F. Ramsay	N. of Scotland & Ork. & Shet. S.N. Co., Ltd.
<i>Runa</i>	GFSW	J. Gilfillan	Clydesdale Shipowners Co., Ltd.
<i>St. Clair</i>	MMFX	T. Gifford	N. of Scotland & Ork. & Shet. S.N. Co., Ltd.
<i>St. Clement</i>	GRGM	W. J. Ramsay	N. of Scotland & Ork. & Shet. S.N. Co., Ltd.
<i>St. Helier</i>	GLBT	— Goodchild	British Transport Commission
<i>St. Julian</i>	GLBV	L. J. Richardson	British Transport Commission
<i>St. Magnus</i>	GFYK	W. G. Stout	N. of Scotland & Ork. & Shet. S.N. Co., Ltd.
<i>St. Nisian</i>	GJBB	A. M. Dundas	N. of Scotland & Ork. & Shet. S.N. Co., Ltd.
<i>Selby</i>	MLFT	A. C. Allen	Wilson's & N.E. Railway Shipping Co., Ltd.

Marid Ships—contd.

NAME OF VESSEL	CALL SIGN	CAPTAIN	OWNERS/MANAGERS
<i>Slieve Bawn</i>	MQCC	R. E. Sherwood, D.S.O., R.D., R.N.R.	British Transport Commission
<i>Slieve Bearnagh</i>	MLNL	E. H. Ashton	British Transport Commission
<i>Slieve Bloom</i>	MQDD	W. J. Roberts	British Transport Commission
<i>Slieve League</i>	MQCM	M. V. Simmons	British Transport Commission
<i>Slieve More</i>	MQBM	R. J. Thomas	British Transport Commission
<i>Southern Coast</i>	MASD	G. Goldman	Coast Lines, Ltd.
<i>Teal</i>	GBXC	R. Warren	General Steam Nav. Co., Ltd.
<i>Thelma</i>	MBKK	F. Fairweather	Clydesdale Shipowners Co., Ltd.
<i>Vanellus</i>	GDVW	J. E. Green	British & Continental S.S. Co., Ltd.
<i>Vienna</i>	GTBR	A. Pearson Sutton	Ministry of Transport
<i>Yarmouth Trader</i>	GUAP	R. A. Goodings	Great Yarmouth Shipping Co., Ltd.

Trawlers and North Sea Traders

The following is a list of trawlers and North Sea traders voluntarily observing and reporting those elements of the weather which do not entail the use of any meteorological instruments.

NAME OF SHIP	CALL SIGN	MASTER	OWNERS/MANAGERS
Trawlers:			
<i>Ernest Holt</i>	GFXD	H. J. Aldiss	Ministry of Agriculture and Fisheries
<i>Lammermuir</i>	MFCF	R. Cooke	B. A. Parkes, Ltd.
<i>Lord Middleton</i>	GYTX	J. Penny	Associated Fisheries Trawling Co., Ltd.
<i>Red Hackle</i>	MLCX	E. Littler	Iago Steam Trawler Co., Ltd.
<i>Red Rose</i>	MFMX	J. McKernon	Iago Steam Trawler Co., Ltd.
<i>Robert Hewett</i>	MDYS	G. Elliot	Hewett Fishing Co., Ltd.
<i>St. Alciun</i>	MGCW	J. Dobson	T. Hamling & Co., Ltd.
<i>St. Amant</i>	GFVD	A. Munger	T. Hamling & Co., Ltd.
<i>St. Britwin</i>	MFXJ	J. H. Miller	T. Hamling & Co., Ltd.
<i>St. Elstan</i>	GDDL	G. Argumont	T. Hamling & Co., Ltd.
<i>St. Just</i>	GTWJ	V. A. Buschini	Hewett Fishing Co., Ltd.
<i>St. Nectan</i>	GZJY	E. Moore	T. Hamling & Co., Ltd.
North Sea traders:			
<i>Carlo</i>	GQKL		Ellerman's Wilson Line, Ltd.
<i>Netherlands Coast</i>	MQLK		Tyne-Tees Shipping Co., Ltd.

Lightvessels

The following lightvessels voluntarily observe, record and/or report from coastal waters of Great Britain.

NAME OF VESSEL	MASTERS
<i>Bar</i>	E. E. Abbott, N. S. Burns
<i>Douling</i>	J. R. Audley, S. R. Smith
<i>East Goodwin</i>	L. W. Ling, N. J. Hawkes, W. H. Price
<i>Galloper</i>	S. J. Vincent
<i>Humber</i>	F. I. Butcher, L. A. Brett
<i>Newarp</i>	T. J. Sales, W. J. Rogers, R. J. Middleton
<i>Royal Sovereign</i>	L. Dawson, S. Sharman
<i>St. Gowan</i>	H. G. T. Morgan
<i>Seven Stones</i>	J. H. Cooper, J. Appleby
<i>Shambles</i>	W. C. Moulant, C. H. Duff
<i>Shipwash</i>	G. W. Broom, C. G. Isaac
<i>Skulmartin</i>	D. Hawkins
<i>Smiths Knoll</i>	W. J. Hall, J. W. R. Reeve, B. Hadden

Training Establishments

The following is a list of Training Establishments which submit logbooks, kept by the cadets under training, to the Marine Branch.

ESTABLISHMENT	CAPTAIN/SUPERINTENDENT	LAST RETURN RECEIVED
<i>Conway, H.M.S.</i>	E. Hewitt, R.D., Capt., R.N.R.	30.7.53
<i>Pangbourne Nautical College</i>	H. C. Skinner, O.B.E., Cdr., R.N.	30.1.54
<i>Warsash, School of Navigation</i>	G. W. Wakeford, Capt.	4.3.54
<i>Worcester, H.M.S.</i>	G. C. Steele, V.C., Cdr., R.N. (Retd.)	31.3.54

AUSTRALIA

Voluntary Observing Ships

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

NAME OF VESSEL	OWNERS
Selected Ships:	
<i>Asphalion</i>	Alfred Holt & Co.
<i>Bulolo</i>	Burns Philp & Co., Ltd.
<i>Canara</i>	British India Steam Navigation Co.
<i>Charon</i>	Alfred Holt & Co.
<i>Chupra</i>	British India Steam Navigation Co.
<i>Duntroon</i>	Melbourne Steamship Co., Ltd.
<i>Gorgon</i>	Alfred Holt & Co.
<i>Idomeneus</i>	Alfred Holt & Co.
<i>Koolinda</i>	Western Australian State Steamships
<i>Koomilya</i>	McIlwraith McEacheron, Ltd.
<i>Koorawatha</i>	McIlwraith McEacheron, Ltd.
<i>Kooringa</i>	McIlwraith McEacheron, Ltd.
<i>Lowana</i>	Melbourne Steamship Co., Ltd.
<i>Malaita</i>	Burns Philp & Co., Ltd.
<i>Malekula</i>	Burns Philp & Co., Ltd.
<i>Nellore</i>	Eastern and Australian Steamship Co., Ltd.
<i>Orestes</i>	Alfred Holt & Co.
<i>Triadic</i>	British Phosphate Commission
<i>Trienza</i>	British Phosphate Commission
<i>Triona</i>	British Phosphate Commission
<i>Wanganella</i>	Huddart Parker & Co., Ltd.
<i>Westralia</i>	Huddart Parker & Co., Ltd.
Supplementary Ship:	
<i>Kabbarli</i>	Western Australian State Steamships

CANADA

Voluntary Observing Ships

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

NAME OF VESSEL	CALL SIGN	OWNERS
Atlantic list:		
<i>Beaverbrae</i>	VCPQ	Canadian Pacific Steamships, Ltd.
<i>Canadian Challenger</i>	VGSK	Canadian National Steamship Co., Ltd.
<i>Canadian Constructor</i>	VGBY	Canadian National Steamship Co., Ltd.
<i>Canadian Cruiser</i>	VGPZ	Canadian National Steamship Co., Ltd.
<i>Cyrus Field</i>	GKQC	Western Union Cable Depot
<i>Eso Knoxville</i>	HPTK	Imperial Oil Shipping Co.
<i>Fort Avalon</i>	MBMC	Furness Withy & Co.
<i>Fort Hamilton</i>	GCSS	Furness Withy & Co.
<i>Imperial Alberta</i>	VGSF	Imperial Oil Shipping Co., Ltd.
<i>Imperial Charlottetown</i>	VDWC	Imperial Oil Shipping Co., Ltd.
<i>Imperial Edmonton</i>	VGSJ	Imperial Oil Shipping Co., Ltd.
<i>Imperial Fredericton</i>	VDWB	Imperial Oil Shipping Co., Ltd.
<i>Imperial Toronto</i>	VGSJ	Imperial Oil Shipping Co., Ltd.
<i>Lord Kelvin</i>	GDMN	Western Union Cable Depot
<i>Paloma Hills</i>	VGGX	Shell Canadian Tankers, Ltd.
<i>Pinnacles</i>	VGGZ	Shell Canadian Tankers, Ltd.
<i>Rincon Hills</i>	VGGY	Shell Canadian Tankers, Ltd.
<i>Rupert Island</i>	VDXX	Hudson's Bay Co.
Pacific list:		
<i>Fort Hearne</i>	VCGX	Hudson's Bay Co.
<i>Lake Kootenay</i>	VDZY	Western Canada S.S. Co.
<i>Lakemba</i>	VPKV	B.C. Ship Chartering Co.
<i>Lakonia</i>	GCDB	Balfour Guthrie, Ltd.
<i>Lake Minnewanka</i>	VCNC	Western Canada S.S. Co.
<i>Maplecove</i>	GNLX	Canadian Pacific S.S. Co.
<i>Mapledell</i>	GBBS	Canadian Pacific S.S. Co.
<i>Mosset Bay</i>	GKCB	Western Canada S.S. Co.
<i>Waihemo</i>	ZMJO	Canadian Australasian Line
<i>Waikawa</i>	ZMHU	Canadian Australasian Line
<i>Wairuna</i>	ZMMQ	Canadian Australasian Line
<i>Waitomo</i>	ZMKO	Canadian Australasian Line
Lightships:		
<i>Lurcher</i>		Minister of Transport
<i>Sambro</i>		Minister of Transport

BERMUDA

Voluntary Observing Ships

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

NAME OF VESSEL	CALL SIGN	OWNERS
<i>Queen of Bermuda</i>	GZKF	Furness, Withy & Co., Ltd.
<i>Ocean Monarch</i>	GJXD	Furness, Withy & Co., Ltd.

INDIA

Voluntary Observing Ships

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

NAME OF VESSEL	OWNERS/AGENTS
Selected Ships:	
<i>Alavi</i>	The Mogul Line, Ltd.
<i>Bahadur</i>	Asiatic Steam Navigation Co., Ltd.
<i>Dara</i>	British India Steam Navigation Co., Ltd.
<i>Daressu</i>	British India Steam Navigation Co., Ltd.
<i>Dumra</i>	British India Steam Navigation Co., Ltd.
<i>Dwarka</i>	British India Steam Navigation Co., Ltd.
<i>Havildar</i>	Asiatic Steam Navigation Co., Ltd.
<i>Indian Exporter</i>	India Steamship Co., Ltd.
<i>Indian Merchant</i>	India Steamship Co., Ltd.
<i>Indian Pioneer</i>	India Steamship Co., Ltd.
<i>Indian Trader</i>	India Steamship Co., Ltd.
<i>Islami</i>	The Mogul Line, Ltd.
<i>Jalazad</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalduta</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalaganga</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalajawahar</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalaketu</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalakrishna</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalakirti</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalamanjari</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalamani</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalaprakash</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalayamuna</i>	Scindia Steam Navigation Co., Ltd.
<i>Jehangir</i>	The Mogul Line, Ltd.
<i>Kampala</i>	British India Steam Navigation Co., Ltd.
<i>Karanja</i>	British India Steam Navigation Co., Ltd.
<i>Mahadevi</i>	Asiatic Steam Navigation Co., Ltd.
<i>Maharaja</i>	Asiatic Steam Navigation Co., Ltd.
<i>Mozaffari</i>	The Mogul Line, Ltd.
<i>Nadir</i>	Asiatic Steam Navigation Co., Ltd.
<i>Nurani</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>State of Saurashtra</i>	Scindia Steam Navigation Co., Ltd.
(Bombay)	
<i>Subadar</i>	Asiatic Steam Navigation Co., Ltd.
<i>Umaria</i>	British India Steam Navigation Co., Ltd.
<i>Warla</i>	British India Steam Navigation Co., Ltd.
Supplementary Ships:	
<i>Amra</i>	British India Steam Navigation Co., Ltd.
<i>Badarpur</i>	Burmah Oil Co., Ltd.
<i>Bharatjal</i>	Bharat Line, Ltd.
<i>Bharatmata</i>	Bharat Line, Ltd.
<i>Bharatmitra</i>	Bharat Line, Ltd.
<i>Bharatnara</i>	Bharat Line, Ltd.
<i>Bharatrani</i>	Bharat Line, Ltd.
<i>Bharatveer</i>	Bharat Line, Ltd.
<i>Indian Commerce</i>	India Steamship Co., Ltd.
<i>Indian Importer</i>	India Steamship Co., 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>Jalakendra</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalamayur</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalarajendra</i>	Scindia Steam Navigation Co., Ltd.
<i>Jalaratna</i>	Scindia Steam Navigation Co., Ltd.
<i>Malika</i>	Asiatic Steam Navigation Co., Ltd.
<i>Risaldar</i>	Asiatic Steam Navigation Co., Ltd.
<i>Rizwani</i>	The Mogul Line, Ltd.
<i>State of Andhra</i>	Scindia Steam Navigation Co., Ltd.

NEW ZEALAND

Voluntary Observing Ships

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

NAME OF VESSEL	OWNERS
Selected Ships:	
<i>Kauri</i>	Union Steam Ship Company of New Zealand, Ltd.
<i>Karitane</i>	Union Steam Ship Company of New Zealand, Ltd.
<i>Kaimanawa</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>Kawatiri</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>Kowhai</i>	Union Steam Ship Company of New Zealand, Ltd.
<i>Kurou</i>	Union Steam Ship Company of New Zealand, Ltd.
<i>Kurutai</i>	Union Steam Ship Company of New Zealand, Ltd.
<i>Matua</i>	Union Steam Ship Company of New Zealand, Ltd.
<i>Mau Pomare</i>	New Zealand Government
<i>Monowai</i>	Union Steam Ship Company of New Zealand, Ltd.
<i>Tofua</i>	Union Steam Ship Company of New Zealand, Ltd.
<i>Waimate</i>	Union Steam Ship Company of New Zealand, Ltd.
<i>Waimea</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>Waitemata</i>	Union Steam Ship Company of New Zealand, Ltd.
Supplementary Ships:	
<i>Kaipoi</i>	Union Steam Ship Company of New Zealand, Ltd.
<i>Kairanga</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>Katui</i>	Union Steam Ship Company of New Zealand, Ltd.
<i>Komui</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>Vasu</i>	Tasman Steam Ship Company of New Zealand, Ltd.
<i>Viti</i>	Tasman Steam Ship Company of New Zealand, Ltd.
<i>Waiana</i>	Union Steam Ship Company of New Zealand, Ltd.

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 OPERATOR
<i>Anking</i>	J. McKinlay	A. J. Keddie, L. W. Rothwell, J. Dawson	D. E. Tavares	China Navigation Co., Ltd.
<i>Anshun</i>	A. Naismith	A. V. Harrison, D. L. Wilson, J. A. McDonald	Pang Ting Yee	China Navigation Co., Ltd.
<i>Castle Peak</i>	W. J. Lang	J. S. Clarke, Yuan King Lau, Jo Tai Chang	Kwok Shek Hee	Mollers Ltd.
<i>Changsha</i>	F. N. Booth	S. R. Woolfe, A. W. K. Prosser, I. F. Robertson	T. W. Pomeroy	China Navigation Co., Ltd.
<i>Choy Sang</i>	D. G. R. Kinneer	P. G. Harkness, M. J. Pope, M. Tonner	J. D. Clutton	Indo-China Steam Navigation Co., Ltd.
<i>Chun Sang</i>	L. C. Cox	R. K. Learoyd, C. M. Gibbs, G. C. Taylor	D. J. O'Moore	Indo-China Steam Navigation Co., Ltd.
<i>Eastern Glory</i>	H. J. Cairns	T. J. Ashcroft, P. J. Sullivan, I. D. Patterson, A. S. Affleck	A. C. Martin	Indo-China Steam Navigation Co., Ltd.
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SOUTH AFRICA

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

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<i>Africana II</i> ..	R. L. V. Shannon, O.B.E. ..	M. Williams, G. P. Brand, R. J. Shipp ..		Division of Fisheries, Cape Town
<i>Aloe</i> ..	S. S. Edwards ..	A. A. Ruckbie ..		South African Railways Ships, Cape Town
<i>F. T. Bates</i> ..	R. W. Watson ..	I. S. McKean, G. R. Davies, D. W. R. Reeve ..	D. Wittridge ..	South African Railways & Harbours
<i>Benin</i> ..	T. E. M. Jenkins ..	D. Powell, A. D. Forster, A. Bluet, P. Jackson ..	A. Briggs ..	Elder Dempster Lines
<i>Constantia</i> ..	A. C. Thomas ..	S. J. Hurst, P. Carrington, S. H. Damp ..	J. Fluittman ..	South African Marine Corporation, Cape Town
<i>Dalka</i> ..	E. N. Stewart ..			South African Railways Ships, Johannesburg
<i>Gilia</i> ..	J. Lundberg, M.B.E. ..	E. Ladbroke, R. G. Addinall, I. Mackintosh ..	P. Soper ..	Irving & Johnson, Ltd., Cape Town
<i>Kaapland</i> ..	P. F. M. Buchholtz ..	M. A. Hoffman ..		South Africa Lines, Cape Town
<i>Mashona Coast</i> ..	L. Coltham ..	P. I. Le Marchand, G. B. Perkins ..		Thesen's Steamship Co., Cape Town
<i>Matabele Coast</i> ..	E. Hale ..	A. Pearson, F. D. Ligget, C. Etherington ..	G. Adey ..	Thesen's Steamship Co., Cape Town
<i>Morgenster</i> ..	D. W. Thorpe ..	P. Sharp, W. Storm, R. Underwood ..	H. A. Pypers ..	South African Marine Corporation, Cape Town
<i>Noordewal</i> ..	D. C. Wallwork ..	G. P. Stevens ..		Van Riebeck Lines, Cape Town
<i>Ouambo Coast</i> ..	P. Bolm ..	J. Van der Veer ..	S. P. Garnett ..	Thesen's Steamship Co., Cape Town
<i>Tristania</i> ..	O. Mohr ..	H. Poulton, D. H. Harris, K. Macnish ..	L. Stanley ..	Tristan Development Co., Cape Town
<i>Verlegen</i> ..	F. Horneyman ..			South African Marine Corporation, Cape Town
South African Nautical College	G. V. Legassick, D.S.C., R.D., Capt. R.N.R. ..			
General Botha Naval Gymnasium, Saldanha Bay	Lt.-Cdr. P. Selk ..			

MALAYA
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<i>Katong</i>	W. Bradshaw	D. J. Evans	K. P. Quinn	Straits Steamship Co., Ltd.
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